CONNECTING ABSTRACT GOALS WITH THE MEANS TO ACHIEVE THEM: CONSTRUAL LEVEL THEORY, STRATEGIC MESSAGES, AND MOBILE TECHNOLOGY

Presented to the Faculty of the Graduate School
of Cornell University
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

by
Sherri Jean Katz
January 2015

CONNECTING ABSTRACT GOALS WITH THE MEANS TO ACHIEVE THEM: CONSTRUAL LEVEL THEORY, STRATEGIC MESSAGES, AND MOBILE TECHNOLOGY

Sherri Jean Katz, Ph. D.
Cornell University 2015

This work provides theoretical models that adapt construal level theory to the study of persuasion and describes findings from tests of several key propositions. The first chapter provides a theoretical model that proposes how the concepts of abstraction and distance influence the processing of persuasive messages. Chapter 2 tests two different mechanisms of fostering cognitive bridging, which is a connection between specific behavioral choices and abstract goals. In three experiments (n = 263, n = 145, n= 145), the induced process was effective at fostering cognitive bridging, while the integrated process was not. This suggests that cognitive bridging can be fostered through the text of the persuasive message, regardless of how abstractly or concretely somebody is initially thinking. In Chapter 3, interactions between construal level theory and psychological reactance theory are explored through two experiments (n = 84, n = 79). Both experiments illustrate that when individuals are thinking specifically (low construal level), the message is psychologically close, and threat to choice is high, message effectiveness is lowest. However, when the individual is shifted to think more abstractly (high construal level), message effectiveness can increase. This suggests that it might be possible to deliver a message featuring a high threat to choice if the individual is processing the message abstractly. In Chapter 4, the affordances of mobile technology are connected to the concepts in construal level theory to present a theoretical model. In Chapter 5, three experiments (n = 232, n = 82, n = 47) test the concept of shifting to explore whether it is possible to shift how abstractly or concretely somebody is processing information using a mobile device. Finally, Chapter 6 concludes with a future research agenda for the study of construal level theory in the field of communication.

BIOGRAPHICAL SKETCH

Sherri Jean Katz was born in Smithtown, NY. She attended the S.I. Newhouse School of Public Communications at Syracuse University as a Chancellor's Scholar. She also had a four-year undergraduate scholarship from United Technologies. Katz graduated Summa Cum Laude with a B.A. in Public Relations (Honors) and Political Science, with a minor in marketing, in 1996. She earned an M.A. in Culture and Communication (2004), as well as certificates in Advanced Event Management (2004) and Digital Media Marketing (2010) from NYU. In route to her Ph.D., Katz earned an M.S. in Communication from Cornell University in 2013. She has worked professionally in advertising, public relations, marketing, and higher education administration and ran Kamalog Communications, Inc. Katz has been inducted into several academic honorary societies, including Phi Beta Kappa, Kappa Tau Alpha, Phi Sigma Alpha, and Phi Kappa Phi. While completing her doctorate, she was awarded the Anson E. Rowe Award for Promising Graduate Student in May 2012 and the Glass Family Fellowship in June 2013. Her dissertation was funded by a National Science Foundation Dissertation Improvement Grant. Katz is the proud mother of Ariana Muriel, who is nine months old.

Dedicated to
Fred and Dianne Katz
and
Ariana Muriel Katz

ACKNOWLEDGEMENTS

There are many individuals who have guided and assisted me throughout my doctoral studies. While words alone cannot possibly express the gratitude I have for their invaluable support, I will try to acknowledge them.

First, as my advisor, Sahara Byrne, Associate Professor in the Department of Communication, has been a champion for me throughout my doctoral studies. She has given me the space to be creative in my scholarly work and the training to be rigorous in its pursuit. I have so many hilarious memories of us working together! I still remember the exact moment that she taught me to think in a theoretical way, enabling my ideas to develop. I am very thankful that she encouraged me to reach beyond the literature and beyond her work to find my own scholarly voice. But mostly, I am so appreciative that she gave me the support to grow personally as well. She has been very supportive of my decision to become a mother while completing my doctorate, and I have learned from her that one can be both a wonderful mother and an accomplished scholar. My life is forever better for having worked with her, both professionally and personally.

Mike Shapiro, Professor in the Department of Communication, has had a tremendous influence on me as well. During my first semester, I was his teaching assistant, and I learned a great deal about teaching from that experience. However, I found the conversations while walking to and from class even more informative. He questioned my ideas, forcing me to think more deeply and more thoughtfully about them. Even now, I emerge from each conversation with Mike thinking profoundly differently than I did before, and I trust his perspective on so many things. I am so appreciative to have had the opportunity to learn from him.

I also have learned so much from Geri Gay, Kenneth J. Bissett Professor of Communication. I had the opportunity to conduct my first study under her guidance, and she taught me so much about managing a complex project. I loved working as her research assistant, and participating in her lab stimulated my interest in mobile technology. She helped me with my NSF application and has been so supportive of me throughout my doctoral studies.

Dennis Regan, Associate Professor of Psychology, has been a terrific influence on my work as well. His seminar course in Advanced Social Psychology transformed the way that I think and contributed greatly to the trajectory of my research. He was close to retirement when he joined my committee, and I am so thankful that he did. He has been a very conscientious committee member, who reads my work carefully and provides thoughtful critique. I appreciate all of his guidance.

Alan Mathios, The Rebecca Q. and James C. Morgan Dean of the College of Human Ecology, has also been a big supporter of my doctoral studies. I have enjoyed working on the cigarette warning labels project with him, and I have learned so much from the experience. I am very thankful to have had the opportunity to work with him, and I really appreciate his support.

I am also very thankful to have had the opportunity to work with Jeff Niederdeppe, Associate Professor of Communication, on both the e-moms project and the cigarette warning labels project. He is a very thoughtful scholar, and I have learned a great deal from him. I am very appreciative of his support and guidance.

I have enjoyed guiding students in the Media Effects Lab. Numerous students have contributed to this dissertation by coding data, running experiments, and assisting with the development of stimuli, and I appreciate their conscientious hard work. I am particularly thankful to Alyssa Irene Kent, who collaborated on the project integrating construal level theory

and psychological reactance theory. And, I am honored to have helped guide Alexia Victor on her capstone project. Presenting with her at NCA and seeing her grow as a scholar was a highlight of my doctoral experience.

The faculty, staff and other students in the Department of Communication, as well as my extended network of family and friends, have also been so helpful throughout the last several years. I have received guidance and advice from so many people, and I truly appreciate their help navigating the challenges of the doctoral experience.

I am most appreciative of my parents, who realized that I had the dream of pursuing my Ph.D. and encouraged me to reach for the sky and realize my potential. They made it possible for me to transition from being a working professional to being a student, and they have been tireless supporters of me throughout my entire life. Words cannot possibly express how appreciative I am of them. They have helped me to accomplish two dreams simultaneously, completing my Ph.D. and becoming a mother. For that, and so much more, I am forever grateful.

Finally, to my daughter Ariana Muriel, who I love more than words can express, thank you for making my life so much richer each day. This dissertation was written as you napped, played in a baby swing and cuddled on my lap as I typed. Thank you for providing me with purpose and balance. I love you so much.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

1. CLO – Construal Level Orientation
2. CLPC – Construal Level Perception of Choice
3. LCM – Linguistic Category Model
4. DAV – Descriptive Action Verb
5. IAV – Interpretive Action Verb
6. SV – State Verb
7. ADJ – Adjective
8. PD – Psychological Distance
9. BIF – Behavioral Identification Form
10. mCLO – Mobile Construal Level Orientation Application
11. PES – Probability Estimate Scale, derived from Wakslak & Trope (2009)

INTRODUCTION

Construal level theory predicts that close items are thought about very concretely, and far items are mentally represented abstractly (Trope & Liberman, 2010). This theoretical framework is well-established in social psychology (see Liberman & Trope, 2008; Trope & Liberman, 2010) and consumer psychology (Dhar & Kim, 2007; Fiedler, 2007; Kim, Zhang, & Li, 2008), and has been shown to influence attitudes in regards to strategic messages (Fujita, Eyal, Chaiken, Trope, & Liberman, 2008; Kim, Rao, & Lee, 2009). However, with few exceptions (eg. Nan, 2007; Lutchyn & Yzer, 2011), prior work has not investigated the influence of construal level theory on persuasion in the field of communication. Construal level theory can influence how we think about strategic message design and delivery.

There are three core extensions that this work makes to construal level theory. Rather than focus only on the relationship between abstraction and distance in the mind, this work considers the role of abstraction, distance and motivation cues in strategic messages and how they integrate with each other and with the way the mind is processing information. Second, abstraction and distance are fluid concepts. Messages can help people connect the specific choice they make in the moment to their long-term, abstract behavioral goal. Indeed, several of the chapters in this work mention this, and Chapter 2 directly focuses on seeking to determine the best technique as well as the underlying mechanisms through which these connections occur. Third, interconnected media, such as mobile technology, can deliver messages within the context of a specific decision and help people to relate that decision context to their higher level, more abstract goals.

This work starts by providing a theoretical model that adapts construal level theory to the study of persuasion. This first chapter highlights two pathways to message effectiveness, one

based on construal level congruence and another based on motivation. Seven propositions and one research question articulate the current state of the literature, as well as an agenda for future inquiry.

Chapter 2 expands upon concepts mentioned in Chapter 1. In this chapter, two processing models of construal level influence, integrated and induced, are directly tested through the concept of cognitive bridging, which is the connection between daily choices and abstract goals. Three experiments test the effectiveness of two different bridging techniques and explore the underlying mechanisms involved in connecting specific choices to more abstract goals. The larger question this chapter is addressing is how strategic messages can help individuals connect the specific choice they make in the moment to their more abstract, higher level goals.

Often in strategic communication, it is necessary to deliver messages that threaten freedom of choice. For example, in health and environmental campaigns, it is often necessary to directly tell somebody what to do (i.e. do not smoke, recycle this bottle, etc). Chapter 3 considers how abstraction and distance interact with messages that threaten freedom of choice. We often deliver these messages so that the action that needs to be taken is very clear (specific) and so the message is relevant (close), however, the findings from these two experiments show that this condition is least likely to be effective. However, if we increase how abstractly the individual is thinking or we increase distance cues in the message, it is possible to effectively deliver messages that threaten freedom of choice.

Chapter 4 provides a theoretical model connecting construal level theory to mobile technology. The affordances of mobile devices are articulated in relation to how they relate to construal level theory. For example, the mobile device can detect when an individual is

psychologically close to a decision, and can deliver a cognitive task designed to shift how abstractly the individual is thinking. Processing a decision from a higher level of abstraction is associated with increased self-control, and therefore, the individual is put in a position to make a choice that is more in line with their higher level values. Chapter 5 offers early tests of a mobile application designed to shift how abstractly one is thinking.

This dissertation concludes by articulating some clear next steps in this line of research. Construal level theory has the potential to transform the field of communication, and the field of communication has the potential to change the theory.

Rethinking Communication

I start each presentation on my work with the sentence, "Construal level theory is from social psychology, and it…." In other words, I start these presentations by discounting ownership of the theory and describing myself as borrowing it from another field. But, I argue in this work that the field of communication has unique contributions to make to construal level theory, and I further argue that communication scholars need to see themselves not as adapting and applying the theoretical framework of another field, but rather as transforming and rewriting the theory to incorporate concepts, such as message cues, that are of particular interest to scholars in the field of communication. Furthermore, construal level theory has the potential to transform our field as well, changing how we think about established theoretical models, such as the theory of planned behavior, and key concepts, such as social distance. Construal level theory can influence research on persuasion, media effects, mobile social networks, interpersonal communication, distributed work, deception and many other areas of inquiry in the field.

The strategic message is powerful. When we think about construal level theory from the vantage of the strategic message, several things occur. Distance and abstraction are no longer

static concepts that either match or do not match. Instead they are dynamic factors that can be linked. Close can become far, abstract goals can connect to specific behavioral decisions. Messages connect our short-term, everyday behaviors to our more long-term, abstract goals. And, in doing so, we recognize the power of construal level theory not just to predict how we mentally render an item, but rather to predict, and change, the choices we make.

