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JUDGMENT AND DECISION MAKING IN MANAGING IT PROJECT RISKS:
A CONSTRUAL-LEVEL THEORY PERSPECTIVE

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Table of Contents

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Brief Introduction to the Research

In this research project, we focused on one of the core issues associated with information technology (IT) project management, namely the tendency to inadequately manage the risks associated with such projects. Surely project managers must know by now that risks can derail projects and that tools and techniques are available to support the risk management process. Why, then, do many project managers seem unable or unwilling to adequately manage IT project risks? We believe that answering this fundamental question requires gaining a better understanding of how project managers perceive or construe risks. To gain this understanding, we turn to Construal-Level Theory (CLT). CLT suggests that human behavior is influenced by the degree to which things are perceived as being psychologically near (i.e., concrete mental construal) versus psychologically distant (i.e., abstract mental construal). In this research, we examined key activities associated with the risk management process from a CLT perspective to determine the impact of construal on the judgment and decision making of IT project managers when it comes to managing IT project risks. Specifically, we conducted a series of four experiments in which we applied CLT to better understand how project managers' mental construal affects key risk management activities (e.g., risk identification, risk assessment, risk planning, and risk response). In our experiments, we found that IT project managers with a concrete mental construal (1) identify a greater number of project risks (Experiment 1); (2) perceive a greater potential impact of project risks (Experiment 2); (3) perceive that more effort and resources are required for risk management (Experiment 3); and (4) are less willing to enact risk responses (Experiment 4) than IT project managers with an abstract mental construal. Our findings have important implications for research and practice because we demonstrate that IT project managers' mental construal can affect a wide range of activities that have been acknowledged to be important to the risk management process.

Research Question/Objectives

IT projects are notoriously difficult to manage and often fail to deliver in one or more areas deemed to be critical (e.g., scope, schedule, cost, and quality). IT project performance problems and outright project failures occur, in part, because project managers fail to adequately identify and manage the risks that can and often do materialize (Flyvbjerg & Budzier, 2011). Despite the importance that is ascribed to risk management, many organizations continue to face challenges related to the risk management process (e.g., risk identification, risk assessment, risk planning, and risk response) (Boehm, 1991; Fairley, 1994; Schmidt, Lyytinen, Keil, & Cule, 2001; Thamhain, 2013). To address these challenges, we need to better understand project managers' judgment and decision making in managing IT project risks. In this research project, we aimed to address the following research question: ***How does the way in which project managers construe risks affect their judgment and decision making with respect to key risk management activities (e.g., risk identification, risk assessment, risk planning, and risk response)?***

Much of the prior literature on IT project risk has focused on identifying common risk factors that can adversely affect projects and developing checklists, frameworks, and questionnaires that can be used to help project managers with risk identification and risk analysis. While this work has been of immense value, it has become clear that the development of such tools alone is insufficient to improve the practice of project risk management. Prior research, as valuable as it has been, has tended to ignore the very human element of how project managers think about and respond to risks. This represents a critical gap in our understanding. Moreover, the research to date has been largely atheoretical, with the implication being that we are at a loss to really *explain* why project managers seem to be doing a rather poor job at risk management in spite of the availability of risk management tools and the growing recognition of the importance of risk management within the project management body of knowledge.

Therefore, the objective of the research was to use CLT to gain insight into project managers' judgment and decision making with respect to risk identification, risk assessment, risk planning, and risk response. Specifically, in this research we aimed to achieve the following objectives:

1. Testing whether project managers with a concrete mental construal would identify a greater number of project risks than project managers with an abstract mental construal;
2. Testing whether project managers with a concrete mental construal would perceive a greater potential impact of project risks than project managers with an abstract mental construal;
3. Testing whether project managers with a concrete mental construal perceive that more effort and resources are required for risk management than project managers with an abstract mental construal; and
4. Testing whether project managers with a concrete mental construal are less willing to enact risk responses than project managers with an abstract mental construal.

Research Frame: Concepts and Brief Literature Review

Our proposed research sits at the intersection of two streams of literature: (1) IT project risk management, and (2) Construal-Level Theory (CLT). We provide a brief overview of these two bodies of literature here, highlighting current gaps in our understanding.

