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Temporal Construal Effects on Abstract and Concrete Thinking: Consequences for Insight and Creative Cognition

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Six studies investigate whether and how distant future time perspective facilitates abstract thinking and impedes concrete thinking by altering the level at which mental representations are construed. In Experiments 1–3, participants who envisioned their lives and imagined themselves engaging in a task 1 year later as opposed to the next day subsequently performed better on a series of insight tasks. In Experiments 4 and 5 a distal perspective was found to improve creative generation of abstract solutions. Moreover, Experiment 5 demonstrated a similar effect with temporal distance manipulated indirectly, by making participants imagine their lives in general a year from now versus tomorrow prior to performance. In Experiment 6, distant time perspective undermined rather than enhanced analytical problem solving.

Insight and creativity have commonly been thought of as personality traits (see, e.g., Eysenck, 1993; Simonton, 1991). However, over the past several years, social psychologists have also identified a range of situational factors that significantly influence insight and creativity, suggesting that they vary within as well as between individuals and that they are very much responsive to the social context. For example, in conditions of situationally induced positive mood, individuals have been found to demonstrate increased creativity relative to those in a neutral mood (e.g., Isen, Daubman, & Nowicki, 1987; Murray, Sujan, Hirt, & Sujan, 1990; see also, Clore, Schwarz, & Conway, 1994; Hirt, McDonald, & Melton, 1996; for reviews, see Isen, 2000; Wyer, Clore, & Isbell, 1999). In our own work, we have shown that even subtle cues associated with approach motivation, such as bodily postures typically enacted during consumption, enhance both insight and creative generation compared with cues associated with avoidance motivation (Friedman & Förster, 2000, 2002). Likewise, an extensive program of research conducted by Amabile and her colleagues (see Amabile, 1996, for a review) has shown how creativity is undermined by the provision of extrinsic rewards and the expectation of social evaluation. Building on these earlier lines of inquiry, in the following studies, we investigate whether a hitherto unexplored situational variable, temporal perspective (Liberman & Trope, 1998; Trope & Liberman, 2003), might also influence insight and aspects of creative cognition. We begin by summarizing recent theory and research on temporal construal before turning to a discussion of how it may impact creativity.

Construal Level Theory

Construal level theory (CLT; Liberman & Trope, 1998; for a review, see Trope & Liberman, 2003) proposes that temporal distance, defined as the perceived proximity of an event in time, changes people's responses to future events by altering their mental representations of those events. The greater the temporal distance, the more likely events are to be represented in terms of more abstract, general, and decontextualized features that convey the perceived essence of the events (high-level construals) rather than in terms of more concrete, contextual, and incidental details of the events (low-level construals). To illustrate: a person thinking about a conference a year from now might think about it in terms of more superordinate goals, such as "learning about new research," whereas a person thinking about a conference that takes place tomorrow might be construing it in terms of more subordinate and concrete goals, such as "ironing one's pants."

Liberman and Trope (Liberman, Sagristano, & Trope, 2002; Liberman & Trope, 1998; see Trope & Liberman, 2003, for a review) suggested that the tendency to construe near future events concretely and distant future events abstractly or in holistic terms

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evolved as a generalized heuristic as a result of differences in what people typically know and do about near and distant future situations. Specifically, in everyday life, details about concrete, secondary aspects of future events—including the context in which they occur—and alternative scenarios and courses of action become available only as the events draw closer in time. An association may thus be formed between temporal distance and level of construal. This association may be overgeneralized, causing people to continue using high-level construals when thinking about distant future events and low-level construals when thinking about near future events, even when the information about the near future and distant future events is the same.

In an extensive research program, Liberman and Trope (Liberman & Trope, 1998; Nussbaum, Trope & Liberman, 2003) have adduced ample evidence for their general notion. To illustrate: in one of their studies (Liberman & Trope, 1998, Study 1, Part 1), participants imagined themselves engaging in various activities (e.g., reading a science fiction book, taking an exam) either "tomorrow" or "next year" and described these activities. The analysis of the content of these descriptions was based on the assumption that superordinate, high-level descriptions of an activity fit the structure "[description] by [activity]," whereas subordinate, low-level descriptions fit the structure "[activity] by [description]" (Hampson, John, & Goldberg, 1986). For example, a description of the activity "reading a science fiction book" as "broadening my horizons" fits the first structure ("I broaden my horizons by reading a science fiction book"). Therefore, this description was classified as a high-level construal of the activity. In contrast, the description "flipping pages" fits the second structure ("I read a science fiction book by flipping pages") and thus constitutes a low-level construal of the activity. Consistent with CLT, it was found that participants used more high-level (i.e., abstract) descriptions in the distant future condition compared with the near future condition and that the reverse was true for low-level descriptions.

This study was replicated with an adapted version of Vallacher and Wegner's (1989) Level of Personal Agency Questionnaire, which was originally designed to assess stable individual differences in action identification (Liberman & Trope, 1998, Study 1, Part 2). The questionnaire presented a list of activities, each followed by two statements, one corresponding to the "why" (high-level) aspects of the activity and the other to the "how" (low-level) aspects of the activity. For example, "locking a door" was followed by a choice between the alternative statements "putting a key in the lock" and "securing the house." Participants were asked to choose which alternative description best characterized the activity. Temporal perspective was manipulated by adding a time indicator to each activity, either "tomorrow" or "sometime next year." As predicted by CLT, participants chose significantly more high-level "why" statements in the distant future condition than in the near future condition. The results of these studies support the hypothesis that individuals use terms on a higher level of abstraction to describe distant future activities than near future activities.

More recently, it has been shown also that temporal distance affects the breadth of object categorization. For instance, in one study (Nussbaum et al., 2003, Study 1) participants were asked to imagine an event (e.g., a camping trip, a yard sale, a visit to New York City) either in the upcoming weekend or a weekend a few months later and to classify 38 objects related to the event (e.g., in the case of a camping trip: tent, toothbrush, flashlight) into as many mutually exclusive and exhaustive groups as they deemed appropriate. As a dependent measure, the authors tallied the number of groups into which participants classified the objects. The results showed that participants used fewer (i.e., broader) categories when they imagined the event occurring in the more distant future.

Along similar lines, Nussbaum et al. (2003) have applied the logic of CLT to social categorization processes. The distinction between concrete and abstract construals of behavior has been of central importance in person perception research (Gilbert & Malone, 1995; Heider, 1958; Jones & Davis, 1965; Trope, 1986). Perceivers use the same behavioral information to draw inferences at different levels of abstraction (Trope, 1989; Trope & Liberman, 1993). Global trait concepts (e.g., extraversion, emotional stability) refer to more general, decontextualized characteristics that are invariant across different situations. In terms of CLT, inferences of global traits constitute relatively high-level construals of behavior, whereas inferences of situation-specific states constitute relatively low-level construals of behavior. Therefore, global traits should receive more weight and situation-specific states should receive less weight in predicting others' behavior in a distant future situation than in a near future situation. Nussbaum et al. (2003) showed that people are more likely to attribute more distant behavior to abstract traits versus concrete situations, suggesting that temporal distance affords more abstract reasoning.

These findings suggest that distant future perspective promotes abstract and general object representations, whereas near future perspective promotes relatively concrete and specific object representations. Thus, the process of abstraction from the concrete seems to be facilitated by distant time perspective. Building on this work, we suggest a model predicting how temporal-distance-based variations in the level of mental representation may influence insight and aspects of creative thought.