The field of communication can, and perhaps with this work will, change construal level theory. First, communication introduces new concepts to the theory. Message cues, such as abstraction, distance, and motivation cues, are an important set of concepts that transform construal level theory. For example, we are no longer interested in predicting how abstraction and distance in the mind relate, but rather in predicting how abstraction and distance in the mind influence the processing of a strategic message containing cues, and how that message can be used to not only change abstraction levels and distance perceptions but also to collapse the distinctions between near and far and abstract and concrete.

Second, when we think about construal level theory from within the field of communication, the predictions actually change. The core prediction of construal level theory is that close items are rendered concretely and far items are rendered abstractly. However, on Facebook, it is possible to know what a person, who I attended day school with at age 3 and who I haven't spoken to since third grade, had for breakfast. In other words, I have very specific information about somebody who is socially, and likely spatially, far. So, on Facebook, far can be very concrete. In other words, the core prediction of construal level theory falls apart, and it is only upheld by thinking of the medium of Facebook as capable of traversing distance. In other words, communication media are tools through which distance can be traversed, whether we are talking about an old fashioned letter, a telephone, or Facebook. As such, concepts introduced in

this work (shifting, bridging and traversing) are not simply concepts that can be applied to construal level theory to extend it, but rather, they are essential to upholding its very core predictions.

Finally, as noted above, the field of communication can change as a result of construal level theory. Previous work has already extended our understanding of the theory of planned behavior (Lutchyn & Yzer, 2011), and Chapter 3 of this work seeks to extend psychological reactance theory. Additionally, there are many theoretical concepts that are studied in the area of persuasion that overlap with construal level theory. As scholars, it is important that we open our established theories and relevant concepts to development, rather than discounting construal level theory or its importance to the field.

CHAPTER 1

Connecting Construal Level Theory to Persuasive Processes

Construal level theory (Trope & Liberman, 2010, for review) has been established in social psychology and consumer behavior, and scholars in the field of communication have recently recognized its potential to explain the processing of persuasive messages (Lutchyn & Yzer, 2011; Nan, 2007). Construal level theory provides a framework for how abstraction and distance relate to each other in the mind, and the goal of this chapter is to illustrate for communication scholars how mental representations of abstraction and distance relate to cues in a persuasive message. It is important to note that this does not seek to replace other theories or processing explanations. Instead, it offers a complementary model with explanatory power for a select set of key concepts.

This work starts with a review of construal level theory, defining key concepts associated with abstraction and distance in the mind. Next, message cues associated with abstraction, distance, and motivation are defined. While highlighting seven propositions and one research question, two pathways to message effectiveness are introduced: one based on construal level congruence and another based on motivation.

In the Mind

Construal Level Congruence

When you think about an item, there are a number of different ways you can mentally represent it. Take, for example, a new class you are teaching -- is it *an enlightening journey through seminal works* or *located in classroom 100 at 2 PM on Tuesdays and Thursdays*? The former of these is very abstract and goal-oriented, while the latter is very specific and means-oriented. Construal level theory predicts how abstractly or concretely you will think about the

class based on how close or far you perceive it to be. So, if the class is next year (temporally far), your concerns will be more abstract than if it starts the next day (temporally close). (Trope & Liberman, 2003; Liberman & Trope, 2008).

When distance and construal level match in this way (i.e. close and specific or far and abstract), they are said to be congruent, which results in increased cognitive fluency and ease of processing (Benning, Breugelmans, & Dellaert, 2012; Kim, Rao, & Lee, 2009). For example, it is easy to mentally render the class tomorrow more concretely and imagine yourself opening the door to classroom 100 at 2 PM and launching your lecture slides. It is more difficult to think that specifically a year away, although you can struggle to do so. This fluency has been illustrated through studies using implicit association tests; congruent pairings (close and low; far and high) were matched faster than incongruent ones (close and high; far and low) (Bar-anan, Liberman, & Trope, 2006).

This connection between the perception of distance and cognitive abstraction has been shown to be reciprocal (Liberman & Förster, 2009; Liberman, Trope, Mccrea, & Sherman, 2007). Just as a representation of distance induces a congruent level of abstraction, it is also the case that how abstractly one is thinking generates thoughts of a congruent level of distance. For example, if you imagine preparing your slides for the first day, the class seems closer. The key concepts that comprise construal level theory are construal level orientation, construal level perception of choice and psychological distance.

Construal Level Orientation

Construal level orientation (CLO) refers to the cognitive processing style one uses to form mental representations. For example, you might think of your undergraduate communication class as consisting of "students," or alternatively, "100 junior and senior

undergraduates, primarily majoring in communication." The former of these is represented at a high construal level orientation (high CLO), in other words at a high degree of abstraction, while the latter is at a low construal level orientation (low CLO), as it is more specific. Construal level orientation is the distinction between the proverbial forest and trees.

Individuals have trait tendencies as to how abstractly or concretely the typically think (Liberman & Trope, 2008; Vallacher & Wegner, 1989; Vallacher & Wegner, 1987), however, this processing style can be manipulated. Scholars have successfully manipulated construal level orientation by using Navon's (1977) global/local processing composite letter task (Liberman & Förster, 2009), by asking participants to explain why (high CLO) or how (low CLO) something is done (eg. Freitas, Gollwitzer, and Trope, 2004), and through tasks that include generating categories (high CLO) or exemplars (low CLO) for target words (eg. Fujita, Trope, Liberman, & Levin-Sagi, 2006). Shifting construal level orientation has been shown to change judgments of distance (Liberman & Förster, 2009) motivational control (Fujita & Han, 2009; Fujita & Roberts, 2010; Fujita, Trope, et al., 2006a), probability judgment (Wakslak & Trope, 2009), planning (Liberman, Trope, Mccrea, & Sherman, 2007), timely completion of tasks (McCrea, Liberman, Trope, & Sherman, 2008), choice strategies (Pick-alony, Liberman, & Trope, 2014), categorization of objects (Krüger, Fiedler, Koch, & Alves, 2014), persuasiveness of advertisements that encourage creative elaboration (Silvera, Pfeiffer, Kardes, Arsena, & Goss, 2014), the influence of affective attitudes on decision-making (Carrera, Caballero, Muñoz, González-Iraizoz, & Fernández, 2014), representations of self (Freitas, Langsam, Clark, & Moeller, 2008), and salience of goals (Freitas, Gollwitzer, & Trope, 2004).

At a high CLO, one is likely to focus attention on higher level values and goals (Fujita et al., 2006; Liberman & Trope, 2008), thoughts about *why to do something* (Freitas et al., 2004),

desirability concerns (Fujita et al., 2008; Liberman, Trope, & Wakslak, 2007), and the central or primary characteristics of items (Fujita et al., 2008; Ledgerwood, Wakslak, & Wang, 2010; Yan & Sengupta, 2012). At a low CLO, one is likely to focus on means-oriented concerns (Fujita et al., 2006; Liberman & Trope, 2008), thoughts about *how to do something* (Freitas et al., 2004), feasibility concerns (Liberman, Trope, & Wakslak, 2007), and the peripheral or secondary features of items (Ledgerwood, Wakslak, et al., 2010; Yan & Sengupta, 2012). For example, as noted above, at a high CLO, you might think of teaching your undergraduate communication class as a valuable opportunity to educate students about theories that are important for them to understand (value-oriented). Alternatively, at a low CLO, you might think about arriving to a bright lecture hall in early afternoon, twice a week and connecting your laptop to the digital projector (means-oriented). In order to fully understand the role of abstraction in the mind, it is necessary to define another concept, construal level perception of choice.

Construal Level Perception of Choice

While construal level orientation refers to how abstractly or concretely one is thinking, construal level *perception of choice* is a related concept that concerns the way one is mentally representing a decision context. For example, a dieter might think about a snack selection as offering the decision to *be healthy* versus *don't be healthy*, which is a higher construal level perception of choice (high CLPC) than the decision to eat an apple or not eat an apple (low CLPC). One's CLO will typically influence the way that one perceives a choice, however, as will be explained below, these concepts can be manipulated separately from one another.

Construal level perception of choice conceptually relates to self-control. Scholars have defined self-control as acting in accord with valued, long-term goals (high CLPC), instead of acting on immediate temptations (low CLPC) (Fishbach & Trope, 2005; Fujita, Trope, et al.,

2006). Individuals exhibit greater self-control when decisions are mentally represented at a high construal level, rather than a low construal level (Fujita & Han, 2009; Fujita & Sasota, 2011; Fujita, Trope, et al., 2006a). For example, when manipulated to higher levels of cognitive abstraction, participants rated temptations less positively (Fujita, Trope et al., 2006), were faster at pairing candy bars with negative words in an implicit association task (Fujita and Han, 2009), were more likely to engage in prospective choice strategies (Fujita & Roberts, 2010), and smoked fewer cigarettes (Chiou, Wu, & Chang, 2013) than those who were manipulated to lower levels of cognitive abstraction. This is because at a high CLPC, goals are salient even when presented with a temptation, but at a low CLPC, only the temptation, not the goal, is salient (Fujita & Sasota, 2011; Fujita & Carnevale, 2012). In other words, when mentally representing the decision at a high construal level perception of choice, as *be healthy* versus *don't be healthy*, seeing a menu choice triggers the association to the dieting goal of *be healthy*, but the goal isn't salient when the choice is rendered as *eat the apple or don't eat the apple*.

As noted above, levels of abstraction are often related to how distance is mentally represented. Therefore, it is important to define the concept of psychological distance.

Psychological Distance

Psychological distance refers to how close or far an item is perceived to be from oneself in the here and now (Trope & Liberman, 2010). The concept has been established along four dimensions of distance: temporal (time), spatial (physical location), social (social closeness), and hypotheticality (how definite) (Bar-anan, Liberman & Trope, 2006). For example, a class you are teaching this semester is closer in time than one you are teaching next year (temporal distance). Your university is spatially closer than one across the country (spatial distance). Colleagues in your department are socially closer than faculty members in another department (social

distance). And, your election to Faculty Senate is far in hypotheticality before you are nominated, and becomes closer after your colleagues have voted for you (hypothetical distance).

These four dimensions have been shown to be connected at similar distances (Bar-Anan, Liberman, Trope & Algom, 2007). For example, participants were faster at classifying the spatial distance of words placed on a close or far arrow, when the distance to the arrow matched the meaning of the word. In other words, they were faster if the arrow was close and the word was tomorrow, which is close in temporal distance, than if the arrow was far and the word was tomorrow (Bar-anan et al., 2007). The colleagues who are socially closer to you are likely located spatially closer to you on campus as well. If a colleague from your department (socially close) were to move to another university across the country (spatially far), they might seem socially farther. After all, daily trips to the campus eatery would turn into catching each other for a dinner once a year while at an annual conference. It is important to note, however, that increasing distance along one dimension does not necessarily directly translate to equal distance along another dimension. The region B paradox holds that once a critical threshold is met, perceptions might be different (Gilbert, Lieberman, Morewedge, & Wilson, 2004). For example, if your colleague were to switch office locations, and move to another building on campus, it may seem like they are socially much further, even though spatially they are still in walking distance. Furthermore, Trope and Liberman (2010) note that dimensions of psychological distance each scale very differently, with temporal distance reaching along one continuum from the past to the future, while spatial distance scales in three directions and social distance scales to a potentially infinite number of networked connections.

Psychological distance has also been shown to be tied to an "egocentric anchor," meaning that it refers to how distance is perceived from one's own perspective, not from the perspective

of another person or object (Liberman and Förster, 2009, p. 206). For example, participants were told they received a postcard for a free dental visit. Those who were asked to estimate egocentric temporal distance (how much time from now), provided estimates that were influenced by a manipulation of their CLO. However, those who were asked to estimate non-egocentric temporal distance (how much time after receiving the postcard), provided estimates that were not influenced by how abstractly or concretely they were thinking.

As mentioned above, our minds anticipate congruence between construal level orientation and psychological distance. Construal level theory has been described as a heuristic processing theory, which means that the mental associations between psychological distance and construal level become habitual and automatic (Liberman & Trope, 2008; McCrea, et al., 2008). This cognitive process enables people to make sense of vast quantities of information quickly. Neural connections in the brain are arranged accordingly, with more abstract renderings located "at higher points in the cortical hierarchy" (Liberman & Trope, 2008, p. 1204).