IT Project Risk Management

IT project risk management is a set of activities aimed at identifying potential risks, estimating both their likelihood of occurrence and potential impact, and developing a plan to reduce their chance of occurring or to mitigate their impact should they materialize (Boehm, 1991; Fairley, 1994; Schmidt et al., 2001). IT project risk management is considered to be an important aspect of IT project management, and prior research has shown that IT project risks can have significant impacts on IT project outcomes (e.g., Wallace, Keil, & Rai, 2004). To date, prior research on IT project risk management has focused largely on the development of checklists, frameworks, and questionnaires for identifying risks or gauging the overall risk level of a project, while comparatively less emphasis has been placed on frameworks or models that specify how to manage and respond to risks (Bannerman, 2008; Barki, Rivard, & Talbot, 1993; Boehm, 1991; McFarlan, 1981; Schmidt et al., 2001; Tiwana & Keil, 2004; Wallace et al., 2004). However, despite considerable research on IT project risk, failure to manage IT project risks is still cited as one of the most significant factors causing project failure (Flyvbjerg & Budzier, 2011).

Some researchers suggest that the continued challenge concerning IT project risk management may be due to a gap between research and practice (Taylor, Artman, & Woelfer, 2012). Indeed, there is very little empirical evidence that existing knowledge about IT project risk management is actually being used for managing risks in projects (de Bakker, Boonstra, & Wortmann, 2010). Now, of course, there are many reasons why this might be the case. One possible explanation is that project managers may not know about the tools that are available. We judge this to be unlikely though. Surely project managers must know by now that risks can derail projects and that tools and techniques are available to support the risk management process (de Bakker et al., 2011; Thamhain, 2013). Another possible explanation is that project managers know about the tools but do not perceive them to be particularly useful. A third possibility is that project managers are so pressed for time that risk management-related activities tend to get pushed to the bottom of the queue on their "to-do" lists. A fourth possibility is that many project managers may work in organizations that simply lack the type of culture that is required in order to practice risk management. While these are all plausible explanations that merit further research before they can be ruled out, we focus here on a more fundamental reason why project managers may not pay adequate attention to risks and to risk management-related activities, namely the psychological tendency for project managers to think of risks as being distant threats that are unlikely to affect their project. Unfortunately, much of the prior research on IT project risk management has been largely atheoretical and has not provided an in-depth understanding of project managers' judgment and behaviors in managing project risks, and thus, our research has the potential to offer new insights into this area by drawing on a well-established theory, namely CLT.

Construal-Level Theory

CLT provides a powerful theoretical lens for gaining insight into project managers' judgment and decision making in the context of risk management. CLT suggests that our judgments and decisions are influenced by the degree to which we perceive something as being psychologically distant. Psychological distance can be thought of in several different ways (e.g., temporal distance, spatial distance, social distance, and hypothetical distance). These distances

are cognitively related to one another, and are influenced by the way in which things are construed (Trope & Liberman, 2010). For example, people construe a psychologically near object concretely, and a psychologically distant object more abstractly. When an object or event is construed in a concrete manner, people will focus on incidental features and specific details of the object or event. In contrast, when an object or event is construed in an abstract manner, people will focus on central features that capture the overall gist of the object or event (Trope, 2012). Further, prior research on CLT has found that mental construal influences individuals' cognition and behavior, and can thus affect their evaluations of objects and events (Trope & Liberman, 2000). Drawing on CLT, we suggest that when project managers think of projects and associated risks as being psychologically distant (i.e., abstract mental construal), their risk perceptions and risk management intentions will be different than then when they think of projects and associated risks as being psychologically proximal (i.e., concrete mental construal).

In an experiment, Chandran and Menon (2004) found that temporal framing (e.g., short term versus long term) influences how people perceive health-related risks. Specifically, people perceived a greater risk when a health hazard was presented in a day frame (e.g., every day, a significant number of people succumb to heart disease) than when it was presented in a year frame (e.g., every year, a significant number of people succumb to heart disease). In interpreting their results, Chandran and Menon (2004) suggested that temporal distance influences the concreteness of a health hazard, thus increasing individuals' risk perception. Although set in a different context, the evidence that construal influences individuals' perceptions of health-related risks highlights the potential of CLT as a theoretical lens to offer fresh insights into project managers' judgment and decision making in managing IT project risks.