Temporal Perspective: Influences on Insight and Creativity

Creativity has been held to profit from abstract thinking (see, e.g., Finke, 1995; Ward, 1995), and a variety of creativity tasks may be readily understood as benefiting from more abstract construals of problem components. For instance, creativity on alternative uses tests (e.g., generating reasons for why to greet somebody; Friedman & Förster, 2002; Schoppe, 1975) should be enhanced by construing the target object at issue (e.g., greeting) on a higher level of abstraction. To follow the example, thinking of greeting in relatively abstract terms as a "way to socialize" or a "gesture of communication" might lead to more diverse and original solutions than thinking of it as "waving the hand" or "saying hello." Therefore, whereas the former might lead to solutions that are more remote and diverse from the actual object, the latter might render common associates overaccessible, impeding innovation (see Marsh, Ward, & Landau, 1999). Extrapolating from this logic, abstract construal of problem elements may be particularly beneficial for creativity when individuals are required to generate relatively abstract solutions (e.g., creative reasons for *why* to greet somebody, as opposed to creative ways of *how* to greet somebody).

Performance on tasks gauging insight might similarly profit from abstract construals of problem elements. For instance, consider the "classic" insight problem that follows:

> A prisoner was attempting to escape from a tower. He found a rope in his cell that was half as long enough to permit him to reach the ground safely. He divided the rope in half, tied the two parts together, and escaped. How could he have done this? [Solution: He unraveled the rope lengthwise and tied the remaining strands together.]

Solving this problem might be facilitated by abstractly conceiving of the problem as "finding a way down the tower" as opposed to conceiving of it more concretely as "tying the ropes together."

Given that creativity is enhanced by abstract representation of problem elements and that, as discussed earlier, distant time perspective of events engenders a tendency toward abstract representation, it is possible that distant time perspective may enhance both insight and creative thought. Specifically, we propose that merely thinking about the distant, as opposed to the near, future in considering an event elicits a tendency toward abstract mental representation that may be beneficially applied (even without intention or awareness) to subsequent creativity tasks.

Essentially, we are proposing that distant future temporal perspective elicits what Schooler (2002; Schooler, Fiore, & Brandimonte, 1997) has termed a "processing shift," a phenomenon in which cognitive procedures activated in the course of engaging in one task remain active so that they are carried over or "transferred" to subsequent tasks. "Transfer-appropriate" processing shifts are said to result when the residually activated procedures are beneficial for subsequent processing, whereas "transfer-inappropriate" shifts are said to result when the procedures at hand impair subsequent processing. In the present case, we posit that distant future-oriented cognition activates general processes of representational abstraction that facilitate subsequent attempts at insight problem solving and creative generation. In other words, we predict that distant future time perspective elicits a transfer-appropriate processing shift with respect to insight and creativity.

Of course, this line of reasoning raises the inevitable question, under what conditions, if any, does distant future time perspective engender transfer-inappropriate processing shifts, undermining task performance? Simply enough, we believe that in cases in which concrete, low-level representation is beneficial for performance, distant future time perspective should yield an inhibitory influence relative to near future time perspective. One such case could be analytical problem solving, which heavily relies on the availability of and adherence to concrete algorithms and problem representations.

Overview of the Experiments

In the present study, we tested these hypotheses by manipulating distant versus near future time perspective, then gauging performance on a variety of tasks posited to assess insight (Experiments 1–3), creative generation (Experiments 4 and 5), and analytical problem solving (Experiment 6). We aimed to investigate temporal distance effects on a multitude of diverse measures, all capturing certain aspects of the problem-solving process. In Experiment 1, we tested three classic insight problems, including the example quoted in the introduction (see Metcalfe & Wiebe, 1987; Schooler, Ohlsson, & Brooks, 1993, Appendix A, Problems 1–3). Following Schooler et al. (1993), these problems may be understood as (a) ultimately soluble by the average problem solver; (b) likely to produce an impasse, a state of high uncertainty as to how to proceed, during the course of solution; and (c) likely to produce an "aha" experience, a state in which impasse is suddenly overcome and the solution (or solution path; Ohlsson, 1984) is suddenly discovered after prolonged efforts at solution. In Experiment 2, we administered the Snowy Pictures Task (SPT; Ekstrom, French, Harman, & Dermen, 1976), presenting participants with a series of images of simple objects hidden within complex patterns of visual noise. Participants view these images sequentially, attempting to perceptually disembed and name the obscured objects they contain. This task, which we have previously used to gauge "breaking context induced mental set," a process historically accorded a central role in creative cognition (Friedman & Förster, 2000; Experiment 2; see Schooler & Melcher, 1995), may essentially be seen as a test of *visual* insight inasmuch as it meets the three formal characteristics of creative insight problems proposed: Each component item is soluble, produces a state of uncertainty regarding how to proceed, and is likely to produce a metacognitive "aha" experience when the impasse is suddenly overcome. Likewise, in Experiment 3, another visual insight task, the Gestalt Completion Test (GCT; Ekstrom et al., 1976; see Friedman & Förster, 2000, Experiments 3 and 4) was used. In this task, participants view a series of fragmented pictures of familiar objects and attempt to perceptually integrate and recognize them, that is, to "close" each "Gestalt." This task may also be seen as requiring visual insight inasmuch as each item is ultimately soluble by the average problem solver and is likely to produce an impasse that may be suddenly overcome after continued efforts at solution (see Schooler et al., 1993). In contrast to the SPT, the GCT task is traditionally used to measure restructuring of a stimulus set so that a new representation emerges (Schooler & Melcher, 1995), a basic process presumably involved in a multitude of creativity tasks. In Experiments 4 and 5, we tested creative generation tasks that tap into various processes of creative thought and represent more face-valid measures of creativity (see Friedman & Förster, 2002). Importantly, we argue that not all aspects of creative generation are based on abstract thinking. For instance, if people have to find concrete ways for "how" to greet someone, less abstract thinking might be involved than if they had to generate reasons "why" to greet a person. Thus, in Experiment 4, we asked half of our participants to generate creative reasons for why to greet someone and the other half to invent creative ways of how to greet someone. As a conceptual replication, in Experiment 5 we changed the demands on abstractness of the task by asking participants to help the protagonist of a story to find creative ways of how to water plants versus to improve her room. On the basis of previous research on abstract versus concrete thinking, we reasoned that the former task would entail more concrete representation, whereas the latter would be represented more abstractly (Vallacher & Wegner, 1989). Finally, in Experiment 6, we administered an analytical reasoning task that should not profit from distant time perspective. This was meant to rule out the alternative explanation that distant time perspective simply increases motivation to work on any task (see Friedman & Förster, 2000).

To manipulate temporal perspective, in all experiments (except Experiment 4), we asked participants to imagine their lives tomorrow (near future perspective) or on a day 1 year from now (distant

future perspective) and then, in all but one experiment (Experiment 5), instructed them to imagine working on the experimental task on that forthcoming day. This manipulation is particularly potent inasmuch as it is directly related to the task at hand. However, a processing-shift assumption would predict an influence of time construal on creative generation even if the time perspective manipulation made no reference to the creativity tasks to be completed in the session. Therefore, Experiment 5 provides the most critical test for the assumed processing shift, in which participants were simply asked to imagine their lives tomorrow or a year from now and then administered an unrelated creativity task.

Again, we predicted that distant, relative to near, future time perspective would bolster performance across multiple indexes of creative generation and insight, whereas it would, if anything, impair analytical problem solving.

Experiment 1

In this experiment, we examined whether insight problem solving benefits from temporal perspective-based processing shifts. Participants were asked to imagine their lives a year from now (or tomorrow) and then to imagine working on a subsequent (insight) task a year from now (or tomorrow). It was predicted that performance on this task would profit from distant temporal perspective.