Therefore, the types of mental representations mentioned above as associated with a high construal level orientation, including a focus on values and goals, considerations about *why*, desirability concerns, and central characteristics, are associated with far psychological distance, while the opposite of these is associated with close psychological distance. For example, at close temporal distance, participants considered the feasibility concerns associated with purchasing a new DVD player, such as how easy the manual is to understand, while at far temporal distance they were more influenced by desirability concerns, such as whether the product was made from environmentally friendly materials (Fujita et al., 2008). Additionally, at far psychological distance, messages that feature base-rate information, which is central and abstract, were shown

to be more effective than messages that use case-based information, which is peripheral and specific (Yan & Sengupta, 2012).

Social distance was also found to influence risk perceptions, with television characters who were perceived to be socially close increasing perceptions of risk for sexually transmitted diseases (So & Nabi, 2013). Similarly, increasing temporal distance reduced the effectiveness of warning label messages for risky products like cigarettes and medications (Steinhart, Carmon, & Trope, 2013).

Motivational focus is also different at close and far psychological distance. As noted above, self-control challenges are often thought about as a conflict between short-term and long-term goals. In other words, self-control is a conflict between how choices are rendered at close and far psychological distance. Does one want to sacrifice eating the tempting treat today (close temporal distance) in exchange for the potential to weigh less a year from now (far temporal distance)? The tendency to overvalue short-term rewards (the temptation) has been termed hyperbolic time discounting (Ainslie & Herrnstein, 1981) and present-biased preferences (Lee, Kiesler, & Forlizzi, 2011).

Making decisions at far psychological distance increases self-control. For example, participants who selected snacks at farther temporal distance, chose more apples than cookies (Lee, Kiesler, & Forlizzi, 2011). As we might expect, perceived self-efficacy of the individual has been shown to interact with psychological distance, with the far temporal distance frame lowering snacking in those who have low self-efficacy, but not those who have high self-efficacy (Churchill, Good, & Pavey, 2014).

Abstraction and distance in the mind influence how a message is processed. However, in order to understand this, it is necessary to first define message cues associated with abstraction, distance, and motivation.

In the Message

A strategic message is one that has a particular intention, such as to encourage healthy eating, environmental conservation or smoking cessation (Byrne & Hart, 2009). These messages may include text, audio, images and moving visuals, and within these message elements, there may be abstraction, distance, and motivation cues.

Abstraction Cues

An abstraction cue is an aspect of a message that contains a relative level of abstraction or concreteness. For example, the language used in a message may be an abstraction cue, as text or audio can vary in lexical concreteness (Hansen & Wänke, 2010; Miller, Lane, Deatrick, Young, & Potts, 2007). Scholars have used the linguistic category model (LCM) to investigate the relative abstraction of different word categories, with descriptive action verbs (DAVs) being more concrete than interpretive action verbs (IAV), which are more concrete than state verbs (SV), which are more concrete than adjectives (ADJ) (Fiedler, 2008; Ijzerman & Semin, 2009). "For example, the same event can be described as *John punched David* (DAV), *John hurt David* (IAV), *John hates David* (SV), or *John is aggressive* (ADJ)" (Ijzerman & Semin, 2009, p. 1216).

Another way abstraction can be varied in a message is through the level of detail that is conveyed (Trope & Liberman, 2010). In other words, a message that captures the essence of a situation, but is devoid of any expository detail, is more abstract than one that contains this detail. Additionally, as explained above, a message explaining *why* one should exercise outdoors is more abstract than a message explaining *how* one exercises outdoors, because *why* is a more

abstract concept than *how*. Finally, visual messages can also vary in abstraction, with an ethereal, misty image of a perfume bottle rendering as more abstract than a clear, vivid image of a box of cereal. An impressionist painting is more abstract than one painted in hyperrealism. Some scholars have also recognized the different ways that abstraction cues in a message can be varied, and used a multifaceted approach in their conceptualization (Talke & Snelders, 2013).

Concrete message cues have been shown to receive higher truth ratings (Hansen & Wänke, 2010), to increase willingness to make financial investments (Elliott, Rennekamp, & White, 2014), and to be more effective at convincing an audience with different political views from the speaker (Menegatti & Rubini, 2013) than abstract message cues. Additionally, a local message, mentioning specific risks to a particular city, was found to be more effective at fostering environmental engagement than a more generic, global message (Scannell & Gifford, 2011). And, adding one concrete example to an abstract message has been shown to aid in decision-making (Van Ginkel-Bieshaar, 2012). However, as will be highlighted below, there are advantages to abstract message cues as well.

Distance Cues

A distance cue is a textual, audio, visual or moving visual element that communicates how near or far an item is. A coupon that mentions a sale starting *tomorrow* is temporally closer than one that mentions a deal starting *next month.* Visually, a spatial distance cue in a message could be a proximal or distant location of a target item in the overall image, for example a product being placed toward the front or back of an advertisement (Hansen & Wänke, 2010; Bar-Anan, Liberman, Trope & Algom, 2007). The mention of a *best friend* (close) versus *an acquaintance* (far) is an example of a social distance cue (Nan, 2007). Hypothetical distance cues in messages include words associated with certainty or probabilistic likelihood. For example, the

message *cigarettes cause cancer* contains a hypothetical distance cue that is closer than the message *cigarettes may cause cancer* (Wakslak & Trope, 2009). Sometimes the message cue itself may stay the same, but the context around it may change how close or far the cue is perceived to be. For example, in the Northeast USA, an advertisement for swimming pool equipment is temporally closer when the advertisement runs in June than when it runs in December.

It is possible for messages to have more than one distance and/ or more than one abstraction cue (Wright et al., 2011; Zhao & Xie, 2011). If two distance cues in a message are at similar distances (both close or both far), they are *distance cue matched* to each other. If they are at different distances (one close and one far), we can say they are *distance cue mismatched*. Similarly, if multiple abstraction cues in a message are at similar levels of abstraction, then the *abstraction cues are matched*, and if they are at different levels, then the *abstraction cues are mismatched.* Furthermore, an abstraction cue and a distance cue together in a message can be *cue congruent* (high abstraction and far distance or low abstraction and close distance) to one another, or they *can be cue incongruent* (high and close or low and far). The term *matched* is used in reference to distance or abstraction, while the term *congruent* is used when describing the relationship between distance and abstraction.

Motivation Cues

Messages can contain text, audio, visuals, or moving visuals that relate to regulatory factors. For example, the text in a message can directly reference a goal in a number of different ways – it can remind the dieter to *eat healthy* (abstract) or to *avoid chocolate candy* (concrete). Researchers have also considered how different types of message frames, such as regulatory focus frames and gain/loss frames, influence how the message is processed. For example,

promotion goal frames and gain frames are motivational cues that emphasize the benefits of a particular activity, while prevention frames and loss frames highlight ways to avoid negative consequences (Chou & Lien, 2011; Förster & Higgins, 2005; Freling, Vincent, & Henard, 2014; Lee & Oh, 2013; Lee, 2010; Nan, 2007; Steinhart, Mazursky, & Kamins, 2013; Zhao & Nan, 2010).

Abstraction, distance, and motivation cues in messages are important in regards to how effectively the message is processed. The goal of this chapter is to illustrate for communication scholars how mental representations of abstraction and distance relate to the cues in the message.

The Construal Level Theory of Persuasion: A Theoretical Framework

The construal level theory of persuasion introduces two persuasion pathways that explain how abstraction, distance, and motivation cues in the message are processed in the context of construal level orientation, construal level perception of choice and psychological distance in the mind. The first pathway is based on congruence, and the second is based on motivation (Figure 1).

As mentioned above, construal level congruence refers to a match between abstraction and distance (close and concrete or far and abstract). The congruence pathway holds that message effectiveness is a function of enhanced processing fluency due to construal level congruence and the concepts that interact with congruence to predict message effectiveness. This pathway focuses on abstraction and distance cues in the message.

The motivation pathway holds that message effectiveness is a function of bolstered self-control and alignment of goals with abstraction and distance. This pathway focuses on the motivation cues in the message. There is a great deal of overlap between these pathways. After all, the alignment of goals with abstraction and distance can be thought of as a motivational

factor interacting with congruence. However, the two separate pathways provide a forum for qualifying different types of relationships and distinguishing between different types of message cues.

Congruence Pathway

Congruence between abstraction and distance can enhance the persuasiveness of a message. As noted above, construal level congruence results in increased cognitive fluency and ease of processing (Benning, Breugelmans, & Dellaert, 2012; Kim, Rao, & Lee, 2009). People assume this fluency is due to a higher quality message, and they attribute the *feels correct effect* to their evaluations of the message itself (Chou & Lien, 2011; Kim et al., 2009).

Of course, there are several different parameters of abstraction and distance to consider. In the mind, the factors are construal level orientation (abstraction), construal level perception of choice (abstraction) and psychological distance (distance). In the message, there are abstraction cues and distance cues, and these can be *cue matched*, *cue mismatched*, *cue congruent* or *cue incongruent*.

Processing fluency. In order for processing of the message to be most fluent, three *congruence conditions* are necessary: 1. Message Condition: the cues in the message must be matched and congruent; 2. Mind Condition: construal level orientation and construal level perception of choice must be congruent to psychological distance; and 3. Processing Condition: the abstraction/ distance cues in the message must be congruent to and match the abstraction/ distance in the mind (high and far; or low and close).

> **P1. When the cues in the message are matched and congruent (message condition), and when construal level orientation and construal level perception of choice are congruent to psychological distance (mind condition), and when the abstraction/distance cues in the message are congruent to and match the abstraction/distance in the mind (processing**

condition), cognitive processing of the message is most fluent. However, when one of these conditions is not met, processing of the message is less fluent.

Interactions with fluency. As noted above, increased processing fluency leads to a *feels correct effect* that is often translated to the message itself. However, processing fluency can either increase, decrease or have no influence on message effectiveness, depending on other factors in the message and depending on other factors in the individual. For example, if a message features strong arguments (100% of donations help the whales), the increased processing fluency achieved through congruence has been shown to increase message effectiveness; however when the message features weak arguments (55% of donations help the whales), congruence has been shown to decrease message effectiveness (Fujita et al., 2008). In other words, while congruence increases the processing fluency of the message, this only enhances the effectiveness of a message in the case of strong, not weak arguments. As will be explored further in Chapter 3, similar interactions with congruence can be found with messages that feature high threat to choice. It appears that congruence increases effectiveness for messages that do not feature a high threat to choice and decreases effectiveness for messages that do feature a high threat to choice. This is because when weak messages or appeals are processed fluently, there is greater attention to the weakness of the argument.

P2. Processing fluency, achieved by meeting the three congruence conditions described in P1, increases message effectiveness in the case of a message with strong arguments or low threat to choice, and decreases message effectiveness in the case of a message with weak arguments or high threat to choice.

There are also several characteristics within the individual that determine if processing fluency increases message effectiveness or not. For example, novices were found to rely upon the *feels correct effect* achieved through processing fluency when evaluating a persuasive

message, while experts were not (Kim et al., 2009). This is because experts were able to evaluate the messages more deliberately, while novices just relied on the *feels correct effect* to guide their evaluations. Another individual difference factor that interacts with congruence is one's score on the consideration of future consequences scale (eg. Strathman, Gleicher, Boninger, & Edwards, 1994), which measures trait tendencies to think about the long-term consequences of one's actions. For participants who scored low on this scale, congruence between close temporal distance cues in a message and construal level perception of choice enhanced message effectiveness (Kees, 2010). However, for those who scored high on this scale, congruence did not influence message effectiveness because they were already focused on the long-term outcomes (far psychological distance) regardless of the temporal distance cues in the message.

> **P3. Individual difference factors, including expertise and the ability to consider future consequences, can interact with congruence, to determine whether increased processing fluency increases, decreases or has no influence on message effectiveness.**

The first three propositions address cases in which message effectiveness is a function of increased processing fluency as a result of congruence or interactions with congruence. These assume that construal level influence occurs through *integrated processing*. Integrated processing means that the effectiveness of the message is a result of the integration of the mind condition, the message condition, and the processing condition. In other words, how abstractly or concretely the individual is thinking influences how they process the message, and these factors integrate to create the persuasive effect. On the other hand, *induced processing* suggests that cues in the message can induce the effect in the mind, regardless of how abstractly or concretely the individual is initially processing. In other words, the effective of the message is a result of the cues in the message. While the message is still being actively processed, induced processing

assumes that it does not matter how abstractly or concretely the individual was initially thinking. Integrated and induced processing with be directly tested in Chapter 2.