CLT also provides insight into the distinction between desirability concerns and feasibility concerns related to goal-directed behavior (Trope, Liberman, & Wakslak, 2007). Desirability concerns pertain to the value ascribed to reaching some end state, whereas feasibility concerns pertain to the means used to reach this end state. As psychological distance increases, CLT predicts that "desirability concerns should receive greater weight over feasibility concerns" (Trope et al., 2007, p. 89). Liberman and Trope (1998, p. 12) conducted an experiment in which they found that "feasibility considerations are relatively more influential in decisions about the near future whereas desirability considerations are relatively more influential in decisions about the distant future."

Based on the above, we suggest that CLT represents a very promising theoretical lens for understanding project managers' judgment and decision making with respect to risk management-related activities (e.g., risk identification, risk assessment, risk planning, and risk response). We believe that application of CLT to the domain of IT project risk management can not only help to explain project managers' judgment and decision making with respect to risks and risk management, but also can provide practical interventions that can sensitize project managers to the risks a project may face and help them become more successful in managing the threats that such risks pose.

Methods

Our overall research design consisted of a series of four experiments, each involving a basic, randomized design comparing two conditions (Shadish, Cook, & Campbell, 2002) in which construal was manipulated to be either concrete or abstract. We chose the experimental method because the major goal of this research was to determine if there was a causal relationship between IT project managers' mental construal and how they engage with key project risk management activities. Internal validity is of paramount concern in testing causal relationships between variables and the experimental method is universally acknowledged as providing high internal validity, making experiments the most appropriate choice for establishing causal relationships. We worked with a survey panel services provider to recruit IT project managers to take part in our experiments. The experiments were conducted in an online setting in which IT project managers visited our web-based experiment via a link provided in the invitation email. We employed several different construal-level manipulation approaches to add robustness to our findings: (1) an approach that aims to induce subjects to focus on desirability (why) versus feasibility (how) of an action[1] (Freitas, Gollwitzer, & Trope, 2004; Stephan, Liberman, & Trope, 2011); (2) an approach that manipulates hypothetical distance (Wakslak, Trope, Liberman, & Alony, 2006); and (3) a category/exemplar approach in which subjects identify specific examples or general categories of objects (Fujita, Trope, Liberman, & Levin-Sagi, 2006).

By conducting multiple experiments, we were able to explore the effect of mental construal on IT project managers' judgment and decision making across a wide range of risk management-related activities. We used Statistical Package for the Social Sciences (IBM SPSS) for our data analysis. For each experiment, we checked to make sure that our manipulations were effective by running an analysis of variance (ANOVA) to determine if there was a statistically significant difference between the concrete construal group and the abstract construal group on the manipulation checks. We also conducted a series of analyses to establish that our measures were reliable and valid. Finally, we ran ANOVA-based procedures to determine if there was a statistically significant difference between the concrete construal group and the abstract construal group on the dependent variable of interest (e.g., risk identification, risk assessment, risk planning, and risk response). ANOVA-based procedures are well-established statistical techniques that are commonly used to assess differences between groups and are thus considered to be appropriate techniques for analyzing data from experiments.

[1] The purpose of an action (i.e., why an action is undertaken) speaks to the issue of desirability, whereas the means of accomplishing an action (i.e., how to perform an action) speaks to the issue of feasibility. According to CLT, why is considered superordinate to how because the means of performing an action is only relevant if the reason for performing an action is relevant (Vallacher & Wegner, 1985, 1987).

Primary Results and Discussion of Findings

Experiment 1: Risk Identification

Experiment 1 was designed to test the effect of mental construal on risk identification and involved a basic, randomized design comparing two treatments (Shadish et al., 2002, p. 258) in which we manipulated IT project managers' mental construal to be either concrete or abstract. We recruited a total of 68 IT project managers (29 males and 39 females) in North America through a survey panel services provider,[2] and randomly assigned them to one of two experimental groups: the concrete mental construal group and the abstract mental construal group.[3] IT project managers who participated in Experiment 1 were, on average, 39 years old, and had, on average, nine years of experience in IT and six years as an IT project manager.

