The influence of emotion on temporal perspectives

Skye Mims Ochsner
ABSTRACT

Recent research suggests that our understanding of the abstract domain of *time* is dependent on the more concrete domain of *space*. At once time is measurable and abstract, thus we often think of it both temporally as well as spatially. Boroditsky and Ramscar (2002) find that the spatial domain influences whether people see themselves as moving through time (ego-moving perspective) or as time moving towards them (time-moving perspective). Might there be other factors at work influencing these perspectives other than just representations of spatial experience?

The current studies investigate the role that emotion plays in construal of time. Specifically, do people's feelings about an event influence how they perceive time and do people's perception of time influence how they feel about an event? Consistent with ego-moving and time-moving perspectives, results suggest a significant effect of emotion on time construal such that people who have negative feelings about an event report that event as approaching them while people who have positive feelings about an event see themselves as approaching that event. A follow-up study shows the reverse process to be true such that ego-moving and time-moving language influence subjective positivity and negativity, respectively.
I certify that I have read this thesis and find that, in scope and quality, it satisfies the requirements for the degree of Master of Arts.

Dr. Scott Allison, Thesis Advisor

Dr. L. Elizabeth Crawford, Thesis Advisor

Dr. Dafna Eylon, Thesis Advisor
ACKNOWLEDGEMENTS

I would like to thank Dr. Dafna Eylon and Dr. Scott Allison for their support, excitement and encouragement on this project.

I would also like to thank and express my immense gratitude to Dr. Beth Crawford for two years of continued support and friendship. This project could not have been happened without her.
Imagine you have an event scheduled next Wednesday. Now imagine that you have been told that the event has been moved forward two days. To which day is it now rescheduled? If you answered Monday, you are correct. However, if you answered Friday, you are correct too. It all depends on how you conceptualize the word “forward”.

Recent research suggests that such ambiguity stems from our use of space to conceptualize time. At once, time is measurable and abstract and thus we often think of it both temporally as well as in the more concrete experience domain of space (Boroditsky, 2000; Boroditsky & Ramscar, 2002). As a result, our language reflects this dependency. Further, Boroditsky and Ramscar (2002) find that this spatial domain influences how people perceive time. Whether people see themselves as moving through time (ego-moving perspective) or as time moving towards them (time-moving perspective) depends on their spatial context. Thus it is from these two perspectives that people conceptualize time. Might there be other factors at work influencing these perspectives other than just representations of spatial experience?

A growing body of research emphasizes the fundamental role that emotion plays in cognitive processing and sensorimotor experiences (Cacioppo, Priester, & Bernston, 1993; Chen & Bargh, 1999; Damasio, 1994). Therefore it would seem plausible that emotion would inherently have a significant effect on time construal. For instance, might there be differences between how people think about the timing of an event about which they feel enthusiasm or dread? In our language we think of negative events as hanging heavily over our bent heads whereas we look forward to and up to positive events. Might such metaphors be indicative of how feeling might effect time perception? By examining the possible effects of emotion on conceptualization of time, this study seeks to extend
the current research and develop a more encompassing picture of how people conceptualize time.

The past couple of decades have witnessed a surge of research in cognition as it is related to sensorimotor experiences and emotional processing (Cacioppo et al., 1993; Chen & Bargh, 1999). Straying from the dualist Cartesian idea of mind and body as separate entities, many researchers have found evidence for a non-dualist existence such that the mind and body interact in intricate and inseparable ways. For these scientists, the assumed dichotomy of perception and conception is inaccurate. Conversely, the two are seen as collapsed and as part of the same bidirectional process (Lakoff & Johnson, 1999).

Our interactions with the world inform and are informed by cognitive processes and thus, the theory suggests, the mind cannot be thought of as a disembodied entity. Barsalou (2003) claims that knowledge is based on our perceptual experience in the world and is derived from "partial simulations of sensory, motor and introspective states" (p. 44). Furthermore, Lakoff and Johnson (1980) suggest that this knowledge, the concepts that we have about the world, are not merely reflections of a disembodied reality but are formed by our unique sensorimotor experiences and that together our "bodies, brains and interactions with our environment provide the most conscious basis for our everyday metaphysics, that is, our sense of what is real" (p.16).