An *induced congruent representation* is when abstraction or distance cues in messages elicit a congruent mental representation of distance or abstraction. In other words, is simply reading a message or viewing an image enough to induce a congruent mental representation? There is some evidence that this takes place. For example, abstract words (*high abstract message cues*) suggested more socially distant individuals (*far social distance*), while concrete words (*low abstraction message cues*) make individuals seem socially closer (*close social distance*) (Fiedler and Mata, 2012). In other words, in this example, an abstraction cue in the message elicited a change in psychological distance in the mind.

P4. Abstraction and distance cues in a message can generate congruent or matching levels of psychological distance in the mind (*induced congruent representation*).

However, it is not clear whether simply reading or viewing abstraction and distance cues in a message can shift construal level orientation. As explained above, prior research has shifted construal level orientation through in-depth cognitive tasks. Additional research is necessary to investigate to what extent abstraction and distance cues in a message can generate a matching and congruent construal level orientation. Furthermore, this work should consider the full range of possible strategic messages, including messages with higher levels of involvement, such as narratives.

RQ1. Can abstraction and distance cues in a message generate a matching and congruent construal level orientation?

Through induced processing, the message directly influences the perception in the mind. However, through integrated processing, message effectiveness is a function of enhanced processing fluency, which is achieved by meeting three congruence conditions (Message

Condition, Mind Condition and Processing Condition). That said, message effectiveness becomes far more complicated in cases where these three conditions are not fully met. In considering the Message Condition, what if a message contains five distance cues, and four of them match? Is processing fluency through the integrated paradigm really inhibited enough to influence message effectiveness? Furthermore, as will be illustrated in Chapter 2, there are advantages to messages that include cues at different levels of abstraction and different distances. In considering the Processing Condition, could abstraction and distance cues in a message *induce congruence* by changing psychological distance in the mind, rendering the Processing Condition met, but only as a result of the actual processing of a message? These are complicated questions that the literature has not yet answered, however, the construal level theory of persuasion offers a framework for these investigations.

The congruence pathway is only one avenue to message effectiveness. The motivation pathway is presented next.

Motivation Pathway

The motivation pathway is consistent with the integrated representation paradigm, as it matters how abstractly or concretely an individual is thinking when they process the message. The motivation pathway holds that message effectiveness is a function of bolstered self-control and the alignment of goals and motivation cues in the message with abstraction and distance in the mind. The motivation pathway is most relevant in reference to a decision context.

Self-Control Bolstering. As described above, prior work has demonstrated that at high levels of mental abstraction and far psychological distance, individuals exhibit higher levels of self-control (Fujita & Carnevale, 2012; Fujita & Han, 2009; Fujita, Trope, et al., 2006a; Lee et al., 2011). In other words, self-control is bolstered. Additionally, it was explained above that a

message may contain motivation cues at differing levels of abstraction, such as *losing weight* (abstract) or *avoiding that piece of chocolate candy* (concrete).

In order for a message to maximize self-control bolstering, three *bolstering conditions* are necessary: 1. Message Condition: the motivation cues in the message must be abstract and far; 2. Mind Condition: construal level orientation and construal level perception of choice must be high, and psychological distance must be far; and 3. Processing Condition: in both the message and in the mind, abstraction must be high and distance must be far.

> **P5. When motivation cues in the message are abstract and far (message condition), and when construal level orientation and construal level perception of choice are high and psychological distance is far (mind condition), and in both the message and the mind, abstraction is high and distance is far (processing condition), self-control bolstering is maximized through the message. However, when one of these conditions is not met, self-control bolstering is not maximized through the message.**

Regulatory Focus. As noted above, promotion and prevention frames are another type of motivation cue in the message. Prior research has shown that messages with promotion frames are more effective when individuals are at a high construal level orientation, high construal level perception of choice and far psychological distance, while messages with prevention frames are more effective when individuals are at low construal level orientation, low construal level perception of choice and close psychological distance (Chou & Lien, 2011). Furthermore, it has been shown this is due to higher levels of engagement, more fluent processing (Lee, Keller, & Sternthal, 2010) and a "temporal-processing-fit-effect" (Steinhart, Mazursky, et al., 2013, p. 315). A similar pattern was found with another type of motivation cue, gain/loss frames (Freling et al., 2014; White, Macdonnell, & Dahl, 2011). For example, the persuasiveness of a message was found to be strengthened with a gain frame (motivation cue) and a societal message (abstract cue) when judgments were made for socially distant others (far psychological distance) (Nan,

2007). So, in other words, messages with either promotion frames or gain frames (motivation cue) are more effective when abstraction is high (high CLO, high CLPC) and distance is far (far PD), while those with prevention frames or loss frames (motivation cue) are more effective when abstraction is low (low CLO, low CLPC) and distance is close (close PD).

> **P6. Motivation cues in the message, including promotion/prevention and gain/loss frames, can influence message effectiveness, such that promotion and gain frames are more effective when individuals are at a high construal level orientation, high construal level perception of choice and far psychological distance; and prevention and loss frames are more effective when individuals are at a low construal level orientation, low construal level perception of choice and close psychological distance.**

Integrating the Pathways

As described above, the congruence pathway focuses on abstraction and distance cues in the message, and the motivation pathway focuses on motivation cues in the message. Each describes how these message cues are processed most effectively. However, there is an important confound presented by these two pathways.

This Piece of Candy. The confound presented by the two pathways involves self-control decisions made at close psychological distance, such as a piece of candy placed in front of a dieter. The motivation pathway explains how self-control can be bolstered, but this requires that the message cues (Message Condition) and mind (Mind Condition) are both at high levels of abstraction and far distance. However, the decision whether or not to eat the specific piece of candy is at a low level of abstraction (low construal level perception of choice) and close temporal and spatial distance (close psychological distance). Furthermore, the congruence pathway would hold that a specific, not an abstract, message would facilitate processing fluency and therein message effectiveness. In other words, in this case, the pathways offer different

message recommendations, and neither is likely to be effective in actually resisting the piece of candy.

As will be theoretically developed further in Chapter 4, linking messages use multiple abstraction and distance cues in order to make connections between high and low levels of abstraction and close and far distances in the mind (Figure 2). They can be used to address the challenge presented above, and also to facilitate congruence as needed for message effectiveness.

Smoking this cigarette will cause cancer. In chapter 4, three types of *linking messages* that can address this challenge are described. They are *bridging*, *shifting,* and *traversing* messages. A *bridging message* is one that uses abstraction cues at two levels (in the message) to connect a low construal level perception of choice to a related high construal level perception of choice, or the reverse (in the mind). For example a message might state that resisting this piece (low abstraction cue) of candy will help to realize the goal to be healthy (high abstraction cue). Chapter 2 tests two methods of fostering bridging, including the use of a bridging message, which is an induced bridging technique. A *shifting message* is one that delivers a cognitive task to shift construal level orientation from high to low or low to high, changing how abstractly or concretely the information is processed. A *traversing message* is one that connects close psychological distance to far psychological distance, or far to close. In other words, a traversing message can psychologically move the candy further away, a concept known as psychological distancing (Day & Bartels, 2006). These three linking messages can be used together to address self-control challenges at close psychological distance.

Decide Now, Choose Later. Two additional types of *linking messages* can create connections between different levels of distance and abstraction. These fall into two different theoretical frames. One type is a counteractive self-control *linking message*, wherein the message

encourages pre-commitment to a decision (specific choice at far temporal distance) and suggests penalties for changing the decision (Fishbach, Zhang, & Trope, 2010; Myrseth, Fishbach, & Trope, 2009; Trope & Fishbach, 2000). In other words, the message encourages a decision at a low construal level perception of choice, even though psychological distance is far. For example, a message to encourage colonoscopies, a medical procedure that is typically thought to be inconvenient and uncomfortable, is likely to be more effective in encouraging testing if the message encourages signing up well in advance.

Implementation intention theory (eg. Gollwitzer & Brandstatter, 1997; Gollwitzer, 1999; Holland, Aarts, & Langendam, 2006) suggests another type of *linking message* that can create connections between different levels of distance and abstraction. Strategic messages in this framework make specific suggestions in advance (low construal level perception of choice) as to how one should respond at a future time (far psychological distance) when a choice is needed. For example, a healthy eating message might state, *when at some point in the future (far distance cue) you see a piece of candy (concrete message cue), then you will walk to the fridge and select an apple instead*. As noted above, often self-control challenges are faced at close psychological distance and processed at a low construal level perception of choice. These types of messages allow the individual to remain at a low construal level perception of choice in a decision context, while taking a specific action that has been predetermined in advance.

> **P7. *Linking messages* connect different levels of abstraction and different distances and can be used to integrate the congruence and the motivation pathways, to address self-control challenges at close psychological distance, and to facilitate congruence as needed for message effectiveness. Shifting, bridging, traversing, counteractive self-control, and implementation intention messages are examples of *linking messages.***

This first chapter provides a model for communication scholars to consider how mental representations of abstraction and distance relate to cues in the message. The model proposes two pathways (congruence pathway and motivation pathway), and identifies two possible ways that construal level processing takes place (integrated processing and induced processing). In this next chapter, the integrated and induced processing models are tested through the concept of cognitive bridging.

CHAPTER 2

Tests of Integrated and Induced Processing Through Cognitive Bridging

As discussed in Chapter 1, construal level theory connects how close or far items are with how abstractly we think about them, and prior work has recognized that construal level theory can be used to predict how effectively persuasive messages are processed by individuals (Fujita, Eyal, et al., 2008; Lutchyn & Yzer, 2011; Nan, 2007). Much of the research on construal level theory and persuasion so far has fallen under what we can term the *integrated process*, that is, when the initial cognitive processing state of the individual (how abstractly or concretely they are thinking prior to delivery of the message) and cues in the persuasive message (abstraction, distance or motivation cues), are integrated to form a persuasive effect. On the other hand, the *induced process* suggests that the message cues are processed the same way, regardless of how abstractly or concretely the individual is initially thinking. The assumption with the induced process is that the message itself can be crafted to have the desired effect, and this is particularly useful from the perspective of communication. The three studies in this article use three different manipulations of construal level orientation to provide the first direct comparison of the integrated and induced processes.

The term cognitive bridging refers to the mental connection between an abstract goal and the means to achieve it. For example, wanting to be healthy is an abstract goal, while going to the gym three times a week is a specific action that one can take to achieve the goal. Cognitive bridging occurs when one thinks about these two elements in relation to each other – going to the gym in order to be healthy - as the means to achieve the goal. In other words, cognitive bridging is a connection between high and low construal levels. The purpose of this article is to test whether cognitive bridging can be fostered through the integrated and induced processes.

Literature Review

Cognitive Bridging

As discussed as part of P7 in Chapter 1, cognitive bridging is when abstract higher level goals (i.e. be healthy) are mentally connected to the specific means to achieve them (i.e. eat bananas). The concept of "cognitive bridging," is the logical connection between how we do something (low construal level) and why we do it (high construal level). It draws upon prior research (Freitas, Gollwitzer, & Trope, 2004; Gollwitzer & Brandstatter, 1997; Vallacher & Wegner, 1989). Vallacher and Wegner's (1987) action identification theory makes a distinction between goal-oriented cognitions, such as why one might take a certain action, and means-oriented concerns, such as how one might do so. Research on construal level theory has connected these to a high and low construal level, respectively (Freitas et al., 2004; Fujita, Henderson, et al., 2006).

Theoretically, there are two possible mechanisms to foster cognitive bridging, the integrated process and the induced process. In these studies, each process is investigated using a distinct "technique" to induce bridging. Below, the two processes are introduced, and the techniques used to elicit cognitive bridging are described.

Integrated Process

As mentioned in Chapter 1, the integrated process holds that the cognitive processing state of the individual (how abstractly or concretely they are thinking) and the cues in a persuasive message (abstraction, distance and motivation cues) integrate to influence how the message is processed. In other words, the same message can be processed very differently based on how abstractly or concretely the individual is initially thinking. Figure 3 provides an illustration of the construal level processing models as they relate to cognitive bridging.