Decision Task, Procedures, and Measures. IT project managers were asked to read a vignette about an IT project, were introduced to a construal-level manipulation, and then asked to identify the risks that they perceived with the IT project and write them down using a numbered list.[4] Our construal-level manipulation was modeled after the why/how approach that is widely used and accepted in the CLT literature. CLT suggests that the abstract mental construal of an action is primarily concerned with *why* aspects of an action, whereas the concrete mental construal of an action is primarily concerned with *how* aspects of the action (Trope & Liberman, 2003). Following this, prior research manipulated construal level by instructing subjects to complete a task that involves describing why or how an action is performed (Freitas et al., 2004; Stephan et al., 2011). For example, Freitas et al. (2004) instructed subjects to consider either why they would engage in an activity (improve and maintain health) (abstract mental construal), or how they would engage in the same activity (concrete mental construal). In our experiment, we asked IT project managers to write down either why (abstract mental construal) or how (concrete mental construal) the project team is implementing the system.

Results. We conducted an analysis of covariance (ANCOVA) in order to compare the average number of project risks identified by IT project managers in the concrete versus abstract mental construal groups. We included risk propensity, IT project management experience, and gender as covariates in the ANCOVA, as these variables might affect IT project managers' risk identification. The results of the ANCOVA indicated that IT project managers in the concrete mental construal group (N = 32, M = 2.50, SD = .62) identified a greater number of risks associated with the project than did IT project managers in the abstract mental construal group (N = 36, M = 1.72, SD = 1.19), and this difference was statistically significant ($F(1,63) = 11.96$, $p<.01$, $\eta^2_p = .17$).

[2] We worked with the same survey panel provider for all experiments reported and ensured that no project manager participated in more than one experiment.

[3] In each of the experiments reported, we checked and confirmed that there were no statistical differences in terms of age, gender, experience as an IT project manager, or risk propensity among the IT project managers who were randomly assigned to the two experimental groups. This confirmed that random assignment was successful and that any differences observed between the two groups could not be attributed to selection bias.

[4] A major benefit of using vignettes in scientific studies is that researchers are able to manipulate specific variables of interest through a written stimulus while controlling other factors, offering "a glimpse into how individuals' thoughts, feelings, behaviors, and decisions are affected by factors that may not be easily accessible in real-life situations because of confounding sources of variability that cannot be controlled" (Evans et al., 2015, p. 161).

Experiment 2: Risk Assessment

Experiment 2 was designed to test the effect of mental construal on risk assessment and involved a basic, randomized design comparing two treatments in which we manipulated IT project managers' mental construal to be either concrete or abstract. We recruited a total of 70 IT project managers (34 males and 36 females) in North America to take part in Experiment 2, and randomly assigned them to either the concrete or abstract mental construal group. IT project managers who participated in Experiment 2 were, on average, 41 years old, and had, on average, nine years of experience in IT and six years as an IT project manager.

Decision Task, Procedures, and Measures. Experiment 2 involved the same vignette used in Experiment 1. After reading the IT project vignette, IT project managers were presented with five risks associated with the project (they were told that the project team had identified these five project risks), introduced to a construal-level manipulation, and asked to estimate the impact that each risk would have on the project should it materialize (0 = lowest impact and 100 = highest impact). The five risks that IT project managers were asked to evaluate were: (1) data quality issues during data migration, (2) failing to determine requirements due to a lack of participation from students, (3) privacy issues that may arise dealing with student records, (4) communication problems with the software testing vendor, and (5) failing to launch the system as scheduled.

The construal-level manipulation used in Experiment 2 was based on hypothetical distance. Hypothetical distance refers to how probable a future event is (Armor & Sackett, 2006). CLT suggests that a highly probable event is processed at a concrete level and a highly improbable event is processed at an abstract level. Several CLT studies have manipulated construal level through hypothetical distance. For example, in an experiment that tested the causal effect of construal level on how people categorize objects (Wakslak et al., 2006), participants were asked to imagine that they were planning on engaging in a series of four activities that were described as either "almost certain to occur" (a low hypothetical distance, concrete mental construal) or "almost certain not to occur" (a high hypothetical distance, abstract mental construal). In our experiment, we told participants that each of the five risks associated with the IT project was either "almost certain to occur" (a low hypothetical distance, concrete mental construal) or "almost certain not to occur" (a high hypothetical distance, abstract mental construal).

Results. We found that IT project managers in the concrete mental construal group perceived a greater potential impact (0 = lowest impact and 100 = highest impact) of each of the five risks compared to IT project managers in the abstract mental construal group. We created a composite measure for perceived potential impact by computing a mean score across the five project risks and then conducted an ANCOVA in order to compare the concrete versus abstract mental construal group. We included risk propensity, IT project management experience, and gender as covariates in the ANCOVA, as these variables might affect IT project managers' perceived potential impact of risks. The results of the ANCOVA indicated that the perceived impact of the five risks was statistically different between the concrete mental construal group ($N = 35$, $M = 63.88$, $SD = 18.51$) and the abstract mental construal group ($N = 35$, $M = 48.51$, $SD = 22.20$), $F(1,65) = 7.11$, $p<.01$, $\eta^2_p = .10$.