It is from this "embodied realism" that conceptual metaphors arise. Lakoff and Johnson (1980) argue that we learn to represent abstract concepts by relating them to more concrete ones. In other words, sensorimotor experiences can be applied to domains of subjective experiences in order to help us conceptualize these otherwise abstract and intangible concepts (Allbritton, McKoon, & Gerrig, 1995; Lakoff and Johnson, 1980,
An example of this is emotion and space. Emotions are abstract concepts that we understand via our experiences in spatial domains. For instance, we think of happy as up and sad as down. From such associations we come to think of emotion in spatial terms. Thus conceptual metaphor becomes a mechanism with which assumptions derived from a more concrete experiential domain are applied to a more abstract concept. Boroditsky and Ramscar (2002) expand on this idea and claim that not only is abstract knowledge built on experiences in a more concrete domain, but that these experiences can simultaneously change and shape such abstract knowledge.

The present research focuses on the conceptual metaphor of space as it relates to time. Our language is infused with spatial terms that are used to describe and understand temporal concepts. While time can be conceived of in temporal terms (i.e., early and late) these are limited and thus we enrich our concept of time by understanding it in terms of spatial domains as well (Lakoff and Johnson, 1980, 1999; Boroditsky, 2000; Boroditsky & Ramscar, 2002; Gentner, Imai & Boroditsky, 2002; McGlone & Harding, 1998; Nunez, 1999). Because time is conventionally thought of as one-dimensional, only those spatial terms that reflect one dimension are found in temporal language. For example, ahead/behind and forward/back work, whereas deep/shallow do not (McGlone & Harding, 1998; Gentner, 2001).

Boroditsky (2000) argues that these one-dimensional spatial metaphors provide structure to abstract concepts of time and that such structure may come to be encoded in one’s conceptual domain of time, even when using temporal language. In a series of experiments, Boroditsky (2001) examined whether the differences in how English and Mandarin speakers talk about time, horizontally and vertically respectively, would reflect
the way the speakers think about time. After having participants (English and Mandarin speakers) solve horizontal or vertical spatial primes, she measured reaction time for answering true or false to the following temporal statement: “March comes earlier than April”. As predicted, Mandarin speakers were quicker to answer true after vertical primes than after horizontal primes. The reverse was true for English speakers. Such results provide support for the idea that spatiotemporal metaphors not only provide a convenient tool for conceptualizing time but they also affect how time is conceptualized.

Even so, such metaphoric structures must be understood with respect to perspective of time (Boroditsky, 2000; Boroditsky & Ramscar, 2002; Gentner, 2001; Gentner et al., 2002; McGlone & Harding, 1998). Specifically, research has shown that our language taps into two spatiotemporal metaphoric systems: the ego-moving metaphor where the observer progresses through space and time toward the future and the time-moving metaphor where time is construed as passing by the observer, like a “conveyor belt or river”, and events move from the future to the past. For instance, one might say “we passed the deadline” (ego-moving) or “the deadline passed” (time moving). While both sentences share the same meaning, they differ in perspective.

What does this say, however, about how we think? Could it be the case that these metaphoric differences are merely linguistic choices and not conceptually based? Current findings would suggest not. Several recent studies have examined this question by looking at the metaphor consistency effect with respect to the two space-time metaphors (Gentner et al., 2002; Langston, 2002). Specifically, according to the metaphor consistency effect, a “boggle” reaction occurs when one reads mixed metaphors and consequently this reaction interferes with comprehension time (Gentner, 2001). Based on
this idea, it would stand to reason that mixing the two spatiotemporal metaphors might have the same effect.

Gentner et. al. (2002) applied this reasoning to a reaction-time comprehension task. Participants were given three setting sentences followed by a test sentence describing a temporal relation between two events. In the consistent mapping condition, the setting sentences and the test sentence used the same metaphoric perspective (ego moving or time-moving) while in the inconsistent mapping condition the setting sentences used a different mapping system than that of the test sentence. As predicted, participants in the consistent condition responded significantly faster than those in the inconsistent condition. As a means of ensuring that their findings were not a product of similar words in the consistent condition, the researchers conducted a second study (Genter et al., 2002) using the same methods as the first experiment. This time however, they used words that can be used in both the ego-moving and the time-moving metaphors, such as ahead, before and behind. Again, they found that participants were quicker to react in the consistent condition than in the inconsistent condition. Similarly, Langston (2002) found that participants had slower reading times for texts that violate orientational metaphors than those that are consistent. Throughout all of these studies, it was found that metaphoric inconsistency interfered with comprehension.