One example of the integrated process is construal level congruence. As described in Chapter 1, construal level congruence is when the level of abstraction in the mind matches the distance conveyed in the message or when the level of abstraction conveyed in the message matches the perception of distance in the mind. In other words, construal level congruence is a match between the mind and the message, such that both are either close and concrete or far and abstract. Congruence has been shown to increase the processing fluency of a persuasive message (Benning, Breugelmans, & Dellaert, 2012; Kim, Rao, & Lee, 2009; Fujita, et al., 2008). For example, in a study on messages highlighting the benefits of taking public transportation, the persuasiveness of the message was found to be strengthened in a congruent condition, when it was a societal message (abstract message) and judgments (mind) were made for socially distant others (far psychological distance) (Nan, 2007). In other words, factors in both the mind and the message *integrated* to influence the persuasiveness of the message.

The integrated bridging technique uses the integration of factors in the mind and the message to foster cognitive bridging. The participant is first shifted to a high construal level orientation, so that they are processing information more abstractly. As noted in Chapter 1, prior work has demonstrated that at high levels of mental abstraction, individuals are more in tune with their higher level goals than those at lower levels of cognitive abstraction (Chiou et al., 2013; Fujita & Carnevale, 2012; Fujita & Han, 2009; Fujita & Roberts, 2010; Fujita, Trope, et al., 2006a; Fujita & Han, 2009; Lee et al., 2011). The participant is then quickly presented with a message that contains only low abstraction cues, an example of a way to achieve the goal. As a procedural example, an experimental participant is first shifted to a high construal level orientation, making the higher level goal of being healthy salient in his mind, and the participant is then presented with a message containing only low abstraction cues, such as text that says “eat

bananas" and a picture of bananas. Because the higher level goals are more salient at the instant the message is processed, the integrated processing approach suggests that a cognitive bridge should be created, connecting the specific behavior, eat bananas, to the higher level goal, be healthy.

Induced Process

The induced process holds that the message cues elicit the persuasive effect, regardless of how abstractly or concretely the individual is initially thinking. In other words, it is the processing of the cues in the message itself that determines how the message is mentally represented, and it does not matter how abstractly or concretely the individual was initially thinking. This is important because often in communication, the practitioner developing the message does not know how abstractly or concretely the recipient will be thinking. While there is limited work on construal level theory and the induced process, as noted in Chapter 1, there is some evidence of its effect (Fiedler & Mata, 2012).

The induced bridging technique features two or more logically-related abstraction cues, with at least one of these cues at a high level of abstraction and one at a low level. For example, a message might reference a high level goal (i.e. eat healthy) and include examples of ways that one might accomplish that goal (i.e. images of fruits and vegetables). When the cues in the message are processed, the cognitive bridge is induced in the mind.

The three studies that follow juxtapose the integrated and induced bridging techniques. This is the first direct comparison of them.

Hypotheses

Cognitive Bridging Outputs

As mentioned above, cognitive bridges are mental representations that connect higher level goals to the means through which they can be achieved. Cognitive bridging outputs are external representations reflecting this connection. For example, if the participant is asked to recall the message and says "eating bananas will make you healthier," that recollection contains a cognitive bridging output because it illustrates a connection between the higher level goal (healthy) and the means of achieving it (eating bananas). However, if the participant recalls the message and says "you should eat bananas," that recollection does not contain a cognitive bridging output because there is no connection to the higher level goal. Cognitive bridging outputs are an indication that cognitive bridging has taken place, and we predict that participants who receive a bridging technique will be more likely to produce cognitive bridging outputs.

> **H1a. Participants who receive an integrated bridging technique will be more likely to produce cognitive bridging outputs than participants in a reference group who do not receive a bridging technique.**
>
> **H1b: Participants who receive an induced bridging technique will be more likely to produce cognitive bridging outputs than participants in a reference group who do not receive a bridging technique.**

Elaboration

The term elaboration has been defined as a continuum, wherein the person may have no thoughts at all about the message or may consider it deeply (Petty & Cacioppo, 1986). Cognitive bridging may be a type of elaboration as the individual is connecting two elements, either factors in the mind and the message (integrated bridging) or two elements within the message (induced bridging). Therefore, we might expect that participants who produce cognitive bridging outputs have longer message recollection responses than those who do not produce cognitive bridging outputs, illustrating that cognitive bridging is a more elaborative process.

H2. Participants who produce cognitive bridging outputs will have message recollection responses that are longer in word length than those who do not produce cognitive bridging outputs.

Message Affinity and Importance

Messages can be evaluated along different dimensions, such as message affinity and message importance. We can predict that cognitive bridging would be associated with an increase in these effectiveness measures. A bridging technique may help participants make sense of the message by connecting specific actions to higher level goals. Therefore, it is likely that participants who receive an integrated or induced bridging technique might like the message more and think that it is more important than participants who do not receive a bridging technique.

H3a: Participants who receive an integrated bridging technique will rate a message higher in message importance and message affinity than participants in a reference group who do not receive an integrated bridging technique.

H3b: Participants who receive an induced bridging technique will rate a message higher in message importance and message affinity than participants in a reference group who do not receive an induced bridging technique.

Abstraction

Cognitive bridging is the connection between a concrete message cue and a related abstract goal. Since cognitive bridging outputs capture both low and high construals, they should be more abstract than outputs that do not contain a cognitive bridge. Therefore, we would expect that participants who receive a bridging technique should have more abstract responses than participants who do not receive a bridging technique.

H4a: Participants who receive an integrated bridging technique will have more abstract responses than participants in a reference group who do not receive a bridging technique.

H4b: Participants who receive an induced bridging technique will have more abstract responses than participants in a reference group who do not receive a bridging technique.

Study 1

Design

Study 1 was completed online by two hundred and seventy-eight undergraduate students at a large northeastern university. Fifteen individuals were removed from analysis for failing to follow directions on the construal level orientation manipulation task (described below). The remaining 263 students ranged in age from 18 to 28 years (M = 19.37; SD = 1.37); 171 indicated that they were female and 92 indicated that they were male. An online, university-operated research pool was used to recruit the participants, and they received extra credit for participating. Each participant signed an IRB-approved consent form.

Participants were placed into one of four conditions using random assignment in a 2 (construal level orientation: high construal level orientation/ low construal level orientation) x 2 (message condition: concrete message cues only/ concrete and abstract message cues) experiment. Stimulus materials were designed by a team of researchers, who consulted samples of actual cafeteria signs.

Procedure

All participants completed the study online. First, they provided demographic information, including age and gender. Next, they were randomly assigned to receive one of the two construal level orientation manipulations (high/ low). Participants were then randomly shown one of two message manipulations. After viewing an assigned stimulus, participants completed dependent measures of message affinity, message importance, and cognitive bridging outputs. They were fully debriefed.

Stimulus Materials

Cafeteria signs are strategic messages designed to promote healthier food choices. They typically hang in cafeterias or dining halls. The stimuli used in this study were modeled after actual cafeteria signs.

Message manipulation. Half of the participants saw a stimulus with only concrete message cues and half of the participants saw a stimulus with both abstract and concrete message cues. The message with both abstract and concrete message cues contained a concrete image (photographs of specific fruits and vegetables) along with abstract text (the goal, "eat healthy"). The message with only concrete cues included an image (bananas) and text ("eat bananas") that were both concrete.

Construal level orientation. Prior research has shown that construal level orientation can be manipulated by changing the stem of a series of questions asked to participants (Freitas, Clark, Kim, & Levy, 2009; Freitas, Gollwitzer, & Trope, 2004). Asking participants "why" they do something shifts them to a high construal level orientation, which is a more abstract way of thinking, while asking them "how" they do something shifts them to a low construal level orientation, which is a more concrete processing state. In other words, they are shifted to either a high or low construal level orientation, respectively. In this study, we introduce a new construal level orientation manipulation, based theoretically on Freitas, et al (2004). Half of the participants were assigned to the high construal level orientation condition and the other half were assigned to the low construal level orientation condition. All participants answered five questions. Those in the high construal level orientation condition responded to questions asking *why*, and those in the low construal level orientation condition responded to questions asking *how*. Items included: *(why/ how) do you exercise outdoors, (why/ how) do you brush your teeth,*

(why/ how) do you get to class, (why/ how) do you clean your apartment or room, and *(why/ how) do you work hard at school*. A pilot study was conducted and validated this new manipulation (described in results).

Post-test measures

Cognitive bridging outputs. As noted above, the concept of cognitive bridging refers to a mental representation in which an abstract goal is connected to the actions one can take to accomplish the goal. In order to capture cognitive bridging outputs, participants were asked *in your own words, what does this sign say.* Participants typed their response in an essay text box that did not have a designated minimum or maximum length. The word length of responses varied from one to seventy-six words ($n = 263$, $M = 13.37$, $SD = 11.34$). Two independent coders, who trained for 2 hours, were unaware of the theoretical rationale of the study, and were blind to condition, coded the responses to indicate if participants mentioned specific items or higher-level goals. They concurred 219 participants mentioned *fruits, vegetables, or bananas* ($n = 263$, $\alpha = .90$, $r = .83$, $p < .001$) and 155 participants mentioned *healthy or implied higher level health goals or values* ($n = 263$, $\alpha = .92$, $r = .85$, $p < .001$). They agreed that 117 participants mentioned both categories, indicating cognitive bridging outputs. Examples of cognitive bridging outputs that participants provided include: *Bananas are healthy and people should consume them; You should eat bananas because they are good for your health and well-being; It says to eat healthy by eating fruits and vegetables;* and *Eat broccoli, asparagus, carrots, berries, and celery because they promote good health.*

The coders were reliable in their classification of whether or not cognitive bridging occurred ($n = 263$, $\alpha = .91$, $r = .83$, $p < .001$). Therefore, as a more conservative measure of cognitive bridging outputs, in the analyses using the dichotomous cognitive bridging output

variable, only those 240 participants (117 who produced cognitive bridging outputs) the coders agreed upon are used.

Affinity and Importance. To measure message affinity, participants were asked to respond on a five-point Likert scale, (1) *strongly disagree* to (5) *strongly agree*, to the statement *I like this cafeteria sign* (n = 263, M = 3.16, SD = .94) (Park, Lee, & Song, 2005). To measure message importance, participants responded on the same scale to the statement *I think this cafeteria sign is important* (n = 263, M = 3.39, SD = .94) (Batra & Ray, 1986).

Abstraction. In order to measure how abstractly or concretely participants were thinking, their outputs were analyzed using the Linguistic Category Model (Coenen, Hedebouw, & Semin, 2006). The Linguistic Category Model (LCM) provides a method of coding text to determine its level of abstraction (Coenen et al., 2006; Fiedler, 2008; Freitas et al., 2004; Trope & Liberman, 2010). Through this procedure, descriptive action verbs are coded as 1; interpretive action verbs are coded as 2; state verbs are coded as 3; and adjectives are coded as 4. This approach recognizes that a descriptive action verb, which describes a physical action with a clear start and end, is more concrete than a state verb, which "refers to an enduring cognitive or emotional state with no clear definition of beginning and end," (Coenen et al., 2006, p. 7).

Two coders, blind to condition and hypothesis, analyzed the outputs. Following the procedure outlined in Coenen, et al. (2006), they coded all of the verbs and adjectives, and those numbers were added together such that each output had one value per coder. The higher the value, the more abstract the response was judged to be. The values provided by the two coders were highly reliable (n = 263, α = .96, r = .94, $p < .001$). Per Coenen, et al. (2006), the raw scores were divided by the number of coded words and averaged together to determine an LCM abstraction measure (n = 263, M = 2.25, $S.D.$ = .71).

Results

Manipulation Checks

Pilot Study. In advance of this study, the new construal level orientation manipulation was validated through a pre-test conducted on mTurk, using a separate group of English-speaking participants ($n = 35$, $n_{male} = 12$, $n_{female} = 23$, $M_{age} = 39.4$, $S.D._{age} = 12.94$). Using the Linguistic Category Model (Coenen, et al., 2006), two coders, asked to conceal condition and unaware of the hypothesis, analyzed the responses to each of the five construal level orientation manipulation questions. The values provided by the two coders were highly reliable ($\alpha = .99$) and correlated ($r = .99$, $p < .001$). The raw scores were divided by the number of coded words and averaged together to determine an LCM abstraction measure (Coenen, et al., 2006). Participants who were manipulated to a high construal level orientation by answering *why* questions had higher LCM abstraction scores ($n = 17$, $M = 13.99$, $S.D. = 1.54$), than participants who were manipulated to a low construal level orientation by answering *how* questions ($n = 18$, $M = 6.97$, $S.D. = 3.74$), $F(1, 33) = 51.67$, $p < .001$, $\eta^2_\rho = .61$. Therefore, the pilot study indicates that the new construal level orientation manipulation is effective at shifting how abstractly or concretely participants are thinking.