Experiment 3: Risk Planning

Experiment 3 was designed to test the effect of mental construal on risk planning and involved a basic, randomized design comparing two treatments in which we manipulated IT project managers' mental construal to be either concrete or abstract. We recruited a total of 70 IT project managers (34 males and 36 females) in North America to take part in Experiment 3, and randomly assigned them to either the concrete or abstract mental construal group. IT project managers who participated in Experiment 3 were, on average, 36 years old, and had, on average, 12 years of experience in IT and five years as an IT project manager.

Decision Task, Procedures, and Measures. The experiment involved identifying specific risks (concrete mental construal) or general categories (abstract mental construal) for 16 risk areas associated with developing a sales management system for external sale. Our construal-level manipulation was modeled after the category/exemplar approach that has been widely used in the CLT literature. Specifically, prior CLT studies have manipulated construal level by asking participants to come up with either superordinate categories or subordinate exemplars of objects. For example, Fujita et al. (2006) provided participants with 40 words (e.g., computer, movie, lunch), and asked them to write down either a superordinate category (abstract mental construal) or a subordinate exemplar (concrete mental construal) of each word. For example, if the word "dog" was given, participants in the abstract mental construal group might write down "animal" while participants in the concrete mental construal group might write down "poodle." In another example of the category/exemplar approach, Fujita, Eyal, Chaiken, Trope, and Liberman (2008) conducted an experiment to investigate the effect of construal level on individuals' willingness to support a wildlife conservation organization and manipulated construal level by describing the wildlife conservation organization as dedicated to protecting a specific killer whale, named Simoon (concrete mental construal) or orcas in general (abstract mental construal).

In our experiment, IT project managers were told that they have been assigned as a project manager to lead a project that is expected to deliver a sales management system for external sales. Further, IT project managers were informed that the project manager and the project team have identified a list of 16 IT project risk areas.[5] We then introduced the manipulation of construal level. Similar to the approach used by Fujita et al. (2006), in the abstract mental construal group we asked IT project managers to write down a general category that each risk area belongs under (e.g., if the risk area is "market demand," a more general category might be "external risk" as market demand is an example of external risk). In the concrete mental construal group, we asked IT project managers to write down a specific risk that falls within each area. In our experiment, IT project managers in both concrete and abstract mental construal groups were presented with the exact same list of risk areas, but they were asked to come up with either a subordinate exemplar or a superordinate category for each risk area. Following the construal-level manipulation, IT project managers were asked to indicate how much effort and resources they thought would be required to manage each of the 16 risk areas on a seven-point scale.

Results. We found that for each of 16 risk areas, IT project managers in the abstract construal group perceived a smaller amount of effort and resources required for risk management than IT project managers in the concrete mental construal group. We created a composite measure by computing a mean score for all 16 risk areas and conducted an ANCOVA with IT project managers' mental construal as the independent variable, and effort and resources required for risk management as the dependent variable. As in the previous experiments, we included IT project management experience, gender, and risk propensity as covariates. The results indicated that IT project managers in the abstract mental construal group perceived a smaller amount of effort and resources required for risk management than did IT project managers in the concrete mental construal group and this difference was statistically significant ($F(1,65) = 7.46$, $p<.01$, $\eta^2_p = .10$).

[5] Development of the 16 risk areas used in our manipulation were informed by the risk breakdown structure examples provided in *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fifth Edition (PMI, 2013) and *Practice Standard for Project Risk Management* (PMI, 2009).

Experiment 4: Risk Response

Experiment 4 was designed to test the effect of mental construal on risk response and involved a basic, randomized design comparing two treatments in which we manipulated IT project managers' mental construal to be either concrete or abstract. We recruited a total of 70 IT project managers (43 males and 27 females) in North America to take part in Experiment 4 and randomly assigned them to either the concrete mental construal group or the abstract mental construal group. IT project managers who participated in Experiment 4 were, on average, 36 years old, and had, on average, nine years of experience in IT and six years as an IT project manager.