McGlone and Harding (1998) provide further support for such findings by examining the role that these two perspectives play in temporal language comprehension in a slightly different manner. After being primed in either the ego-moving or time-moving perspective by using context sentences, participants saw a target sentence describing a scenario in which a fictitious event originally scheduled to take place on one
day had been rescheduled. The rescheduling was described in one of three ways: advanced, moved forward, or moved back. The participants were then asked to indicate to which day the event had been rescheduled, given the choice of Monday or Friday. They found that priming did have an effect on time construal such that those primed in the ego-moving condition tended to say Friday while those in the time-moving condition tended to say Monday. It should be noted, however, that these results were stronger when the question posed used “advanced” and “moved forward” as opposed to “moved back”.

Gentner et al. (2002) proceeded to test the generalizability of these phenomena to the real world, O’Hare Airport. Participants were approached and greeted with the introductory statement “Hello, I’m on my way to Boston.” After which they were asked either “Is Boston ahead or behind us time-wise?” (ego-moving question) or “Is it later or earlier in Boston than it is here?” (time-moving perspective). After the participant answered, the experimenter asked the ego-moving test question “Should I turn my watch forward or back?” Results indicate that participants in the consistent condition responded faster than those in the inconsistent condition. Moreover, participants in the inconsistent condition often, switched back to the original primed condition.

Expanding on these findings, Boroditsky and Ramscar (2002) found that not only does spatial metaphor influence conceptualization of time but that representation of space as well as representation of movement in particular spatial activities will directly influence how people think about time. In a series of experiments participants (who were recruited in a lunch line, on a train, and at the airport) were given a one-page questionnaire stating: “Next Wednesday’s meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?” Participants who were just
getting on or off the train, at the end of a lunch line or had just flown in were significantly more likely to say Friday. Conversely, participants who were in the middle of a train ride, at the beginning of a lunch line or who were waiting to depart on a flight were significantly more like to say Monday. The researchers reason that the different responses stem from participants’ perception of their spatial experience, as either ego-moving or time-moving. Furthermore, the researchers underscore that it is this thinking, and not the actual spatial motion, that influences people’s thinking about time.

The above experiments have either primed or tapped into people’s actual spatiotemporal perspective as a means of examining if they respond in a metaphoric congruent manner to scenarios and questions about time. The evidence strongly suggests that they do. Might there be other types of priming that would predict similar metaphoric congruency? Given recent findings (Damasio, 1994; Cacioppo et al., 1993; Chen & Bargh, 1999), we suggest that emotional states will tap into these same metaphoric structures, such that positivity will prime one spatiotemporal metaphor while negativity will prime another.

Based on his examinations of patients with neurological damage, Damasio (1994) claims that emotion is at the foundation of reasoning and thought. Moreover he suggests that emotions are derived from body experiences, which consequently influence and drive cognitive processes. Further research bolsters this claim by showing how approach and avoidance behaviors are mediated by emotional evaluation and not solely by conscious thought. Cacioppo et al. (1993) found that motor processes (arm flexion and extension) and/or their sensory consequences play a fundamental role in affective evaluation. In particular, participants who pushed against a table while viewing neutral stimuli indicated
they like the stimuli less than individuals who viewed the same neutral stimuli while pulling up against the table. Building upon this research, Friedman and Forster (2000) reported that arm flexion, relative to arm extension, facilitated insight-related cognitive processes while arm extension, relative to arm flexion, facilitated analytic reasoning.