Construal Level Orientation. Two separate manipulation checks for construal level orientation were conducted on the dataset from Study 1. First, two independent coders, unaware of the theoretical basis of the study and asked to conceal condition, coded each item. If the participant's response answered *how*, the coders scored the answer with a -1, and if the participant's response answered *why*, the coders scored the answer with a 1. If the participant's response fit neither condition, the coder scored it with a 0. The two coders were highly reliable ($n = 263$, $\alpha = .99$, $r = .99$, $p < .001$), and the scores were summed and averaged to create a single

abstraction score for each participant, ranging from -5 to +5, with a higher score representing a higher construal level orientation. As predicted, participants who answered *why* questions had a significantly higher abstraction score (n = 138, M= 4.70, SD = .49) than the individuals who answered *how* questions (n = 125, M= - 4.45, SD = .75), F (1, 261) = 14,057.69, $p < .001$, η^2_ρ = .98).

While this first manipulation check confirms that the participants answered the question appropriately, it is essential to actually demonstrate that they were processing information more or less abstractly, based on their condition. Therefore, as the second manipulation check for construal level orientation, two coders, blind to condition and hypothesis, analyzed the responses to the why/how questions following the Linguistic Category Model (Coenen, et al., 2006). The values provided by the two coders were highly reliable (n = 263, α = .95, r = .92, $p < .001$). Per Coenen, et al. (2006), the raw scores were divided by the number of coded words and averaged together. Confirming the manipulation check, participants who answered *why* questions had significantly higher LCM abstraction scores (n = 138, M = 2.85, SD = .33) than the individuals who answered *how* questions (n = 125, M = 2.48, SD = .91), F (1, 261) = 20.17, $p < .001$, η^2_ρ = .07. Therefore, the manipulation of construal level orientation was effective.

Message condition. As a manipulation check for message condition, the participant's open response to the message was coded. Two independent coders, unaware of the theoretical basis of the study and condition, coded each item to determine if it mentioned the word banana and/or the word healthy. The coders were found to be reliable (n = 263, α_{banana} = .99, r_{banana} = *.98, p < .001*; $\alpha_{healthy}$ = .95, $r_{healthy}$ = *.90, p < .001*). As expected, participants in the condition that received the concrete-only message cues included the word *banana* in their description significantly more than those who received both concrete and abstract message cues, χ^2 (1, N =

263) = 73.36, $p < .001$. Similarly, participants in the condition that received concrete and abstract message cues included the word *healthy* in their description significantly more than those in the concrete-only message condition χ^2 (1, N = 263) = 68.83, $p < .001$.

Analyses of Hypotheses

The construal level orientation manipulation was fully crossed with the message manipulation, yielding four conditions. One group of participants was manipulated to a high construal level orientation and viewed concrete-only message cues (integrated bridging technique). There were two groups of participants who viewed the message with low and high abstraction cues (induced bridging technique), those at a high construal level orientation and those at a low construal level orientation. Finally, participants who received a low construal level orientation manipulation and viewed the image with concrete-only message cues did not receive a bridging technique, and therefore, these participants are used as a reference group. Dummy variables were created to compare the groups in the integrated and induced conditions with the reference group.

Hypothesis 1 considered whether receiving an integrated bridging technique (H1a) or an induced bridging technique (H1b) would increase the odds of producing cognitive bridging outputs in comparison to a reference group who did not receive a bridging technique. To determine classification, binary logistic regression analysis was used (eg. Allison, 2012; Gray & Kinnear, 2012). The dummy variables were used as explanatory predictors and entered into step 1. Data from 240 participants, including 117 participants who produced cognitive bridging outputs, were available for analysis, and the correct classification rate for cognitive bridging outputs was 59.6%, χ^2 (3, N = 240) = 9.02, $p = .03$.

The Nagelkerke R square statistic, which is preferred to Cox and Snell, indicates how "useful the explanatory variables are in predicting the response variable and can be referred to as (a measure) of effect size" (Bewick, Cheek, & Ball, 2005, p. 1). In the case of this data, the Nagelkerke R square statistic was .05.

The two conditions that included an induced bridging technique were able to accurately discriminate between those who produced cognitive bridging outputs and those who did not (see Figure 4). Specifically, participants in the low construal level orientation, χ^2 (1) = 5.19, p = .02, and the high construal level orientation χ^2 (1) = 4.86, p = .03 induced bridging technique conditions were over twice as likely to produce cognitive bridging outputs (Exp B = 2.46, β = .90 and Exp B = 2.28, β = .83, respectively) than participants in the reference group (H1b). On the other hand, participants who received the integrated bridging technique (H1a) were not more likely to produce cognitive bridging outputs, χ^2 (1) = .17, p = .68 than participants in the reference group. Therefore, the results indicate support for H1b (induced process) and not H1a (integrated process), in that the induced bridging technique increased the likelihood of producing cognitive bridging outputs, but the integrated bridging technique did not.

Hypothesis 2 predicted that those who produce cognitive bridging outputs will have responses that are longer in word length than those who do not produce cognitive bridging outputs. An ANOVA was conducted comparing those who produced cognitive bridging outputs and those who did not produce them, upon the dependent variable of response length. The data indicate that participants who produced cognitive bridging outputs (n = 117, M = 14.91, SD = 9.17), used significantly more words in response to the message than participants who did not produce cognitive bridging outputs (n = 123, M= 9.55, SD = 9.39), F (1, 238) = 19.93, p < .001, η^2_ρ = .08. Therefore, hypothesis 2 is supported.

Hypothesis 3 considered whether receiving an integrated bridging technique (H3a) or an induced bridging technique (H3b) would increase the affinity and importance of the message. A 2 (construal level orientation: high/low) x 2 (message condition: abstract and concrete message cues/ concrete-only message cues) multivariate analysis of variance (MANOVA) was performed on the dependent variables of message affinity and message importance, as they were theoretically related and moderately correlated with one another (α = .43) (Tabashnick & Fidell, 2007). Table 1 includes the means and standard deviations.

The MANOVA indicated a significant main effect for message condition, $F_{Wilks' Lambda}$ (2, 258) = 21.06, $p < .001$, but not for construal level orientation, $F_{Wilks' Lambda}$ (2, 258) = .06, $p = .94$, or the interaction between these two variables $F_{Wilks' Lambda}$ (2, 258) = .08, $p = .92$. There was a strong association between message condition and the combined DVs, $\eta^2_\rho = .14$, and there was a main effect for message condition on message importance, F (1, 259) = 28.09, $p < .001$, η^2_ρ = .10. Participants who were in the induced bridging conditions, meaning that they viewed the message with both abstract and concrete cues, scored significantly higher on message importance than participants in the non-bridging reference group ($M = 3.06$, $SD = .90$). This finding held both for those manipulated to a high construal level orientation ($M = 3.68$, $SD = 1.01$), F (1, 127) = 13.49, $p < .001$, $\eta^2_\rho = 10$, and those manipulated to a low construal level orientation ($M = 3.69$, $SD = .82$), F (1, 123) = 16.78, $p < .001$, $\eta^2_\rho = 12$. Participants who were in the integrated bridging condition ($M = 3.14$, $SD = .84$) did not rate the message as more important than the participants in the reference group, F (1, 133) = .25, $p = .62$, $\eta^2_\rho = .002$. Therefore, in regards to message importance, H3a is not supported, but the findings indicate support for H3b, as participants who received the induced bridging technique rated the message as more important.

Hypothesis 4 considered whether receiving an integrated bridging technique (H4a) or an induced bridging technique (H4b) would lead to more abstract responses. The dummy variables for each condition were entered as explanatory predictors into an OLS regression, and the LCM abstraction scores of the outputs were used as the dependent variable. Table 1 includes the means and standard deviations. The overall model was significant, $F(3, 259) = 12.01$, $p < .001$ and indicated that the two conditions that included an induced bridging technique were significant. Specifically, participants in the low construal level orientation, induced bridging condition ($M = 2.34$, $SD = .59$), $t = 2.76$, $p = .006$, and the high construal level orientation, induced bridging condition ($M = 2.62$, $SD = .60$), $t = 5.14$, $p < .001$, had significantly more abstract responses than participants in the non-bridging reference group ($M = 2.01$, $SD = .76$). Therefore, in response to H4b, receiving an induced bridging technique leads to more abstract responses. This was not the case with the integrated bridging technique (H4a), as the outputs in this condition did not differ in abstraction from those in the comparison group ($M = 2.04$, $SD = .70$), $t = .27$, $p = .79$.

Study 1 Discussion

Study 1 was the first experiment to compare the integrated and induced processes in an attempt to foster cognitive bridging. The induced process leads to higher perceptions of message importance, more abstract responses and an increased likelihood of producing cognitive bridging outputs, which are more elaborative responses. While the induced process influenced these dependent measures, the integrated process did not. This suggests that the induced process may be a stronger way to elicit cognitive bridging than the integrated process and highlights an important dynamic in regards to how construal level theory applies to persuasion and the field of communication.

Construal level theory suggests that shifting to a higher level of abstraction should make higher level goals more salient, but it may be necessary for the individual to already hold this goal in order for this to work (Fujita & Han, 2009; Fujita, Trope, et al., 2006a). One explanation for the findings above is that the integrated condition did not work because participants did not actively hold the "eat healthy" goal, and so when they were shifted to a higher level of abstraction, this goal did not become salient. Theoretically, this would have influenced the integrated condition, and not the induced condition, as the integrated condition is the one where the cognitive bridge was dependent upon the higher level goal becoming salient when the participant was shifted to a higher level of abstraction. Therefore, study 2 is conducted with participants who already have the goal to eat healthy. It also utilizes a different manipulation of construal level orientation in order to focus attention on this goal.

Study 2

Design

Study 2 was completed by two hundred and nine undergraduate students at a large northeastern university. Participants who had completed study 1 were precluded from doing study 2. Fifteen individuals were removed from analysis for failing to follow directions on the construal level manipulation task (described below). As noted above, the focus of Study 2 is to investigate the influence of the integrated and induced processes on individuals who expressly hold the "eat healthy goal." Therefore, forty-nine additional students were excluded from analysis for indicating "no" to the question, *Are you currently dieting or watching what you eat?* The remaining 145 participants ranged in age from 18 to 24 years (M = 20.34; SD = 1.22); 105 indicated that they were female and 40 indicated that they were male. The procedures for study 2 were the same as for study 1, and again, participants were randomly assigned to condition.

Manipulations

The manipulations for study 2 were the same as those in study 1, with one exception. The Freitas et al. (2004) construal level orientation manipulation was used as originally designed and as utilized in prior research (Carrera, Muñoz, Caballero, Fernández, & Albarracín, 2012; Sanna, Lundberg, Parks, & Chang, 2010). The task involves a series of seven successive *how* or *why* questions, in which participants have to keep responding *how* or *why* to their previous response. Those manipulated to a high construal level orientation responded to *why do you improve or maintain your physical health*, and those manipulated to a low construal level orientation answered *how do you improve or maintain your physical health.* One advantage to using this manipulation is that asking about physical health is likely to make higher level health goals more salient, which theoretically should help the integrated condition.

Post-test measures

Cognitive bridging outputs. Cognitive bridging outputs were measured and coded the same way as in study 1. The word length of responses varied from two to fifty-one words (n = 145, M = 11.26, SD = 8.58). The coders concurred that 125 participants mentioned *fruits, vegetables, or bananas* (n = 145, α = .89, r = .81, p < .001) and that 81 participants mentioned *healthy or implied higher level health goals or values* (n = 145, α = .92, r = .86, p < .001). In our analyses in which cognitive bridging outputs are utilized, we again use only those cases in which the two coders agreed whether or not bridging took place (n = 145, α = .90, r = .82, p < .001), bringing our entire sample for these analyses to 132 participants (66 who produced cognitive bridging outputs).

Other measures. Message importance (n = 145, M = 3.17, SD = .94) and message affinity (n = 145, M = 3.12, SD = .97) were measured in the same way as in study 1, as was

abstraction. Regarding abstraction, the coders were reliable (n = 145, α = .93, r = .88, p < .001), and the raw scores were used to calculate the LCM abstraction measure (n = 145, M = 2.27, *S.D.* = .76).