Method

Participants. Thirty-five (18 female, 17 male) 1st-year undergraduates at International University Bremen (IUB; Bremen, Germany) majoring in different disciplines were recruited from their first lecture in a seminar in social psychology to participate in a brief study on creativity. Participants were from 21 different nations. Cheating was prevented by careful seating arrangements. The experiment was conducted in English, and participants were randomly assigned to the conditions. There were no gender effects in any results reported subsequently.

Procedure. Participants were asked to participate in a brief study on "imagination and intellectual performance." Note that in this experiment, neither insight nor creativity was explicitly mentioned in the cover story. In their questionnaire booklets, participants were first asked to take 5 min to imagine performing the intellectual task a year from now (distant future time perspective) or tomorrow (near future time perspective), depending on their assigned experimental condition. The task was described briefly with a short example. Afterward, because it has been shown that mood influences insight and creativity (e.g., Isen, Daubman, & Nowicki, 1987), they were asked to complete a questionnaire containing control measures of current mood ("How do you feel right now?") on a Likert scale ranging from 1 (*very bad*) to 9 (*very good*). Furthermore, as expectancy and value of the task could have been influenced by time construal as well (see Liberman & Trope, 1998), expectations regarding task performance ("How well will you perform on the following task?"), anchored at 1 (*very poorly*) and 9 (*very well*), and liking of the task ("How much would you like to solve the following task right now?"), anchored on a scale from 1 (*not at all*) to 9 (*very much*), were additionally assessed.

On completion, the experimenter administered three classic insight problems, including the example quoted in the introduction (see Appendix). Participants were given 2 min to solve each problem. All tasks were timed with a stopwatch by the experimenter. Afterward, current mood was checked again, and difficulty of the imagination task ("How difficult was it to imagine doing the task tomorrow/a year from now?") was assessed on a scale anchored at 1 (*not difficult at all*) and 9 (*very difficult*). We included those questions to explore experienced difficulty as a possible mediator for the effect—it might be that imagining doing a task a year from now is more difficult than imagining doing it tomorrow. This difference could increase or undermine motivation to work on the task.

Participants were then debriefed and a class on "creativity in context" based on the discussion of the experiment followed. No participants voiced any suspicions regarding the connection between the imagination task and the insight measures.

Results and Discussion

Performance on insight problems. We calculated insight problem-solving scores by summing the number of problems solved (out of the three presented). As predicted, participants in the distant future condition solved more problems ($M = 1.28$, $SD = 1.18$) than participants in the near future condition ($M = 0.35$, $SD = 0.70$), $t(33) = 2.80$, $p < .01$.

Mood, liking, expectancies, and difficulty. We conducted several *t* tests with each of the self-report measures, which showed no differences between the experimental groups, with the single exception of experienced task difficulty. Participants reported more difficulty solving the task when they imagined doing it the next day ($M = 6.35$, $SD = 1.66$) than when they imagined doing it a year from now ($M = 4.56$, $SD = 2.53$), $t(33) = 2.47$; $p < .02$. However, when difficulty was entered as a covariate in an analysis of variance (ANOVA) predicting the number of correct solutions from the experimental manipulation, the effect of time perspective remained equally reliable, suggesting that experienced difficulty did not mediate the effect.

In sum, the ability to solve insight problems was facilitated when participants imagined doing the task a year from now (distant future time perspective) compared with imagining doing it tomorrow (near future time perspective). This effect was not mediated by mood, expectancies of success, task liking, or subjective task difficulty. The present findings therefore provide initial evidence that distant future time perspective elicits a processing shift toward abstract thought, which bolsters subsequent efforts at insight problem solving.

In the next experiment, we replicated Experiment 1 with a visual, as opposed to a verbal, insight task: the SPT. In this task, participants mentally extract images of familiar objects (e.g., a bird) from intricate patterns of visual noise or "snow" (see Friedman & Förster, 2000, 2002). Like verbal insight problems, SPT problems often produce an impasse during solution in which participants do not know how to proceed. This impasse may be suddenly resolved, and the solution or solution path discovered, with continued effort (Schooler & Melcher, 1995; Schooler et al., 1993). As alluded to by Ekstrom et al. (1976), while working on the SPT and other tasks of this type, individuals may initially test preliminary hypotheses as to the identity of the object obscured by the visual noise. These efforts at testing concrete hypotheses may impede perceiving the image more holistically and thereby disrupt the perceptual processes required for solution. In other words, construing the image more abstractly (e.g., as "a bunch of lines and dots") instead of adding concrete meaning to the images (e.g., trying to see if it is a dog or a fire engine) may help overcome the tendency to impose misleading initial interpretations on a given image and, in so doing, aid in finding the hidden figure. As such, by increasing the likelihood that images would be processed abstractly, distant future time perspective was predicted to bolster performance on the SPT.

Beyond adding a new measure of insight, in Experiment 2 we also added a control group in which participants simply completed the task without first imagining doing so the next day or a year hence. We predicted no differences between the control and the near future group because we reasoned that construals for "tomorrow" compared with "today" would not differ appreciably in terms of concreteness. If this were to bear out empirically, it would support our contention that the effects found in the first two experiments were driven by the facilitative influence of distant future time perspective as opposed to the inhibitory influence of near future time perspective.

Experiment 2

Method

Participants. Forty-two (18 male and 24 female) university undergraduates and high school students from the Bremen area majoring in disciplines other than psychology were recruited for a study on several issues, including "perception and concentration." The experiment was conducted at IUB. Participants worked individually in 2-hr sessions and received 14 Euros for their participation. Gender had no effect on the analyses below and is not discussed further.

Procedure. On arrival, participants were asked to work on a number of unrelated tasks. They received a packet, which they worked on for 20 min. Embedded within this packet was the manipulation of time construal, directly followed by the SPT. One third of the participants were randomly assigned packets containing the distant future version, another third were assigned to the near future version. The manipulation consisted of a task in which participants were asked to imagine solving the subsequent task either tomorrow or a year from now. Specifically, they were asked to imagine in some detail the respective day, as well as their life in general, for a period of 5 min. They were also asked to imagine solving the following task during that day. The SPT task was described as "several puzzles" in which it would be important to solve as many problems as possible within a given time. They were told the task measured "important aspects of personality" and one example of a snowy picture was given. The third group of participants, the control group did not complete the time construal task before the SDT task. The SPT task contained 12 pictures, and participants were allowed to work on it for 3 min, timed by experimenters who were blind to both the condition and hypothesis. Before they worked on the tasks, we again measured mood, expectations of solving the task, and liking of the task, and we rechecked mood following the SPT section, adding a measure gauging difficulty in imagining the situation (see Experiment 1).

After completing the survey packet, participants were probed for suspicion, debriefed, paid, and released. No suspicions were raised regarding the connection between the temporal construal manipulation and the SPT.

Results and Discussion

SPT insight scores. We computed SPT insight scores by adding the number of embedded images (out of 12) correctly identified. To assess the experimental hypothesis that distant time perspective enhances SPT performance relative to near time perspective, we conducted a one-way ANOVA comparing the total number of correct solutions offered in the distant, near, and control conditions, respectively. Consistent with our prediction, participants in the distant future condition correctly solved significantly more SPT items ($M = 7.86$, $SD = 2.35$) than did those in the near future condition ($M = 5.93$, $SD = 5.93$) and in the control condition ($M = 5.93$, $SD = 1.07$), $F(2, 39) = 4.85$, $p < .02$. Contrast analyses revealed that the distant future group differed from both the near future condition, $t(39) = 2.70$, $p < .02$, and the control condition, $t(39) = 2.70$, $p < .02$, which did not differ from each other ($t < 1$), as predicted.