Chen and Bargh (1999) found the reverse process to be true such that positive evaluations produce approach tendencies and negative evaluations produce avoidance tendencies. Their findings support the idea that the process of automatic evaluation has behavioral as well as motivational consequences and that this relationship is non-conscious. Cacioppo, Gardner, and Bernston (1999) conclude that such a motivational system encourages “free and swift approach to appetitive stimuli and rapid and unfettered withdrawal from aversive stimuli” (p.841). Taken together, these studies support the idea that emotion activates and is activated by sensorimotor behaviors, such that negative affect is associated with withdrawal and positivity is associated with approach toward a stimulus.

Given this conclusion, what would happen to one’s construal of time if the affective context was experimentally manipulated? We predict that given such evidence of emotion driving approach and avoidance behavior, there would be a similar influence on time construal. Specifically, positivity should be associated with the ego-moving metaphor (approach) and negativity associated with the time-moving metaphor (avoidance). As mentioned earlier, common metaphors found in our language would suggest that valenced states would predict such directions. For example we look forward to positive events about which we are enthusiastic and we crouch beneath the looming negative ones. Might these be considered conceptual metaphors are they merely a non-
conceptual part of our language? The current studies address this question and these predictions.

Specifically, this research seeks to determine the role of emotion in people’s spatial thinking about time. In Experiments 1 and 2 we examine whether spatiotemporal metaphor perspectives (ego-moving or time-moving) are influenced by emotion (positivity or negativity). We follow up these studies with Experiment 3 which seeks to determine whether the ego-moving or time-moving perspectives influence subjective positivity or negativity.

EXPERIMENT 1

Experiment 1 examines whether emotion (dread or enthusiasm) influences one’s perception of time such that dread activates the time-moving metaphor while enthusiasm activates the ego-moving metaphor.

Method

Participants. One-hundred and fifty seven University of Richmond undergraduates participated in the study. Participants were approached during various classes and asked to take 5 minutes of their time to participate in the study on a volunteer basis. No credit was given.

Procedure. The purpose of the experiment was to examine how valenced events influence subjects’ construal of time. This was a between subjects study where half of the participants were in the positive event group while the other half were in the negative event group.

Participants were given a questionnaire asking them to think of a possible event in the future, either real or imaginary, about which they might feel either dread or
enthusiasm, depending on their assigned group. Dreadful events, it was suggested, might be a stressful exam, a court appearance, defense before an honor council, or removal of wisdom teeth. Examples of enthusiastic events may be seeing a distant loved one, ring-dance, or getting a new car. Additionally, participants were told that they will never be asked to share the events they chose to imagine and therefore they should feel free to think of any event the prospect of which evokes strong positive or negative feelings. They were also told that their event was scheduled for next Wednesday.

Participants were given one minute to think about their event. After one minute, they turned to the next page of the questionnaire on which they were informed that next Wednesday’s event had been moved forward two days. Following this news, participants answered the following questions:

1. What day is the event now that it has been rescheduled?

2. How does this news change how you feel about the event?

   Worse
   Better

3. Which statement best expresses how you feel?

   a. I am approaching this event.
   b. The event is approaching me.

Results. Three chi-square tests were conducted to assess whether emotion influences people’s construal of time. The first chi-square looked at how emotional condition influences people’s response to the question asking to what day the event had been rescheduled. The results of this test were not significant, _χ^2_ (1, 150) = 2.23, _p_ = .14.
The second chi-square test examined whether participants, depending on condition, thought of themselves as approaching the event or the event approaching them. The results of this test were significant, $\chi^2 (1, 154) = 9.8, p < .01$, such that participants in the dread condition perceived the event as approaching them, while participants in the enthusiastic condition perceived themselves as approaching the event. The third chi-square test analyzed how participants, for each condition, felt about the event once it had been changed. The results of the test were significant, $\chi^2 (1, 154) = 11.97, p < .001$ suggesting that participants in the dread condition felt worse about the event once it had been changed and those in the enthusiastic condition felt better about the event. The observed frequencies for all three questions can be found in Tables 1A-1C.

EXPERIMENT 2

This experiment sought to improve upon Experiment 1 by making it internet-based, thus making it easier to administer to more people. Moreover, Boroditsky and Ramscar (2002) found that spatial experience influences people's thinking about time. Thus by administering the questionnaire in the classroom, as we did in Experiment 1, participants were subject to similar spatial experiences which may have impacted how they answered the questionnaire. By having the questionnaire available on the internet, we increased our chances that participants are answering the survey in different spatial contexts.