Results

Manipulation Checks

Construal Level Orientation. As in Study 1, we conducted two separate manipulation checks for construal level orientation. Using the same procedure as in the earlier study, the coders determined if the participants responded *why* or *how* (n =145 α = .99, r = .98, p < .001). They scored +1 if the participant answered *why*, - 1 if the participant answered *how*, and 0 if the participant did not answer either *why* or *how*. As predicted, participants who answered *why* questions had a significantly higher score (n = 76, M = 6.38, SD = .74) than the individuals who answered *how* questions (n = 69, M = -6.72, SD = .47), F (1, 143) = 15,666.95, p < .001, η^2_ρ = .99).

For the second manipulation check of construal level orientation, the open-ended responses were coded using the LCM procedure (Coenen, et al., 2006). The values provided by the two coders were highly reliable (n = 145, r = .98, α = .99, p < .001), and the raw scores were used to calculate the LCM abstraction scores. Confirming that the manipulation was effective, participants who answered *why* questions had significantly higher abstraction scores (n = 76, M = 3.03, SD = .23) than the individuals who answered *how* questions (n = 69, M = 2.64, SD = .28), F (1, 143) = 86.41, p < .001.

Message condition. Study 2 used the same manipulation check for message condition that was used in study 1 (n = 145, α_{banana} = .96, $\alpha_{healthy}$ = .93; r_{banana} = .92, p < .001; $r_{healthy}$ =.88, p < .001). As expected, participants in the condition that viewed the concrete-only message cues

included the word *banana* in their description significantly more than those in the message condition that viewed the abstract and concrete message cues, χ^2 (1, N = 145) = 52.64, $p < .001$. Similarly, participants in the condition that viewed the message with abstract and concrete cues included the word *healthy* in their description significantly more than those in the concrete-only condition χ^2 (1, N = 145) = 49.36, $p < .001$.

Analyses of Hypotheses

As in study 1, there were four conditions. One group of participants was manipulated to a high construal level orientation and viewed concrete-only message cues (integrated bridging technique). Two groups of participants viewed the message with low and high abstraction cues (induced bridging technique), and were either at a high construal level orientation or a low construal level orientation. Finally, participants who received a low construal level orientation manipulation and viewed the image with concrete-only message cues did not receive a bridging technique, and therefore, these participants are used as a reference group. The statistical procedures used were the same as in the earlier experiment and facilitated comparison of the groups in the integrated and induced conditions with the reference group.

Hypothesis 1 considered whether receiving an integrated (H1a) or an induced bridging technique (H1b) would increase the odds of producing cognitive bridging outputs. Data from 132 participants, including 66 participants who produced cognitive bridging outputs, were available for analysis, and the correct classification rate for cognitive bridging outputs was 65.9%, χ^2 (3, N = 132) = 14.79, $p = .002$. The Nagelkerke R square statistic was .14, indicating a good model fit.

The two conditions that included an induced bridging technique were able to accurately discriminate between those who produced cognitive bridging outputs and those who did not (Figure 4). Specifically, participants in the low construal level orientation, induced bridging

condition, χ^2 (1) = 9.94, p = .002, and the high construal level orientation, induced bridging condition χ^2 (1) = 7.74, p = .005 were much more likely to produce cognitive bridging outputs (Exp B = 5.62, β = 1.73 and Exp B = 4.33, β = 1.46, respectively) than participants in the non-bridging reference group. On the other hand, participants in the integrated bridging condition (H1b) were not more likely to produce cognitive bridging outputs, χ^2 (1) = .92, p = .34 than participants in the non-bridging reference group. Therefore, the results replicate the findings from study 1, supporting H1b (induced process) and not H1a (integrated process). The induced bridging technique increased the likelihood of producing cognitive bridging outputs, but the integrated bridging technique did not.

Once again, participants who produced cognitive bridging outputs (n = 66, M = 13.55, SD = 7.09) had responses that were longer in word length than those who did not produce cognitive bridging outputs (n = 66, M= 7.94, SD = 8.38), F (1, 130) = 17.20, p < .001, η^2_ρ = .12. Therefore, hypothesis 2 is supported, replicating the findings from Study 1.

Using the same MANOVA and pairwise comparison procedures as in Study 1, we considered whether receiving an integrated bridging technique or an induced bridging technique increases message importance and message affinity (α = .61), Table 1. There was no main effect for message condition $F_{Wilks' Lambda}$ (2, 140) = 1.72, p = .18 or construal level orientation condition $F_{Wilks' Lambda}$ (2, 140) = .67, p = .51; however, the interaction between these two variables approached significance $F_{Wilks' Lambda}$ (2, 140) = 2.84, p = .06, η^2_ρ = .04. There was a significant interaction between construal level orientation and message condition on the variable of message importance, F (1, 141) = 5.47, p = .02, η^2_ρ = .04. Specifically, an induced bridging condition increased message importance when construal level orientation was low (M = 3.49, SD = .89), F (1, 67) = 4.64, p = .035, η^2_ρ = .07, in comparison to the non-bridging reference group

(M = 3.00, SD = .99). However, there was no difference between the induced bridging, high construal level orientation condition (M = 2.97, SD = .96) and the non-bridging reference group, F (1, 69) = .01, p = .91 or between the integrated bridging condition (M = 3.21, SD = .86) and the non-bridging reference group, F (1, 71) = .90, p = .35. Therefore, the findings in study 2 partially replicate study 1 in three ways: 1. neither the integrated nor the induced bridging condition influenced message affinity, 2. the integrated bridging technique did not differ from the non-bridging reference group on the variable of message importance, 3. the induced bridging technique increased message importance in comparison to the non-bridging reference group when construal level orientation was low. The one difference between the findings in study 2 and study 1 is that in study 2, the induced bridging technique did not increase message importance in comparison to the non-bridging reference group when construal level was high. Therefore, H3a is not supported and H3b is partially supported.

Hypothesis 4 considered whether receiving an integrated bridging technique (H4a) or an induced bridging technique (H4b) would lead to more abstract responses. The dummy variables were entered as explanatory predictors into an OLS regression, with the LCM abstraction scores of the outputs as the dependent variable. The overall model was significant, F (3, 141) = 4.00, p = .009 and indicated that the two conditions that included an induced bridging technique were significant. Specifically, participants in the induced bridging, low construal level orientation condition (M = 2.55, SD = .51), t = 3.28, p < 001, and participants in the induced bridging, high construal level orientation condition (M = 2.37, SD = .52), t = 2.28, p = .02, had significantly more abstract responses than participants in the non-bridging reference group (M = 1.97, SD = .71). Therefore, as in Study 1, receiving an induced bridging technique led to more abstract responses (H4b). Once again, this was not the case with the integrated bridging technique, H4a,

as the outputs in this condition ($M = 2.18$, $SD = 1.03$) did not differ significantly from those in the comparison group, $t = 1.22$, $p = .23$. Therefore, in regards to H4, the findings in study 2 replicate study 1.

Study 2 Discussion

Study 2 successfully replicated key findings from Study 1, establishing the ability of an induced bridging technique to elicit more abstract responses and to increase the likelihood of producing cognitive bridging outputs, which are more elaborative responses. Once again, the integrated bridging condition did not have these effects. These findings provide additional support for the induced process. However, it is important to note that there was one key difference in the findings in study 2. Participants in the induced bridging, high construal level orientation condition did not differ from the non-bridging reference group on the dependent measure of message importance. Therefore, while hypotheses 1, 2, and 4 were replicated in Study 2, hypothesis 3 was only partially replicated.

There are a number of possible explanations for why the integrated process is not working and the induced process is working to foster cognitive bridging. First, study 1 and study 2 were conducted online, and we might expect that if participants are distracted while doing the study, this would influence the integrated condition more than the induced conditions, as in the former, the process requires participants to focus on their higher level goal of eating healthy throughout the delivery of the message. Additionally, adding a fully-crossed construal level orientation control group and trying a different manipulation of construal level orientation can help to highlight how the construal level orientation manipulation is influencing the two processes. One possible critique of the prior two studies is that the way that the open-ended, dependent measure was asked may have been generating a recall response. While not convinced

that cognitive bridging outputs are simply a recall measure, as the abstraction level changes as well, it is useful to consider replicating the study but using a different choice of words to gather the open-ended response to the message. Finally, in the prior two studies, the concrete message cues were not held constant between the two message conditions. Therefore, it is necessary to add a condition which features both concrete and abstract message cues, but that holds the concrete cues the same as in the concrete-only condition. In Study 3, we seek to replicate the findings of the previous two studies by addressing each of these issues.

Study 3

Study 3 was conducted to replicate and extend the earlier two studies. Once again, the purpose was to test the integrated and induced techniques of cognitive bridging.

Design

Study 3 was completed by 168 university students using iPads in a quiet laboratory space. We asked them to put their phones away to reduce distraction and all complied. One participant was removed from analysis for failing to follow directions on the construal level orientation manipulation task (described below). Additionally, 21 participants were removed from analysis for having completed an earlier version of the study.[1] One participant's data was removed from analysis because of technical difficulties using the iPad. The remaining 145 participants ranged in age from 18 to 39 years (M = 20.03; SD = 1.97); 88 indicated that they were female and 57 indicated that they were male. The procedures for study 3 were similar to the earlier experiments, however, participants were randomly assigned to receive one of three construal level orientation

[1] The department changed the study recruitment system that students used; and therefore, it was possible for participants who had completed one of the earlier two studies to sign up to do study 3. Students who had completed an earlier version were removed from analysis.

manipulations (high/low/control) and one of three cafeteria signs (as described further below), and the open-ended dependent measure was asked in a different way.

Manipulations

Message condition. As mentioned above, Study 3 included the original two message conditions: concrete-only message cues and abstract and concrete message cues. Additionally, a new message condition featuring abstract and concrete message cues, but using the same concrete image as in the concrete-only message condition was used. In the new condition, just the text was manipulated, such that participants saw the concrete image of the bananas and the abstract, goal-oriented words "Eat Healthy." Therefore, the message featured both abstract and concrete message cues.

Construal level. The previous two studies used construal level orientation manipulations based on answering why or how questions. In this third study, we used a construal level orientation manipulation that did not involve answering why or how questions. Instead, participants completed a letter identification task based on Navon's (1977) composite letters. This widely used global/local processing task, featuring large letters made of smaller letters, has been utilized as a manipulation for construal level orientation in prior work (Liberman & Förster, 2009; Wakslak & Trope, 2009). Participants viewed 24 composite letters from Wakslak and Trope (2009), one at a time at 200 pixels in height and 300 DPI. Those in the high construal level orientation condition were instructed to identify the larger letters, and those in the low construal level orientation condition were instructed to identify the smaller ones. The control group received neither task.

Post-test measures

Cognitive bridging outputs. In order to address the critique that the open-ended question in the prior two studies was capturing message recall, in this third study, participants were asked more broadly to describe the message in their own words. Cognitive bridging outputs were measured and coded the same way as in the earlier studies. The word length of responses varied from two to 103 words (n = 145, M = 22.43, *S.D.* = 15.36). The coders concurred that 115 participants mentioned *fruits, vegetables, or bananas* (n = 145, α = .94, r = .89, p <.001) and that 92 participants mentioned *healthy or implied higher level health goals or values* (n = 145, α = .93, r = .91 p < .001). In our analyses in which cognitive bridging outputs are utilized, we again use only those cases in which the two coders agreed whether or not bridging took place (n = 145, α = .93, r = .88, p <.001), bringing our entire sample for these analyses to 136 participants (70 who produced cognitive bridging outputs).

Other measures. Message importance (n = 145, M = 3.57, SD = .83) and message affinity (n = 145, M = 3.24, SD = 1.04) were measured in the same way as in the prior studies. Abstraction was coded the same way (n = 145, α = .94, r = .90, p < .001), and used to calculate the LCM abstraction measure (n = 145, M = 2.71, *S.D.* = .63).

Results

Manipulation Checks

Construal level orientation. As a manipulation check for construal level orientation the responses to the composite letter task were scored for accuracy. Participants received +1 for each large letter, -1 for each small letter, and a 0 if they failed to accurately identify the letter. These were summed to calculate an abstraction score, ranging from -24 to 24. Participants who received the high construal level orientation manipulation had higher abstraction scores (M =

23.93, *S.D.* = .33) than participants who received the low construal level orientation manipulation (*M* = -23.94, *S.D.* = .24), F (2, 142) = 510,976.09, $p < .001$.