Mood, liking, expectancies, and difficulty. We conducted several one-way ANOVAs with each of the self-report measures. These analyses reflected no significant differences attributable to our manipulation. Thus, mood, liking of the task, expectancy to succeed, and difficulty of the task did not appear to mediate our results.

To sum up, Experiment 2 provided additional evidence for a facilitative effect of future time perspective on insight problem solving. Again, this effect was not mediated by motivational or mood variables. In the next experiment, we used a different measure of perceptual insight: the GCT. Whereas the SPT is supposed to measure one classic component of creativity, "breaking context induced mental set" (e.g., entailing disregarding misleading interpretations, unwarranted assumptions, and inappropriate strategies rendered overaccessible by the context of the problem), the GCT is a classic measure of "restructuring" a stimulus set (e.g., entailing globally shifting perspective or reencoding stimuli so that a novel representation of the given problem emerges; see Schooler & Melcher, 1995). It was assumed that distant time perspective enhances solving these problems because it facilitates abstracting information from given facts (Trope & Liberman, 1993).

Experiment 3

Method

Participants. Forty-five (26 female, 19 male) German university undergraduates and high school students from the Bremen area majoring in disciplines other than psychology were recruited for a study on several issues, including "perception and concentration." The experiment was conducted at IUB. Participants worked individually in 2-hr sessions and received 14 Euros for their participation. When groups (of up to 3 participants) were tested in the same room, we ensured that the individuals could not see each other. Three participants had to be excluded from the analyses, 2 because of experimenter error and 1 because he or she did not want to continue. Gender had no effect on the results below and is not discussed further.

Procedure. Participants received a booklet with general instructions explaining that, for economic reasons, we were testing several different tasks within a single study, which would last about 2 hr. After completing tasks unrelated to the experiment for about 30 min, participants were introduced to the time construal task as a pretest on "perspective taking." For the construal manipulation, participants were asked to imagine their life in general 1 year from now (distant future) or tomorrow (near future) in some detail for a period of 5 min. They were also asked to imagine solving the following task, described as a creativity task, during that respective day. The control group did not complete this task. To enhance participants' motivation, we mentioned that the measures capture important aspects of personality. Two examples of the GCT were provided. After having imagined the situation, participants answered questions about current mood, expectations regarding task performance, and expected task liking (see Experiment 1).

To assess insight, we administered the first 10 items of the GCT, in which participants view a series of fragmented pictures of familiar objects and attempt to perceptually integrate and recognize them; that is, to close each Gestalt. As with the SPT, performance on the GCT may be seen as benefiting from relatively abstract construal of the fragmented images (e.g., seeing them as a "collection of blobs"), inasmuch as testing concrete

preliminary hypotheses regarding the identity of each fragmented image may disrupt elementary perceptual processes. Moreover, it has been shown that distant time construal facilitates the process of abstracting information, which may help in the case of perceptual abstraction as well.

In the present experiment, the GCT items were printed on two 8.5 in. × 11 in. sheets of paper laid flat on a countertop. Participants had 2 min to complete the task, which was timed by the experimenters with a stopwatch. Afterward, the experimenter administered a questionnaire regauging general mood (see earlier text); retrospective liking of the task ("How much did you like solving the task?"), on a scale anchored at 1 (*not at all*) and 9 (*very much*); difficulty in imagining the situation ("How difficult was it to imagine doing the task a year from now/tomorrow?"), on a scale ranging from 1 (*very difficult*) to 9 (*very easy*); and difficulty in solving the task ("How difficult was it to perform the task?"), on a scale ranging from 1 (*very difficult*) to 9 (*very easy*). The last question was included to explore whether the perceived feasibility of the task was affected. Liberman and Trope (1998) have shown that distant time construal increases desirability and decreases the feasibility aspects of certain tasks.

At the end of the entire session, participants were debriefed, probed for suspicions, paid, and released. None of the participants reported any suspicions regarding a connection between time construal and task performance.

Results and Discussion

GCT insight scores. We computed GCT insight scores by summing up the number of fragmented images (out of 10) correctly identified. A one-way ANOVA was conducted comparing the total number of correct solutions offered in the distant, near, and control conditions. Consistent with predictions, participants in the distant future condition correctly solved significantly more GCT items ($M = 8.64$, $SD = 1.15$) than did those in the near future condition ($M = 7.36$, $SD = 1.45$) or the control condition ($M = 7.43$, $SD = 1.40$), $F(2, 39) = 4.08$; $p < .03$. Simple contrast analyses revealed that the difference between the distant future and control conditions was significant, $t(39) = 2.40$; $p < .03$, as was the difference between the distant future and near future conditions, $t(39) = 2.54$; $p < .02$. The difference between the near future and control conditions was nonsignificant ($t < 1$).

Mood, expectancies, liking, and difficulty. ANOVAs on the questionnaire variables revealed no significant between-groups differences. Thus, the manipulation did not affect self-reports of liking, expectancy, difficulty, and general mood, and these variables in turn did not affect performance on the insight task.

In summary, Experiment 3 offered additional evidence that visual insight is facilitated when participants adopt a distant time perspective on their lives and the task they are to perform. In Experiment 4, we attempted to expand on these convergent findings by using a creative generation task. Usually such tasks require participants to generate useful but unique uses for specific objects (e.g., a brick, a pair of scissors), and the creativity of solutions, as rated by experts, is taken as the dependent variable. However, we suggest that creative generation is not necessarily based on, and does not necessarily profit from, abstract thinking in all such tasks. Specifically, whereas most of the tasks measuring creativity might demand abstract thinking (such as when people try to decorate their homes), tasks requiring more mundane solutions (such as when people try to fix their curtains) might not profit from abstract thinking to nearly the same extent. Thus, we manipulated the extent to which the creativity task was dependent on abstract thought. Specifically, we administered a creative generation task and framed the task such that half of the participants were to generate relatively concrete solutions (creative ways of greeting someone), whereas others were to generate relatively abstract solutions (reasons why individuals should greet someone). The rationale behind this manipulation was derived from Strack, Schwarz, and Gschneidinger's (1985) and Vallacher and Wegner's (1989) work on levels of construal. They argued that action can be identified in different ways, which build up to a hierarchy from low-level identities that specify how one acts to high-level identities that specify why or with what effect one acts. For example, "reading a book" can be identified as "flipping pages" or "entertaining oneself." Whereas flipping pages is a more concrete, lower level identity (how one reads), reading (why one flips pages) is a more abstract, higher level identity, which is itself lower and more concrete than is entertaining oneself (one reads because one wants to be entertained). We predicted that the relatively abstract generation task would be especially influenced by distant time perspective, as it would stand to profit more from the tendency toward abstract representation engendered by distant time perspective.

Experiment 4

Method

Participants. Fifty-two (32 female, 20 male) German university undergraduates and high school students from the Bremen area majoring in disciplines other than psychology were recruited for a study on several issues, including creativity. The experiment was conducted at IUB. Participants worked individually in 2-hr sessions and received 14 Euros for participation. When groups (of up to 3 participants) were tested in the same room, we ensured that they could not see each other. Three participants had to be excluded from the analyses because they failed to answer all questions. Gender did not affect any of the results below and is not discussed further.

Procedure. Participants received a booklet with general instructions explaining that, for economic reasons, we were testing various different tasks within a single study, which would last about 2 hr. After having completed tasks unrelated to the experiment for about 50 min, the creativity task was administered. Before completing the task, participants were asked to report on their current mood, performance expectations, and expected task liking (see Experiment 1). Participants were then asked to either think of creative reasons why people should greet someone (abstract generation condition) or think of creative ways of greeting someone (concrete generation condition). They were asked to produce only solutions that were realistically possible. Participants were also instructed to think of solutions that would be prospectively implemented a year from now (distant time perspective condition) or tomorrow (near time perspective condition). To strengthen the manipulation of time perspective, participants were asked to begin each listed response with the phrase "a year from now [tomorrow], I will greet someone because [by] _____." Notably, unlike in our previous experiments, participants were not additionally asked to imagine their lives in general in the near or distant future. We thought that beyond its use for experimental purposes, this procedure might also be relatively applicable in everyday life, for example, when people want to improve their creative thinking. Participants had 2 min to work on the task and were timed by experimenters with a stopwatch.