Methods.

Participants. Two-hundred thirty-four University of Richmond undergraduates. Participants were randomly selected from the campus email directory and contacted by email.
Procedure. Participants were sent an email in which they were told that they had been chosen to participate in a web-based survey. The survey looked similar to the paper-based questionnaire with the exception of a few changes. First, instead of being asked to think of an event about which they feel dread or enthusiasm, they were asked to think of an event about which they might feel negatively or positively. Second, after having thought about their event, participants were asked a series of questions meant to serve as a mood manipulation check. Finally, participant email addresses were entered into a lottery of $50.

Results. As in Experiment 1, chi-square tests were conducted to assess the influence of emotion on one’s construal of time. The first chi-square test, examining the effect of emotion on participant’s answer to the day question was not significant, \( \chi^2(1, 229) = 1.53, p = .22 \). Results for the approach question however were significant, \( \chi^2(1, 233) = 18.9, p < .001 \). Significance was also found for the question concerning how the participant felt now that the event had been moved forward two days, \( \chi^2(1, 227) = 50.35, p < .001 \). The observed frequencies for all three questions can be found in Tables 2A-2C.

Discussion of Experiments 1 and 2

In these first two experiments, participants in the negative condition significantly reported that they felt that the event was approaching them (time-moving) while those in the positive condition significantly reported that they were approaching the event (ego-moving). This significance was strong and as predicted. However, when asked to which day the event had been moved, results are not significant, although they are moving in the predicted direction. What about the approach question taps into the metaphoric
perspective more so than does the day question? Why would one show much stronger significance than the other?

One possible explanation might be that the last two questions (that of approach and feeling about the changed event) ask participants to respond in a way that is more directly associated with emotion. The first question regarding day, however, asks participants to provide a specific temporal answer with no reference to affective reaction. Moreover, people tend to have a fixed idea about which answer is the correct one to this question (Boroditsky & Ramscar, 2002), thus the manipulation of emotion may not have been powerful enough to activate spatial thinking with regards to day.

Alternatively, perhaps there is a natural bias toward the time-moving perspective given an ambiguous temporal sentence. McGlone and Harding (1998) found this to be the case. Specifically they found that participants generally prefer time-moving consistent interpretations. They reason that this might be due to a higher prevalence of time-moving sentences in text and discourse in general. The question about day represents one such ambiguous temporal sentence and thus perhaps participants in both positive and negative conditions are answering “Monday” more often due to a time-moving bias. The approach question, on the other hand, lacks ambiguity and perhaps taps more strongly into the approach/avoidance drive that is present.

Moreover, Gray (2001) suggests that spatial tasks are enhanced by withdrawal states and impaired by approach states while the opposite holds true for verbal performance, suggesting that approach-withdrawal states have selective influences on cognitive control. Perhaps such a spatial bias for withdrawal states subtly influenced our manipulation such that those in the negative condition were more apt to apply
spatiotemporal metaphors to their thinking relative to those in the positive condition. Further explanations will be discussed in our General Discussion.

Despite the non-significance of the day question, the results from these two experiments support the idea that emotion activates spatiotemporal thinking on a certain level. In order to further understand this process, the directionality of this effect should be explored.

EXPERIMENT 3

Experiment 3 examined whether this effect is bi-directional. If emotion activates spatiotemporal metaphoric perspectives, might spatiotemporal metaphors activate emotion? In particular, how might the ego-moving perspective or the time-moving perspective make one feel about a neutral event?

Methods.

Participants. Sixty-one participants were recruited at both the University of Richmond Arts & Sciences Research Symposium and at the campus coffee shop, “8:15 at Boatwright”, in University of Richmond’s Boatwright Library.

Procedure. The purpose of this experiment was to determine whether spatial language used to describe time might influence people’s feelings about an event. Participants were given a brief two-sentence excerpt in which a character named Paul discussed an event scheduled for Wednesday that had been moved forward two days. In one condition, Paul used the ego-moving metaphor to describe the scheduled event and said it had been moved to Friday. In the second condition, Paul used the time-moving metaphor to describe the event and said it had been moved to Monday. (See Appendix A
for scenarios). After reading the excerpt, participants were asked to rate on a scale from 1 (very negative) to 6 (very positive) how they think Paul felt about the event.