Decision Task, Procedures, and Measures. IT project managers were asked to read a vignette of an IT project that involved developing an application to read and translate the barcodes that are used to track packages. In the vignette, "conflict among team members over the best development methodology to employ" was introduced as a project risk that had been identified. After reading the vignette, IT project managers were asked to complete a task that was designed to induce either a concrete mental construal or an abstract mental construal. Specifically, the construal-level manipulation was modeled after the how/why approach that is widely used and accepted in the CLT literature (Freitas et al., 2004; Stephan et al., 2011). Using this approach, construal level is manipulated by instructing subjects to write either how or why they would do an activity. In our experiment, we instructed IT project managers to write either how or why they would enact a series of four risk responses: (1) mitigate the risk, (2) reserve resources to manage the risk, (3) prevent the risk, and (4) monitor the risk. Next, IT project managers were asked to indicate whether they would: (1) mitigate the risk, (2) reserve resources to manage the risk, (3) prevent the risk, or (4) monitor the risk.

Results. We found that IT project managers in the abstract mental construal group were more willing to enact risk responses than in the concrete mental construal group for each of the four risk responses. Next, we conducted an ANCOVA in which the independent variable was IT project managers' mental construal and the dependent variable was a composite score for risk response created based on a mean of risk response decisions across risk mitigation, risk reserve, risk prevention, and risk monitoring. We included IT project management experience, gender, and risk propensity as covariates. The results of the ANCOVA showed that IT project managers in the abstract mental construal group were more willing to enact risk responses ($N = 36$, $M = 6.10$, $SD = .74$) than IT project managers in the concrete mental construal group ($N = 34$, $M = 5.49$, $SD = 1.00$), and this difference was statistically significant ($F(1,65) = 7.14$, $p<.01$, $\eta^2_p = .10$).

Significance of the Research Findings

Our research findings are significant for three reasons. First, they extend our understanding of IT project risk management. Second, they extend our understanding of CLT. Third, they extend our understanding of optimism in IT project management.

Much of the prior research on IT project risk management has focused on the development of checklists, frameworks, questionnaires, risk management models, and risk response strategies (see, e.g., Schmidt et al., 2001). While there are a few exceptions (Lyytinen, Mathiassen, & Ropponen, 1998), the application of solid theory capable of advancing our knowledge of IT project risk management has been quite limited. By bringing CLT into the picture and using it to put the spotlight on IT project managers' mental construal, we gain new insight into how IT project managers engage in risk management activities. Project risk management researchers have long suggested that IT project managers' behavior with respect to risk management does not always conform to the rational choice model (Lyytinen et al., 1998). Our research adds to this discourse by providing strong evidence that IT project managers' mental construal can influence the entire sequence of risk management activities, including risk identification, risk assessment, risk planning, and risk response. Given the obvious and long-standing question of why IT project risk management theory is not having a greater impact on IT project risk management practices, our research suggests that, along with other possible explanations (e.g., lack of time to engage in risk management activities, lack of adequate culture to support risk management practices, or perfunctory approaches to risk management), one simple explanation is that IT project managers' mental construal may impede them from getting the maximal benefit from the risk management activities that they do perform.

Our research extends CLT by theorizing and then showing empirically how mental construal affects context-specific activities that are important in IT project risk management. By incorporating CLT within the context of IT project risk management, we explain how the theory operates within that context, which represents a distinct contribution (Eisenhardt & Graebner, 2007). In terms of CLT, IT project risk management represents a novel context, and by exploiting this novel context, we were able to consider novel dependent variables that have not previously been investigated by CLT scholars. This novelty extends to the relationships that we examined and lends new insight into what is influenced by construal level.