After completing the task, the experimenter administered a questionnaire assessing general mood (see earlier text); retrospective liking of the task ("How much did you like the creativity task?"), on a scale anchored at 1 (*not at all*) and 9 (*very much*); and difficulty of performing the task ("How difficult was it to perform the creativity task?"), on a scale anchored at 1 (*very difficult*) and 9 (*very easy*).

At the end of the entire session, participants were debriefed, probed for suspicions, and paid. None of the participants reported any hypothesis with relevant connections between time perspective and task performance.

Results and Discussion

Creative generation. The solutions were rated by two independent experts ("How creative is the solution?") on a scale from 1 (*not creative at all*) to 7 (*very creative*). To enhance interrater reliability, the experts received some examples of solutions and discussed the criteria. The experts were blind to the hypothesis (Cronbach's $\alpha = .84$). For the qualitative creativity measure, we averaged the two scores. To reiterate, we predicted an increase in creativity for the distant, relative to the near, time perspective group and that this difference would be most pronounced among those who had to generate relatively abstract solutions. As a more quantitative measure of productivity, the mean number of solutions was also used as a dependent variable.

The ANOVA on the creativity scores revealed no significant main effects (all Fs < 2.52; ps $> .11$), but they did reveal a highly significant interaction, $F(1, 45) = 11.96$; $p < .01$, reflecting the fact that participants in the distant future time perspective condition who completed the abstract generation task ($M = 4.16$, $SD = 0.58$) were more creative than those in all other conditions ($M_{\text{distant/concrete}} = 3.07$, $SD = 0.77$; $M_{\text{near/abstract}} = 3.14$, $SD = 0.76$; $M_{\text{near/concrete}} = 3.53$; $SD = 0.86$). Simple contrast analyses showed that whereas creativity for abstract solutions was enhanced under distant compared with near time perspective, $t(45) = 3.40$; $p < .01$, there was a tendency for reversal for the concrete solutions that was not significant, $t(45) = 1.51$; $p > .13$.

For the number of solutions, only a marginally significant main effect for abstractness emerged, indicating that more solutions were produced for the concrete level ($M = 8.37$, $SD = 3.15$) than for the abstract level ($M = 6.92$, $SD = 2.48$), $F(1, 45) = 3.44$; $p < .08$. No other significant effects were obtained (all Fs < 1.33; all ps $> .25$). Entering the number of solutions into the analyses on creativity scores as a covariate did not reduce the significance of the Time Perspective (near vs. future) $\times$ Task (abstract vs. concrete) interaction, thereby suggesting that effects on solution quantity did not drive effects on solution quality.

Mood, liking, expectancies, and difficulty. ANOVAs on each of the self-report measures revealed two significant main effects, for time perspective on prospective liking of the task and on expectancies of success. Participants expected to like the task more and expected to perform better in the distant time perspective conditions ($M_{\text{liking}} = 6.92$, $SD = 2.28$; $M_{\text{expectancy}} = 5.92$, $SD = 1.95$) than in the near time perspective conditions ($M_{\text{liking}} = 4.92$, $SD = 2.21$; $M_{\text{expectancy}} = 4.72$, $SD = 2.21$); $F(1, 45) = 8.48$; $p < .01$, for liking; $F(1, 45) = 3.88$; $p < .06$, for expectancy. These effects were not predicted and did not replicate in any of the other studies. More research is needed to interpret these findings There was also a significant interaction for retrospective difficulty, reflecting the fact that participants found it easier to solve the concrete task in the near future ($M = 6.50$; $SD = 1.88$) and the abstract task in the distant future ($M = 5.83$; $SD = 1.99$) compared with the concrete–distant future task ($M = 4.83$, $SD = 2.62$) and the abstract–near future task ($M = 4.92$; $SD = 1.89$), $F(1, 45) = 4.54$; $p < .04$. Interestingly, this suggests that compatibility between time perspective and task abstraction seems to render the task subjectively less difficult than incompatibility between these factors. (However, because these effects were not replicated in other studies, one should not overinterpret these findings.) Finally, analyses of covariance were conducted with creativity scores as the dependent variable; time distance and abstractness as the independent variables; and prospective liking, expectancy, and retrospective difficulty as auxiliary predictors. The Time Distance (near vs. future) $\times$ Task (abstract vs. concrete) interaction remained reliable in all cases, suggesting that the aforementioned predictors did not mediate this effect.

In sum, the results of Experiment 4 suggest that the facilitative influence of distant future time perspective on creativity is only reliable when the creativity task at hand is relatively demanding of abstract thought. The next experiment was a conceptual replication of Experiment 4 that used a different manipulation of task abstraction and with an important change in procedure. Even though Experiments 1–4 strongly support our main hypothesis that distant time construal facilitates insight and creative thinking, we need to provide stronger evidence for the processing-shift assumption. Although thinking about performing the upcoming task in the near versus distant future may strengthen the manipulation of time perspective, according to our processing-shift account, merely thinking about life in the near versus distant future should suffice to activate a tendency toward representational abstraction that should carry over to influence subsequent creativity measures. To subject this key assumption to a stronger test, in Experiment 5, participants were not asked to imagine working on the forthcoming experimental task a year from now or tomorrow. Instead, they were merely instructed to think about their life in general at different points in time and were then asked to complete an allegedly unrelated creative generation task.

Experiment 5

Method

Participants. One hundred thirty-eight (78 female, 60 male) German university undergraduates and high school students from the Bremen area majoring in disciplines other than psychology were recruited for a study on several topics, including creativity. The experiment was conducted at IUB. Most participants worked individually in 2-hr sessions and received 14 Euros for participation. When groups (of up to 3 participants) were tested in the same room, we ensured that they could not see each other. Five participants had to be excluded from the analyses, 3 because of experimenter error and 2 did not wish to complete the task. Gender did not affect any of the results below and is not discussed further.

Procedure. Participants received a booklet with general instructions explaining that, for economic reasons, we were testing various different tasks within a single study that would last about 2 hr. After completing tasks unrelated to the experiment for about 45 min, participants were introduced to the relevant tasks as unrelated tests of both perspective taking and creativity. For the time perspective manipulation, participants were asked to "travel in time" and imagine their lives in general 1 year from now (distant future) or tomorrow (near future) in some detail for a period of 2 min. (Participants in the control conditions did not receive any time travel instructions.) Afterward, participants received a questionnaire containing items probing their current mood, providing a short description of the creativity task, and then probing their performance expectations regarding the task and expected liking of the task (see Experiment 1). After this period, they were asked to work on a creative generation task. No relation between the time perspective manipulation and the generation task was

mentioned. For the task, a scenario was invented to manipulate abstract versus concrete processing requirements:

> Ms. Miller likes her plants. Please help her to find as many creative ways as you can regarding how she can water her plants (concrete)/ further improve her room (abstract).

This example was taken from the Behavior Identification Form (Vallacher & Wegner, 1989), which is supposed to measure high- versus low-level construals for the same activity: caring for houseplants. To reiterate, high-level construals concern the reasons why one does something, whereas low-level construals reflect how one is doing something in order to attain a higher goal.