Results. An independent samples T-Test was conducted to compare how people felt in the ego-moving condition to how those participants felt in the time-moving condition. Results are significant, \( t(59) = -2.2, p < .05 \), such that participants in the time-moving condition rated that Paul felt more negatively \( (M = 3.0, SE = .17) \) about the event than did those in the ego-moving condition \( (M = 3.6, SE = .22) \). (See Table 3 and Figure 1.)

DISCUSSION

Based on these results, it appears that spatiotemporal metaphors play a role in activating emotion. Specifically, ego-moving language activates positivity while time-moving language activates negativity. These results suggest that this is a bi-directional process such that emotion (positivity and negativity) activates and is activated by spatial metaphors. These findings support the intimate relationship between language and thought in that spatiotemporal language had an impact on participant’s affective reactions.

Within each condition of this study, the day was consistent with the spatiotemporal metaphor. Specifically, in the ego-moving condition, the day was moved forward to Friday while in the time-moving condition, the day was moved forward to Monday. Follow-up experiments will investigate how this effect holds when the day is inconsistent with its respective metaphoric time perspective.

GENERAL DISCUSSION
In summary, findings reported from these three experiments offer evidence that emotion influences and is influenced by spatial thinking and conceptual metaphor. In particular, we found that positivity facilitates proactive spatial thinking while negativity is associated with a more passive representation of spatial thinking. With respect to time, given a neutral scenario, described in ego-moving or time-moving language, people are more likely to feel respectively positive or negative about that neutral scenario.

Based on results from the first two experiments, positive or negative feelings about an event will influence how people spatially perceive themselves with respect to this event. Specifically, participants in the negative condition see themselves as passive while those in the positive condition perceive themselves to be more proactive.

This is consistent with research looking at motivational systems of behavior in particular those driven by approach and avoidance goals (Elliot & Thrash, 2002; Dickson & MacLeod, 2004). This research suggests that positivity is associated with proactive, approach behavior while negativity is associated with avoidance behavior (relative to approach behavior) as evidenced by diminished approach motivation and more passive behavior. Clinical and cognitive research (Dickson & MacLeod, 2004) shows that depression, for example, is associated with a motivational hopelessness and disengagement. As a result, this negative affect produces a more passive way of thinking about oneself. This active-passive dichotomy of motivational thinking and behavior seems to be present in the approach data found in this study.

With respect to spatiotemporal metaphors, while it is possible that this activity and passivity underlies respective ego-moving and time-moving perspectives, because we
did not get significant results on the day question, at this stage such a conclusion cannot be determined.

Taking into account what we know about the influence of conceptual metaphor as well as the influence of emotion on approach and avoidance thoughts and behaviors, these results make sense. It is unclear, however, why this bi-directional phenomenon did not show up in the question regarding change of day. At this stage, we can only hypothesize as to why this might be the case.

One possibility might be that emotion does not have a strong enough effect on how people construe time to the extent that they will unwittingly change how they would answer the day question. Perhaps, as discussed above, affect is shaping proactive and passive spatial thinking, but not necessarily perception of time. Given the research showing the strong relationship between spatiotemporal metaphors and thought (Boroditsky & Ramscar, 2002; McGlone & Harding, 1998) coupled with that finding evidence for the role of emotion in approach/avoidance behavior (Cacioppo et al. 1993; Chen & Bargh, 1999, Friedman & Forster, 2000), it seems premature to discount the idea that emotion would not affect people’s thinking about time.

An alternative explanation might be that people might want positive events to happen sooner (hence wishing them to be Monday), but might also take a more proactive ego-moving perspective by pushing the event to Friday, as these results indicate. Such a conflict could explain the noise found in our data on the question about day. A possible approach that might help to counter this variance would be to set the event in the distant future in order to reduce the immediacy of the event and thus the wish factor associated with this positivity.
Moreover, the power of the manipulation should be considered. For our purposes, we primed participants to think positively or negatively about an upcoming event of their choosing, actual or made-up. By having participants imagine an event, perhaps we are tapping into an emotional response that is strong enough to affect how people construe time with respect to “approach” but not strong enough to change people’s intuitions about the day change. Perhaps such a manipulation that makes participants feel about a future event is not as strong as one that would make participants feel in the present. Consequently, this may have affected how participants responded to the day question.