Finally, our research offers a new theoretical perspective in understanding optimism in IT project management by showing that an abstract mental construal generates greater optimism (i.e., underestimation of effort and resources) in risk planning relative to a concrete mental construal (Experiment 3). Optimism has been recognized as an important and persistent problem in software development, and optimistic estimation has been the most commonly cited form of optimism (i.e., underestimating the time required to complete a task or a project; see Abdel-Hamid & Madnick, 1989; Brooks, 1995; Jones & McLean, 1970; McConnell, 2006; Shmueli, Pliskin, & Fink, 2016; Van Genuchten, 1991). To date, researchers have offered limited explanations as to why optimism might be so prevalent in software development. In his seminal book on software engineering, *The Mythical Man-Month*, Brooks (1995) suggested that optimism is a key problem in software development and that "all programmers are optimists." Similarly, Jones and McLean (1970) suggested that "as a class, programmers tend to be eternally optimistic . . . they fail to be realistic about the problems of system design and the time necessary to complete a complex system." More recently, researchers suggested that managers are more prone to optimistic estimation than programmers (Jørgensen & Molokken-Ostvold, 2004). Much of the prior research seems to suggest that optimism may be a personality issue. Another explanation for optimism in software development is concerned with the nature of software development work and technologies. Abdel-Hamid (1988) suggested that "poor visibility" in software development is a factor contributing to the underestimation problem. Against this backdrop, our research offers a new perspective that advances the scholarly understanding of optimism in IT project management by focusing on IT project managers' mental construal.

Practical Application(s) of Findings

Our research has important implications for practice because it offers a path toward the development of interventions (based on manipulation of construal level) that can improve the practice of IT project risk management. One possible intervention is to have IT project managers incorporate *how* exercises into their risk-identification practice. Once a project is selected and approved, IT project managers should focus on how specific elements of the project are planned to be implemented and this exercise can help them think more concretely about implementation plans and identify holes or cracks in the plans.

Another possible intervention is to have IT project managers separately evaluate the *probability* and *impact* of risks as they work through the activity of risk assessment. Since our research suggests that high-probability risks are perceived to have higher impact (because of reduced psychological distance), and low-probability risks are perceived to have lower impact (because of increased psychological distance), IT project managers may underestimate the potential impact of risks that are less likely to occur if the assessment of probability and impact are done together. Prior research has suggested that many IT projects fail due to improbable events that end up having a significant impact (Flyvbjerg & Budzier, 2011). Thus, we suggest that organizations and/or IT project managers adopt the practice of evaluating probability and impact independently (e.g., when a project manager evaluates the potential impact of a risk, the information about the estimated likelihood of the risk is not presented), as this can help reduce the potential mistake of underestimating the risk impact.

A third possible intervention relates to risk planning where we suggest that decomposing risk areas into specific risk events can help to combat overly optimistic thinking. This approach is consistent with the concept of developing a risk breakdown structure (RBS) that is a hierarchical organization of project risks arranged by risk categories (PMI, 2013). An RBS organizes various risk areas and identifies the specific events associated with each risk area. The idea is that developing an RBS can help to identify risks that one might not otherwise think of. As demonstrated in our research, the risk decomposition exercise that is inherent to the development of an RBS can reduce potential optimism associated with risk planning. As part of the RBS process, we further suggest that organizations adopt the practice of identifying specific examples of each risk area (i.e., concrete mental construal) prior to estimating the effort and resources required for risk management, as this should help to generate a more conservative estimate and reduce optimism regarding successful risk management.

Finally, it is important for IT project managers to enact appropriate risk responses. We recommend that organizations advise IT project managers to focus on pros (abstract mental construal) associated with risk responses rather than cons (concrete mental construal) associated with risk responses. An abstract mental construal will help IT project managers focus on arguments in favor of enacting risk responses, rather than arguments against doing so.

Conclusions

Risk management is widely believed to be critical for successful IT project management. Still, the situation in most organizations is that risk management activities are performed in a perfunctory manner. Even in organizations that make a serious attempt to put risk management tools into practice, it is not clear that IT project managers are able to reap the maximal benefits that could be derived from engaging in risk management. Among the things that must change if we are to advance both IT project risk management theory and practice is a solid theory to inform our understanding of how IT project managers can engage in a more productive way with risk management activities. In this research, we introduce a recognized theory from psychology—Construal-Level Theory—to examine previously unexplored relationships involving the impact of IT project managers' mental construal on various risk management activities. Our research shows that IT project managers' mental construal can influence a broad range of project risk management activities. Further, it offers one possible explanation as to why risk management is not taken more seriously in organizations, and why IT project managers may not be getting as much benefit as they can from the risk management activities that they do engage in—namely that project managers may not be able to see the "trees" (i.e., the risks) because they are too busy looking at the "forest." We believe that a CLT lens not only improves our theoretical understanding of IT project risk management, but that it also offers a promising avenue for improving IT project risk management practices by pointing the way toward interventions that can be used in actual project settings.