After completing the task, participants were administered a questionnaire including general mood (see earlier text); retrospective liking of the task ("How much did you like solving the creativity task?"), on a scale anchored at 1 (*not at all*) and 9 (*very much*); liking of the time perspective task ("How much did you like the time travel task?"), on a scale from 1 (*not at all*) to 9 (*very much*); and difficulty solving the task ("How difficult was it to perform the creativity task?"), on a scale anchored at 1 (*very difficult*) and 9 (*very easy*).

At the end of the entire session, participants were probed for suspicions, debriefed, and paid. None of the participants reported any hypothesis-relevant suspicions regarding the connection between the time distance manipulation and the creativity task.

Results and Discussion

Creative generation. The solutions were rated by two independent experts ("How creative is the solution?") on a scale from 1 (*not creative at all*) to 7 (*very creative*). To enhance interrater reliability, the experts received some examples of solutions and discussed the criteria. The raters were blind to the hypothesis (Cronbach's $\alpha = .89$). As in Experiment 4, both the number of solutions and mean creativity scores were used as dependent measures. Again, we predicted an increase of creativity especially in the distant time perspective group with the abstract task (solutions for room design) but not with the concrete task (watering plants). The results are summarized in Table 1.

The ANOVA on the creativity scores revealed a main effect of time perspective, whereas participants were more creative when they imagined their life a year from now ($M = 3.40$) compared with participants in the control condition ($M = 2.46$) and those who imagined their life tomorrow ($M = 2.46$), $F(2, 127) = 25.05$; $p < .01$. However, this main effect was qualified by a Temporal Distance (near vs. control vs. future) × Task (abstract vs. concrete) interaction, $F(2, 127) = 10.13$; $p < .01$, reflecting the fact that the most creative solutions were produced by participants in the distant future perspective–abstract processing (room design) condition. Simple contrast analyses showed that whereas creativity was enhanced on the abstract task relative to the concrete task under distant time perspective, $t(127) = 4.23$; $p < .001$, this difference was not significant for the control and the near future conditions ($ts < 1.53$; $ps > .12$). Within the concrete conditions, no differences were significant (distant vs. near, $t[127] = 1.53$; $p > .12$; distant vs. control, $t[127] = 1.61$; $p > .11$; near vs. control abstract, $t < 1$); whereas within the abstract conditions, creativity in the distant future condition significantly differed from both the near future, $t(127) = 7.30$; $p < .01$, and the control condition, $t(127) = 6.84$; $p < .01$. There was no significant difference between the near future condition and the control with abstract solutions ($t < 1$). The main effect of abstractness was not significant ($F < 1$).

For the number of solutions, no significant effects were obtained, main effect $Fs < 1.25$, and $F(2, 127) = 1.96$; $p > .14$ for the interaction. Inclusion of the number of solutions as a covariate in the analysis did not reduce the reliability of the effects of the experimental factors on creativity.

Mood, liking, expectancies, and difficulty. ANOVAs with each of the self-report measures revealed only a main effect of time distance on retrospective difficulty of the creativity task, $F(2, 127) = 8.23$; $p < .01$, and for liking of the creativity task, $F(2, 133) = 3.80$; $p < .03$. Participants found it more difficult to complete the task in the control condition ($M = 4.59$, $SD = 2.10$) compared with the distant future ($M = 5.87$, $SD = 1.86$) or near future ($M = 6.28$, $SD = 2.11$) conditions. They also liked the task more in retrospect in the near future condition ($M = 6.19$, $SD = 2.17$) than in the distant future ($M = 5.41$, $SD = 2.22$) or the control ($M = 4.84$, $SD = 2.43$) conditions. When these variables were entered as covariates in the analyses on creativity, the effects of the experimental factors remained significant, suggesting that these auxiliary predictors did not mediate the latter effects. No other significant effects were found.

In sum, the results of Experiment 5 converge with those of Experiment 4 to suggest that distant, relative to near, time perspective facilitates creative generation, but only when the creativity task at hand is relatively demanding of abstract thought. Moreover, the results of Experiment 5 also suggest that merely thinking about life in the distant versus near future suffices to shift cognitive processing in a manner that influences creativity. Creative task performance does not rely on imagining task engagement in the

Table 1
Experiment 5: Mean Creativity Scores and Mean Number of Solutions by Abstractness and Time Construal

	Distant (a year from now)		Near (tomorrow)		None	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
No. of solutions						
Concrete (watering flowers)	4.26	2.53	5.57	3.75	6.05	3.30
Abstract (room design)	5.65	4.05	4.27	2.47	5.73	3.09
Mean creativity scores						
Concrete (watering flowers)	2.93	0.155	2.59	0.162	2.58	0.159
Abstract (room design)	3.86	0.155	2.24	0.159	2.34	0.159

distant versus near future, strengthening our assumption that an unintentional processing shift took place.

Until now, we have adduced evidence that distant time perspective produces a transfer-appropriate processing shift that may bolster creativity, at least on tasks that require more than a modicum of representational abstraction. However, as discussed earlier, we posit that in cases where concrete, low-level representation is required for successful task performance, distant, relative to near, future time perspective should have an inhibitory influence. This notion was tested in Experiment 6. Here, we administered a portion of the Graduate Record Examination (GRE) Analytical test, which relies on adherence to concrete algorithms as opposed to abstract heuristics (Amabile, 1996; Friedman & Förster, 2000). As such, we expected to find poorer performance under distant time perspective compared with near time perspective. Notably, finding that distant time perspective impairs performance under certain conditions would lend support to our contention that the effects at issue are not due to simple differences in motivation but, rather, are due to differences in processing style, which may be either beneficial (i.e., transfer appropriate) or harmful (i.e., transfer inappropriate) for performance on subsequent tasks.

Experiment 6

Method

Participants. Sixty (42 female, 18 male) German university undergraduates and high school students from the Bremen area majoring in disciplines other than psychology were recruited for a study on "perception and concentration," which took place at IUB. Participants worked individually in 2-hr sessions and received 14 Euros for their participation. Participants were tested in single sessions. Two participants had to be excluded from the analyses because they did not want to continue. Gender had no effect on the results below and is not discussed further.

Procedure. The procedure was exactly the same as described in Experiment 2, except for that participants received a set of analytical-reasoning problems instead of the SPT. The problems consisted of four logic puzzles borrowed from the analytical section of the GRE and translated into German by native-German speakers (see Friedman & Förster, 2000; Experiment 7).

At the end of the entire session, participants were probed for suspicions, debriefed, and paid. None of the participants reported suspecting a connection between the time perspective manipulation and task performance.

Results and Discussion

GRE scores. A one-way ANOVA was conducted comparing the total number of correct solutions (out of four) offered in the distant, near, and control conditions. Consistent with predictions, participants in the distant future condition correctly solved significantly fewer GRE items ($M = 1.00$, $SD = 0.74$) than those in the near future condition ($M = 1.65$, $SD = 0.99$) or the control condition ($M = 1.74$, $SD = 0.99$), $F(2, 55) = 3.69$; $p < .04$. Simple contrast analyses revealed that the difference between the distant future and control conditions was significant, $t(55) = 2.48$; $p < .02$, as was the difference between the distant future and near future conditions, $t(55) = 2.22$; $p < .04$. The difference between near future and control condition was not significant ($t < 1$).

Mood, expectancies, liking, and difficulty. None of the questionnaire variables, when analyzed with one-way ANOVAs, revealed significant differences between the groups. Thus, the manipulation did not appear to affect self-reports of task liking, performance expectancy, task difficulty, or general mood and therefore did not mediate the influence of time perspective on analytical task performance.