Further research using real positive and negative events as manipulation may be considered. However, in using real events, we must be cautious of the possibility that more than one emotion may be elicited, thus confounding our manipulation. Another approach may be to create third-person scenarios (extremely positive and extremely negative) as we did in Experiment 3. While such a manipulation risks not tapping into to true affective reactions, the ability to control the manipulation might outweigh this cost.

Finally, rather than directly examining how spatial experience influences people’s thinking about time as did Boroditsky and Ramscar (2002), in the present studies we are looking at how emotion (an abstract concept) influences thinking about time (another abstract concept) via the more concrete domain of space. Thus by examining a less direct process, we are open to more mediating factors that might decrease the effect of the approach/avoidance influence of emotion. Representation of spatial experience, for instance, as we know plays a strong role in people’s thinking about time and thus undoubtedly plays a factor in our studies. Future research should make an effort to observe participants’ spatial context while they are filling out the questionnaire and
analyze the data accordingly. Such analysis hopefully would help to tease apart and clarify the role of emotion in driving people’s construal of time.

Stepping back from the examination of the role of emotion on people’s construal of time, it is interesting to consider how these data fit in with the idea of locus of control. Locus of control refers to the extent to which people see their actions having direct consequences on outcomes. On the one hand, people might believe that outcomes are contingent on proactive behavior (internal locus of control). On the other hand, people might believe that outcomes are chance and unpredictable and thus take a rather passive approach (external locus of control).

Recent research on locus of control suggests that negative affect is associated with external locus of control while positive affect is associated with internal locus of control (Klonowicz, 2001; Henson & Chang, 1998). The findings of the approach question reported here suggest a similar relationship. Specifically, those in the negative condition significantly reported that “the event is approaching me” (external locus of control) while those in the positive condition reported that “I am approaching the event” (a more internal locus of control perspective.) Language, in this case spatial metaphor, provides us with a tool with which we can understand individual perspectives. It would stand to reason that clinical research as well as treatment should further explore the means by which language and metaphor may be a valuable tool for understanding individual affect and cognition.

As we can see, metaphor is pervasive in our language and reflects our thinking, our understanding and feelings about the world around us. Cross-cultural research on conceptual metaphor (Boroditsky, 2001; Majid, Bowerman, Kita, Haun, & Levinson,
2004) has provided evidence that metaphoric thinking can be variable depending on culture and that language may be a powerful root source of this difference in cognition. Future research in this area will further benefit and elucidate our understanding of the mechanisms by which language plays a role in shaping human thought and cognitive processes.

From a neurobiological perspective, recent research conducted by Kemmerer (2005) on patients with neurological damage suggests that while spatial metaphor is fundamental "scaffolding" for conceptualizing abstract concepts in more concrete terms, this language may not always activate spatial thinking. Specifically, his evidence supports the idea that spatial and temporal meaning, while intimately linked, may also be processed independently. As we advance our knowledge of the cognitive implications of conceptual metaphor, specifically space, such neurological work should be considered as a means of further understanding the underlying processes at work.

Emotion, based on the present research, seems to be intimately linked with how people think about time. Yet, a host of further variables are also at work influencing subjective time perception. It follows that to properly understand this integrated network that drives our construal of time, and even cognition in general, it is important to gain a holistic picture of how the underlying processes of this network influence each other, as they do not exist in a vacuum. Our embodied knowledge and perceptions are a result of an accumulation of sensorimotor experiences (emotional reaction, spatial movement) that influence each other in shaping thought. Abstract thought, in particular, capitalizes on more concrete domains, such as space, and is thus subject to even more influences from both physical and affective experience.
Thus far, the majority of research studying abstract thinking about time has looked at concrete spatial influences on this perspective. Here we add to this body of research by offering evidence that emotion, as well as spatial experience, plays a fundamental role in our spatial conception of time. Moreover, this research sheds new light on the flexibility of metaphor and its unique ability to reflect our thinking and our feelings. Specifically, these findings highlight an important relationship between affect and locus of control that is observed via spatial metaphor. The implications of such uses of spatial metaphor would seem to be beneficial to clinical research and assessment.
References


Scenario 1

We're interested in how people make inferences given very little information. Please read this excerpt:

Paul explained, “It was scheduled for a week from Wednesday. As I got closer to the event, I learned that it had been moved forward two days to Friday.”