Appendix 1: List of Outputs

Completed:

1. Manuscript titled "Seeing the Trees or the Forest? The Effect of IT Project Managers' Mental Construal on IT Project Risk Management Activities" currently in press at *Information Systems Research*
2. 10-page final report
3. Presentation for local PMI chapter meeting; a presentation was made at the PMI Tampa Bay, Florida Chapter on 20 August 2018

Planned:

1. One-hour PMI webinar (to be scheduled upon submission of 10-page final report)

Appendix 2: List of Published Articles, Conference Papers/Presentations, and Other Presentations Based on This Research

No published articles or conference papers/presentations have yet materialized from this research. However, we do have a paper that is currently under review at *Information Systems Research* which is a top-tier journal in the information systems field. We have also presented the research at several universities after the PMI grant was received (see list below):

- "Optimism Bias in Managing IT Project Risks: A Construal-Level Theory Perspective," invited presentation given at the Swinburne University of Technology, 21 March 2017
- "Optimism Bias in Managing IT Project Risks: A Construal-Level Theory Perspective," invited presentation given at the Rotterdam School of Management, Erasmus University Rotterdam, 18 May 2017
- "Optimism Bias in Managing IT Project Risks: A Construal-Level Theory Perspective," invited presentation given at the Terry College of Business, University of Georgia, 20 April 2018
- "Seeing the Trees or the Forest? The Effect of IT Project Managers' Mental Construal on IT Project Risk Management Activities," invited presentation given at the Alfred Lerner College of Business & Economics, University of Delaware, 3 December 2018

Appendix 3: Comparison of Planned Deliverables in Research Agreement to Actual Project Deliverables

Originally Planned Deliverables

1. 10-page final report
2. Journal article submission for *Information Systems Research*
3. Journal article submission for *Project Management Journal®*
4. Paper for academic conference
5. One-hour PMI webinar
6. Presentation for local PMI chapter meeting
7. Presentation for PMI® Global Conference
8. Summary of research for reflective practitioners

Actual Project Deliverables

1. 10-page final report
2. Journal article submission for *Information Systems Research*
3. One-hour PMI webinar (to be scheduled upon submission of 10-page final report)
4. Presentation for local PMI chapter meeting; a presentation was made at the PMI Tampa Bay, Florida Chapter on 20 August 2018

Upon consultation with Terry Williams (PMI project liaison) and Heather Ramsey (manager, academic programs, PMI) on 1 May 2018, the actual project deliverables were reduced relative to the originally planned deliverables. As Mr. Williams observed: Dr. Keil "clearly got over-enthusiastic and agreed to just about every possible deliverable . . . he shouldn't have said that many—and they will duplicate each other." Ms. Ramsey's response was that the three "must dos" based on the contract included:

- 10-page final report
- Journal article submission
- One-hour PMI webinar

Plus one of the following:

- Article for ProjectManagement.com
- Additional journal article
- Presentation at academic or management conference
- Presentation for local PMI chapter meeting
- Presentation for PMI® Global Conference
- Summary of research for reflective practitioners

Based on the above list, we elected to make a presentation for a local PMI chapter meeting.

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Mark Keil is a distinguished university professor at Georgia State University where he is the John B. Zellars Professor of Computer Information Systems in the J. Mack Robinson College of Business. Dr. Keil holds BSE, SM, and DBA degrees from Princeton University, MIT Sloan School, and Harvard Business School, respectively. His research focuses on IT project management and decision making, and includes work on preventing IT project escalation, improving IT project status reporting, identifying and managing IT project risks, improving project control, managing IT implementation projects, and overcoming barriers to system use. He has published over 100 refereed journal articles in outlets such as: *MIS Quarterly, Information Systems Research, Strategic Management Journal, Journal of Management Information Systems, Decision Sciences*, *IEEE Transactions on Engineering Management*, *Sloan Management Review*, and *California Management Review.* Dr. Keil currently serves as a senior editor for *MIS Quarterly* and is on the editorial board of the *Journal of Management Information Systems*. He has previously served as a senior editor for *Information Systems Research* and *Information Systems Journal*, an associate editor for *MIS Quarterly* and *Decision Sciences*, co-editor of *The DATA BASE for Advances in Information* Systems, and as an editorial board member for *IEEE Transactions on Engineering Management*. He is a past division chair for the Academy of Management (Organizational Communication and Information Systems Division).

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