To summarize, the results of Experiment 6 suggest that distant time perspective can have detrimental effects on performance if the processing style it elicits is not suitable for solving the problem at hand. Analytical reasoning, which imposes relatively heavy demands for concrete, low-level processing, is impeded by the tendency toward abstract mental representation engendered by distant future temporal perspective.

General Discussion

In six experiments, using diverse measures, we found that distant time perspective enhances insight and abstract creative performance. Participants who imagined their lives and/or envisioned working on the experimental task a year later solved more insight problems than those who imagined their lives and/or envisioned engaging in the task the next day solved. In two further experiments (Experiments 4 and 5), we additionally demonstrated a facilitative effect of distant time construal on creative generation; however, it was limited to creativity tasks with heavier demands for abstract thinking. Moreover, Experiment 5 showed that the influence takes place even when the time construal task and the creativity task are unrelated. Finally, in a sixth experiment, we found that distant time perspective undermines rather than enhances analytical reasoning.

These findings were taken to support our contention that thinking about the distant future elicits a processing shift (Schooler, 2002; Schooler et al., 1997) toward abstract mental representation that is transferred to subsequent tasks, thereby facilitating performance on creativity tasks, which require abstract thought, and undermining performance on analytical tasks, which require relatively concrete processing. This assumption was most strongly supported by Experiment 5, in which the process of abstract thinking assumed to be triggered by one task (mental time travel into the distant future) shifted, with beneficial results, to another allegedly unrelated task (the creative generation task).

To rule out alternative explanations, in all six experiments, we included measures of task liking, performance expectancies, and transient mood. We did not find any statistical evidence of mediation by these variables, suggesting that any changes in these variables wrought by the time distance manipulations did not drive the effects of temporal perspective on performance. However, it is possible that our manipulations affected other experiences, which we did not measure. For instance, it might well be the case that subjective feasibility or desirability aspects of the task can be influenced by the mental time travel inductions and could have influenced the subjective importance of the task (Liberman & Trope, 1998). Future research will have to investigate these possible mediators more directly. We should caution, however, against including too many measures that could weaken the manipulation of temporal distance and undermine its effects on subsequent tasks.

The fact that distant time perspective influenced the quality of creative output rather than mere quantity (Experiments 4 and 5) and diminished rather than enhanced performance on analytical-reasoning problems (see Experiment 6) suggests that the effects of

distant future temporal perspective do not represent a general tendency to intensify effort or productivity. We instead conclude that manipulated differences in time perspective altered participants' processing styles, thereby either improving or diminishing their performance on the basis of the compatibility between the elicited processing style and the demands of the task at hand.

Implications for CLT

For CLT, the news is that temporal construal has implications for performance in certain achievement tasks; namely, insight problem solving and aspects of creative cognition. Changes in temporal perspective are associated with general changes in processing style (e.g., a tendency to construe events and objects abstractly), which may affect performance on unrelated subsequent tasks without intention or awareness. Moreover, such processes might shift to other tasks. When the elicited processing style and the demands of the task are congruent, facilitation (i.e., a transfer-appropriate processing shift) results, and when the elicited processing style is incongruent with the demands of the task, impairment (i.e., a transfer-inappropriate processing shift) results.

Although most of the research on CLT has used manipulations of temporal distance (see Trope & Liberman, 2003, for a review), CLT is actually a more general theory of mental distance (Lewin, 1951) and thus is not restricted to the dimension of time. In light of this, we are currently exploring the effects of *spatial* distance on creativity. Specifically, we predict that performance should be enhanced on a creativity task presented at a distance compared with the same task presented in closer spatial proximity to the participants. As in the case of distancing in time, we assume a heuristic may have evolved over time associating spatial distance with abstract representation because at a spatial distance, individuals tend to focus on more global rather than local units (the forest rather than the trees, see Trope & Liberman, 2003). If so, manipulations of spatial distance might lead to a direct activation of different processing styles in a fashion analogous to that identified in the studies previously discussed (i.e., mental representations of extended distance would produce abstract thinking and facilitate creative problem solving via transfer-appropriate processing shifts). Along similar lines, we have also begun investigating whether retrieving memories from the distant past leads to more creative thinking than retrieving memories from the recent past. Plans are also underway to examine how chronic, individual differences in the tendency to think about the distant versus near future (or past) might yield analogous effects on creative and analytical problem solving.

The fact that temporal construal affects creativity could also have important implications for decision making. Looking at a problem more creatively might lead to a consideration of its multifaceted nature. For instance, people in a creative-thinking mode might be less likely to base their judgments on overaccessible knowledge and subsequently avoid anchoring biases (Strack & Mussweiler, 1997). Moreover, instead of relying on established rules of thumb, they might instead try to find more unconventional ways to solve problems and avoid falling prey to the base-rate fallacy and other biases engendered by undue reliance on conventional heuristics. Clearly, more research is needed to investigate the interrelationship between temporal perspective, creative thinking, and decision making.

Processing Shifts and Creativity: Beyond Temporal Construal

As implied by our discussion, we view the present effects of temporal construal on performance as a special case of the general phenomenon by which engagement in one cognitive activity automatically elicits a processing shift that influences performance on subsequent tasks. Given the present findings, it seems likely that creativity may be positively or negatively "primed" by prior performance of a range of tasks that predominantly demand relatively abstract or concrete representation of problem elements, events, or objects. Such "primes" may include activities as rudimentary as merely thinking about concrete social behaviors versus abstract behavioral traits or considering concrete means to goal attainment versus superordinate goals. Interestingly, unlike other automatic-priming phenomena (e.g., semantic or goal priming; see, e.g., Shah, Kruglanski, & Friedman, 2002), processing shifts may yield remarkably broad effects on behavior inasmuch as they involve activation of basic (perhaps ineffable and consciously inaccessible) mental processes rather than specific representational contents or motives. As such, social cognitive research on automaticity may benefit tremendously from (re)exploring the ways in which subtle activation of general processing routines, as opposed to specific concepts or goal representations, might impact social perception, judgment, and action.

Alternative explanations. Of course, although not explicitly referred to in this manner, the notion of processing shifts is present in a number of theories of self-regulation that suggest that certain situational cues can directly engender qualitatively different processing styles. Let us consider two of the most prominent theories of this ilk, with an eye toward evaluating whether they can account for our findings.

One alternative conceptual framework that may potentially be brought to bear on the present findings is Epstein's Cognitive–Experiential Self Theory (CEST; Epstein, 1991, 1994). Simply stated, according to this theory, people can vary over time in the extent to which they process information rationally or experientially. Whereas the rational system operates primarily at the conscious level and is intentional, analytical, primarily verbal, and relatively affect free, the experiential system is assumed to be automatic, preconscious, holistic, associationistic, primarily nonverbal, and intimately associated with affect. On the basis of these premises, CEST predicts facilitation of aspects of creative thinking and deterioration of analytic thinking when the experiential system, compared with the rational system, is in use. With regard to our experiments, although possible, it seems unlikely that "thinking about one's life a year from now" is more associated with experiential-processing modes than with rational ones compared with the task of "thinking about one's life tomorrow." On the contrary, thinking about things that may occur the very next day may lead to a greater feeling of urgency and thereby be more affectively arousing than those imagined to occur in the more distant future. As such, we do not believe CEST can parsimoniously explain the present results.