How do you think Paul feels about the event?

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Very negative                  Very Positive
Appendix A cont.

Scenario 2

We’re interested in how people make inferences given very little information. Please read this excerpt:

Paul explained, “It was scheduled for a week from Wednesday. As the event got closer, I learned that it had been moved forward two days to Monday.”

How do you think Paul feels about the event?

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Very negative       Very Positive
# TABLES

## Table 1A
*Observed Frequencies for Day Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>Friday</td>
<td>30</td>
<td>23</td>
</tr>
</tbody>
</table>

## Table 1B
*Observed Frequencies for Approach Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Approaching</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Approaching Event</td>
<td>47</td>
<td>28</td>
</tr>
</tbody>
</table>

## Table 1C
*Observed Frequencies for Emotion Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse</td>
<td>31</td>
<td>53</td>
</tr>
<tr>
<td>Better</td>
<td>46</td>
<td>25</td>
</tr>
</tbody>
</table>
Table 2A
*Observed Frequencies for Day Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td>Friday</td>
<td>17</td>
<td>26</td>
</tr>
</tbody>
</table>

Table 2B
*Observed Frequencies for Approach Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Approaching</td>
<td>46</td>
<td>84</td>
</tr>
<tr>
<td>Approaching Event</td>
<td>66</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 2C
*Observed Frequencies for Emotion Question*

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse</td>
<td>29</td>
<td>80</td>
</tr>
<tr>
<td>Better</td>
<td>87</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 3
*Mean Rating and Standard Deviation of Emotion Inferred based on Spatiotemporal Metaphor*

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ego-Moving</td>
<td>3.6</td>
<td>.21</td>
</tr>
<tr>
<td>Time-Moving</td>
<td>3.0</td>
<td>.17</td>
</tr>
</tbody>
</table>
Figure 1. Average ratings with standard error of means for time-moving and ego-moving conditions.
SKYE OCHSNER
3611 Henrico St., Norfolk, VA 23513
757-855-8093, skyeochsner@hotmail.com

EDUCATION
Ph.D. student, Clinical Psychology, Virginia Commonwealth University. Present.
M.A., Psychology, University of Richmond. May 2005.
B.S., French, Georgetown University. May 1995.
(Fluent in French, proficient in Italian)

RESEARCH
Research on Cognition, Emotion, and Memory, University of Richmond, August 2003- present.
   Investigating the underlying metaphors that influence temporal and spatial judgments of emotionally evocative material.
   Investigating the underlying metaphors and double standards that influence social perceptions, expectations, and judgments.

WORK EXPERIENCE
   Researched and associate produced one-hour science and news documentaries.

GRANTS AND FELLOWSHIPS
University of Richmond Travel Grant: $900 (November 2005).
   Received funding to present research at the Society for Personality and Social Psychology Annual Conference.
University of Richmond, Quest Summer Fellowship: $4,000 (May 2004).
   Received funding to conduct research at Kyoto University on emotion and memory.
International Education Award: $400 (May 2004).
   Additional funding for research at Kyoto University.
University of Richmond Graduate Travel Grant: $900 (April 2004).
   Received funding to present research at the American Psychological Society Conference.
University of Richmond Graduate Research Grant: $400 (March 2004).

HONORS
Outstanding Graduate Student Award, University of Richmond. May 2005.
Williams Scholarship, Fall 2004- Spring 2005.
Roper Scholarship, Fall 2004- Spring 2005.
University of Richmond Graduate Assistantship, Fall 2003-Spring 2005.
PUBLICATIONS

CONFERENCE PRESENTATIONS


TEACHING EXPERIENCE
Lecturer, Introduction to Psychology. (Spring, 2005)
Teaching Assistant, Psychology 200: Methods and Analysis. (Spring 2004; Fall 2004).