Another alternative explanation for the present findings may be derived from Higgins's (1997) regulatory focus theory (RFT). RFT distinguishes between two qualitatively distinct motivational orientations, a *promotion focus*, which entails motivation to attain *nurturance* (e.g., appetizing food), and a *prevention focus*, which

entails motivation to attain *security* (e.g., shelter from harm). According to Higgins, these distinct motivational orientations elicit qualitatively distinct processing styles, whereas that elicited by a promotion focus may enhance and that elicited by a prevention focus may undermine creative thought. We (Friedman & Förster, 2004) recently tested this notion. Participants in our experiments were administered either a promotion or a prevention maze task. In both conditions, we depicted a cartoon mouse trapped inside the maze and asked participants to find the way out for the mouse by tracing the correct path. In the promotion-cue condition, a piece of Swiss cheese was depicted as lying outside the maze. It was predicted that approaching food would activate a promotion focus (a promotion focus on attaining nurturance). The other half of the participants were asked to solve the very same maze with one exception: instead of cheese outside, an owl was depicted as hovering above the maze, presumably ready to capture the mouse unless it could escape the maze. Completion of this task was posited to activate a prevention focus (a prevention focus on attaining safety). Our results indicated that after having completed the promotion maze, participants performed better on insight and creative generation tasks than participants did who completed the prevention maze.

More recently, we also found evidence that differential hemispheric activation at least partially mediates these effects (Friedman & Förster, 2004). On the basis of the theorizing of Derryberry and Tucker (1994), we argued that rudimentary promotion, relative to prevention motivational cues, engenders greater relative right-hemispheric activation. This prediction was supported in a series of experiments that used both interoceptive (approach vs. avoidance arm motor actions) and exteroceptive motivational cues (the aforementioned maze manipulations) and two different behavioral measures of relative hemispheric activation: a line-bisection task (Milner, Brechmann, & Pagliarini, 1992) and a chimeric faces task (Levy, Heller, Banich, & Burton, 1983). These experiments replicated earlier findings (Friedman & Förster, 2001, 2002) that demonstrated that promotion cues bolster creativity and prevention cues bolster analytical problem solving and, additionally, provided evidence that these effects were statistically mediated by differences in relative right-hemispheric activation.

In light of these findings, the question arises: Can variations in temporal perspective influence abstract versus concrete thought by way of their differential impact on regulatory focus? Quite recently, Pennington and Roese (2003) have adduced evidence that a distant future time perspective may increase concerns with promotion goals, whereas a near future time perspective may increase concerns with prevention goals. However, they also found evidence for the obverse pattern, with promotion and prevention foci influencing the perceived temporal distance of future goals. As such, it is unclear whether variations in temporal perspective elicit processing shifts toward abstract versus concrete thought via activation of differential regulatory foci, regulatory foci engender these processing shifts via elicitation of differential mental distances, or both. Clearly, future exploration of these issues is much needed. Another intriguing possibility is that the processing shifts separately engendered by distinct but associated situational factors, such as temporal perspective and regulatory focus, may affect cognitive styles by way of similarly shifting the balance of hemispheric activation from left to right.

In sum, CEST and RFT implicitly or explicitly espouse the notion of processing shifts, by which activation of certain modes of thought and motivational systems carry over to influence abstract versus concrete processing on subsequent tasks. It will be worthwhile to investigate these variables in relation to temporal perspective, to determine how they may mutually, as well as uniquely, impact insight and creative cognition.

Societal implications. One might ask whether the experiments reported have implications beyond confirming a theoretical assumption. We believe that laypersons and creative people alike might intuit that distancing, in a general sense, enhances creativity. Examples of individuals who had their most ingenious ideas in the bathtub or while sitting under apple trees rather than in their offices might reflect such a role of distancing in human creativity. The so-called "incubation" phase (Poincaré, 1924; Simon, 1966), meaning that after long periods of unsuccessful attempts to solve a problem the solution pops up in an unexpected context (during a coffee break, during vacation, etc.) when the problem is actually and sometimes literally put aside, might point to the power of distancing in problem solving. Moreover, in modern art, where an unskilled audience sometimes has difficulty appreciating the creative performance inherent in the object, distancing oneself from the concrete material is essential to perceiving its artistic value. To give a famous example, the janitor of the Düsseldorf Art Museum who furbished Joseph Beuys's famous greasy bathtub, and thus destroyed one of the most important objects of contemporary art, obviously did not abstract any value from the actual mundane material from which the artwork was fashioned, and she was not alone—the misperception of Beuys's objects as "nonart" led to several such acts of "sacrilege" (e.g., members of the Social Democratic Party group cooled beer in one and in Leverkusen several of these objects were cleaned by cleaning personnel). Thus, one must distance oneself from the mundane nature of these objects by construing them in relation to other objects of art or representing them in a more meaningful or symbolic manner to perceive their value. What is true for the perception of art also holds for its production: Deciding that mundane objects are (can be) objects of art affords some abstraction (see Menke, 1993).

Moreover, as Arndt, Greenberg, Solomon, Pyszczynski, and Schimel (1999) noted, some creative acts violate social norms. Again, modern artists have often been nonconformists and thus distanced themselves from the group. Such artists might have intuitively or consciously (e.g., via the use of drugs) tried to avoid the norm in order to be creative. To be sure, nonconventionality is certainly not a precondition for creativity, as a number of biographies of artists and scientists reveal; however, it might be one means among others to distance oneself from the immediate social context and to enhance creativity. Last but not least, art itself can be a means to distance oneself from the mundane world, and thus, the process of producing it can at the same time lead to creative outcomes. To our knowledge, there are no documented cases of individuals using mental travel in time as a means to enhance creativity; however, our results do suggest that it could be beneficial.

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Appendix

Insight Problems Used in Experiment 1

Problem 1: A prisoner was attempting to escape from a tower. He found a rope in his cell that was half as long enough to permit him to reach the ground safely. He divided the rope in half, tied the two parts together, and escaped. How could he have done this?

Solution: He unraveled the rope lengthwise and tied the remaining strands together.

Problem 2: A dealer in antique coins got an offer to buy a beautiful bronze coin. The coin had an emperor's head on one side and the date 544 B.C. stamped on the other. The dealer examined the coin but instead of buying it, he called the police. Why?

Solution: In 544 B.C. Jesus had not been born, so a coin from that time would not be marked "B.C."

Problem 3: Show how you can make the triangle below [see Figure A1] point downward by moving only three of the circles.

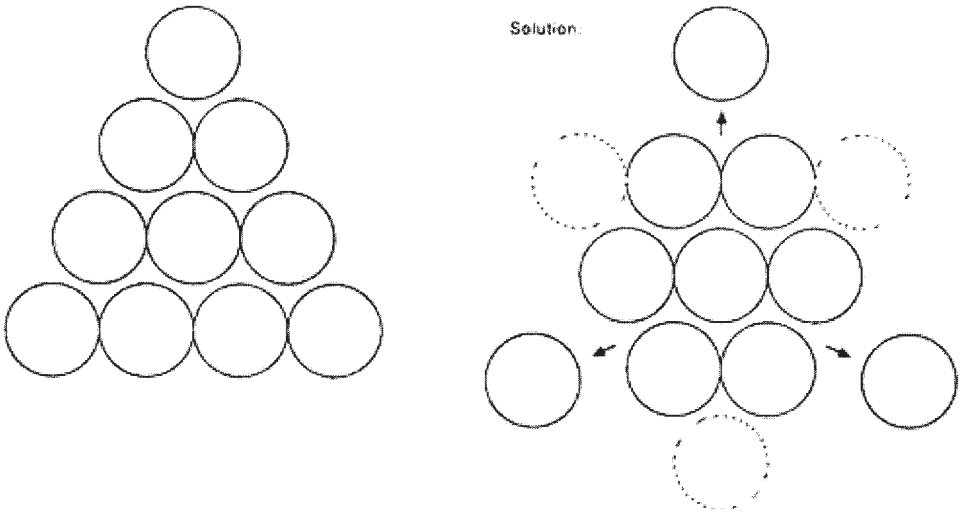

Figure A1. Diagram and solution for the triangle problem.

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