Message condition. Study 3 used the same manipulation check for message condition as in the earlier studies, and the coders were reliable ($n = 145$, $\alpha_{banana} = .99$, $\alpha_{healthy} = .94$; $r_{banana} = .99$, $p < .001$; $r_{healthy} = .89$, $p < .001$). As expected, participants who saw concrete-only message cues included the word *banana* in their description significantly more than those who saw the original message featuring abstract and concrete message cues, χ^2 (1, N = 145) = 39.60, $p < .001$. Similarly, participants who saw the original message featuring abstract and concrete message cues included the word *healthy* in their description significantly more than those who saw the concrete-only message cues χ^2 (1, N = 145) = 31.42, $p < .001$. Additionally, 94.6% of participants who saw the new message, which including abstract and concrete message cues and the original concrete image, mentioned either *banana* and/or *healthy* in their output.

Analyses of Hypotheses

In study 3, there were nine conditions. One group of participants was manipulated to a high construal level orientation and viewed concrete-only message cues (integrated bridging technique). Six groups of participants viewed one of the two messages with low and high abstraction cues (induced bridging technique), and were either at a high, low, or control construal level orientation. Finally, two groups did not receive a bridging technique – participants who viewed the image with concrete-only message cues and were either in the low construal level orientation or control construal level orientation condition.

In order to consider hypothesis 1, dummy variables were used as explanatory predictors in a binary logistic regression, and the low construal level orientation, concrete-only message cues condition was once again used as the reference group. Data from 136 participants, including

70 participants who produced cognitive bridging outputs, were available for analysis, and the correct classification rate for cognitive bridging outputs was 70.6%, χ^2 (8, N = 136) = 34.56, $p <$ .001. The Nagelkerke R square statistic is .30, indicating a good effect size.

In support of H1b, all six conditions that included an induced bridging technique were able to accurately discriminate between those who produced cognitive bridging outputs and those who did not (Figure 5). Specifically, participants, who were manipulated to a low construal level orientation and who saw the original message with both abstract and concrete cues, χ^2 (1) = 5.42, p = .02, were over 14 times more likely (Exp B = 14.86, β = 2.70) to produce cognitive bridging outputs than participants in the non-bridging reference group. Participants who were manipulated to a high construal level orientation and who saw the original message with both abstract and concrete cues, χ^2 (1) = 6.28, p = .01 were 28 times as likely to produce cognitive bridging outputs (Exp B = 28, β = 3.33) than participants in the non-bridging reference group. Additionally, as in the prior two studies, participants in the integrated bridging condition (H1a) were not more likely to produce cognitive bridging outputs, χ^2 (1) = .19, p = .66 than participants in the non-bridging reference group. Therefore, study 3 replicates the earlier experiments, as H1b is supported and H1a is not supported.

Study 3 also tested several new induced bridging conditions, all of which were able to accurately discriminate between those who produced cognitive bridging outputs and those who did not. This finding held, regardless of whether the participant was at a low construal level orientation, χ^2 (1) = 7.26, p = .007 (Exp B = 24, β = 3.18), a high construal level orientation, χ^2 (1) = 4.21, p = .04 (Exp B = 10.4, β = 2.34) or in the construal level orientation control group, χ^2 (1) = 6.44, p = .01 (Exp B = 24, β = 3.18). The findings for participants who saw the original message with both abstract and concrete message cues and who were in the construal level

orientation control group, approached significance χ^2 (1) = 3.15, p = .076 (Exp B = 8, β = 2.08). These new conditions featured the induced bridging technique and increased the likelihood that participants would elicit cognitive bridging outputs, in further support of H1b.

Study 3 also supports Hypothesis 2, which predicted that those who produce cognitive bridging outputs (n = 70, M = 25.51, SD = 13.78) will have responses that are longer in word length than those who do not produce cognitive bridging outputs (n = 66, M = 18.61, SD = 13.36), F (1, 134) = 8.79, p = .004, η^2_ρ = .06. This replicates the findings from the earlier studies, illustrating that cognitive bridging outputs are a more elaborative process.

Next, a MANOVA was conducted to investigate whether receiving an integrated bridging technique (H3a) or an induced bridging technique (H3b) increases the perceived importance and affinity of the message (α = .37) (Table 1). As in study 1, the model for message condition was significant $F_{Wilks' Lambda}$ (4, 270) = 3.61, p = .007, and construal level orientation condition $F_{Wilks' Lambda}$ (4, 270) = .63, p = .64 and the interaction $F_{Wilks' Lambda}$ (8, 270) = .70, p = .70 were not. However, in study 3, message condition is a significant predictor for message affinity F (2, 136) = 3.12, $p < .05$, η^2_ρ = .04, and approaches significance for message importance F (2, 136) = 2.65, p = .07, η^2_ρ = .04.

Tukey post-hoc analyses illustrate that participants who received the original induced bridging technique (M = 3.70, SD = .83), rated the message as significantly more important than those who saw the message with concrete-only cues (M = 3.29, SD = .74), $p < .05$. Participants who received the new induced bridging technique (M = 3.66, SD = .86) also rated the message as more important than those in the concrete-only message condition, although the difference merely approached significance, p = .07. Therefore, participants who received an induced bridging technique, either through the original or new message, rated the message as more

important than those who did not receive an induced bridging technique. However, as the non-bridging reference group scored particularly high on message importance in this study (M = 3.66, SD = .68), there are no significant differences between participants in any of the induced bridging conditions or in the integrated bridging condition from those in the non-bridging reference group. Therefore, H3a and H3b are not supported for the dependent variable of message importance.

Participants who received the original induced bridging technique, both at a low construal level orientation (M = 2.95, SD = 1.12) and a control construal level orientation (M = 2.76, SD = 1.48), rated the message significantly lower than the non-bridging reference group (M = 3.90, SD = .88) on the variable of message affinity, p = .017 and p = .006, respectively. There was no difference in ratings of message affinity for those in the integrated condition (M = 3.50, SD = .91), p = .36. Therefore, on the variable of message affinity, H3a and H3b are not supported, as neither the integrated nor the induced bridging techniques increased ratings of message affinity.

Hypothesis 4 predicted that receiving an integrated bridging technique (H4a) or an induced bridging technique (H4b) would lead to more abstract responses. In order to account for all possible relationships, a univariate analysis was conducted on the LCM abstraction scores, with construal level orientation and message condition as predictors. There was a main effect for message condition, F (2, 136) = 5.23, p = .007, η^2_ρ = .07, however, there was no main effect for construal level orientation condition and no interaction. Participants in the original induced bridging conditions (M = 2.82, SD = .72) and participants in the new induced bridging conditions (M = 2.83, SD = .49) responded significantly more abstractly than participants who did not received an induced bridging technique (M = 2.44, SD = .61), p = .012 and p = .007,

respectively. Participants in the integrated bridging condition (M = 2.45, SD = .76) did not differ from the non-bridging comparison group (M = 2.40, SD = .49) on abstraction, p =.88. Therefore, as in the earlier studies, the induced bridging technique led to more abstract responses (H4b), while the integrated bridging condition did not (H4a).

Study 3 Discussion

Study 3 replicated key findings from the earlier two studies. The induced bridging conditions increased the likelihood that participants would respond more abstractly and elicit cognitive bridging outputs, which are more elaborative responses, while the integrated bridging condition did not. The findings for message importance and message affinity were more complex. While there were indications that those who received an induced bridging technique once again scored higher on message importance, this finding was not upheld when compared to the non-bridging reference group, which scored particularly high on this measure. Replicating earlier findings, neither bridging technique increased message affinity, although, two of the induced conditions actually decreased it. Together, these findings indicate support for the induced process, and not the integrated process, as a method of fostering cognitive bridging. Furthermore, they indicate that more work is needed to determine how message affinity and message importance relate to cognitive bridging.

It is important to note that in study 3, the new induced bridging conditions fostered cognitive bridging in the same way as the original induced bridging conditions. In other words, even though the new message with both abstract and concrete cues looked visibly like the concrete-only message, it operated the same way as the original message with abstract and concrete cues. Therefore, the new message conditions operated in the way we would expect them to theoretically. This was important to demonstrate because one possible critique of the original

message featuring abstract and concrete cues is that while the individual fruits and vegetables are low abstraction cues, taken together, they may represent a more abstract concept, such as food. However, this was not the case, as they fostered cognitive bridging like the original message featuring abstract and concrete cues.

General Discussion

As the field of communication continues to consider the applicability of construal level theory to the study of persuasion, cognitive bridging is an important area of inquiry. The connection between our everyday behaviors, such as eating a specific piece of fruit, recycling one water bottle, or avoiding a particular cigarette, have meaning when connected to our higher level goals, such as eating healthy, saving the planet, or avoiding illness. By fostering cognitive bridging, we can help individuals connect very concrete behaviors that are likely high in efficacy to more abstract, higher level goals.

The purpose of this chapter was to highlight two different mechanisms of fostering cognitive bridging and then juxtapose and test them. The findings suggest that the induced process, in which a message contains both the concrete and abstract message cues that are logically related, is an effective way of fostering cognitive bridging. In other words, within the body of the message, we can provide the elements that encourage the connection between the specific behavioral action and the higher level goal. This is useful because it means that cognitive bridging can be fostered, regardless of how abstractly or concretely an individual is thinking. And, this is particularly important because in large scale public health and advocacy campaigns, messages are often delivered without knowledge of how abstractly or concretely the recipients are thinking.

Across all three studies, the integrated bridging technique was ineffective at fostering cognitive bridging. In other words, when participants were manipulated to think more abstractly, which theoretically should make their higher level goals more salient, they did not connect a specific message to their higher level goal to eat healthy. This seems counter to many studies on construal level theory and persuasion, which suggest that how abstractly or concretely somebody is initially thinking makes a difference in how the message is processed (Fujita et al., 2008; Kim et al., 2009; Nan, 2007). Indeed, it highlights a limitation of construal level theory, in that it is not simply enough to shift somebody to think abstractly and hope that goal orientation carries through subsequent message and decision contexts.

However, even though the integrated pathway is not effective at fostering cognitive bridging, it is likely still a valid mechanism of construal level influence when considering other persuasive outcomes, especially ones for which processing fluency is strengthened and a key mediator. One possible explanation for why the integrated pathway did not foster cognitive bridging is that processing fluency was inhibited since in the integrated condition, the participant was manipulated to think abstractly and the message was concrete. As noted above, prior research has shown that processing fluency is enhanced when abstraction/distance in the mind is congruent to abstraction/ distance in the message (Benning, Breugelmans, & Dellaert, 2012; Kim, Rao, & Lee, 2009; Fujita, Eyal, Chaiken, Trope, & Liberman, 2008), and it is likely also the case that processing fluency is enhanced when abstraction and abstraction match.[2] In the integrated condition, abstraction in the mind and abstraction in the message were at different levels.

[2] The term congruence refers to the relation between abstraction and distance and the term matching refers to either abstraction or distance (abstraction matching with abstraction; distance matching with distance).

The explanation for why the induced process was effective at fostering cognitive bridging is that the active processing of message cues actually induce changes in how one is thinking. This suggests tremendous potential in the body of the message itself, and an entirely new conceptual layer to construal level theory that has not been addressed in other fields, such as psychology.

Limitations and Future Research

These studies build upon one another, addressing several limitations. For example, participants may have been distracted in the online studies, and therefore, study 3 was conducted in the lab. It may have been necessary for participants to be reminded of the "eat healthy" goal, and therefore, they all actively held and were primed with, this goal in study 2. A different manipulation of construal level orientation was used in each study, and we asked the open-ended question differently in the third study. Finally, study 3 added a new image manipulation to make certain that the concrete cues in the message was held constant.

There are also some additional limitations. First, these studies used only messages about one goal, eat healthy. Future work should seek to replicate these findings using different topics, such as recycling a bottle (how) in order to save the earth (why) and studying (how) in order to do well in school (why). We might also consider seeing whether cognitive bridging outputs could be fostered with concrete behaviors that are more difficult to enact, such as those with a prevention focus (Förster & Higgins, 2005). For example, we might see if an induced bridging technique can help smokers who want to quit avoid smoking their next cigarette (how) in order to stay alive (why, promotion focus frame), or alternatively avoid dying (why, prevention focus frame). Or, we might see whether an induced bridging technique can help dieters avoid sweets (how) in order to eat healthy (why, promotion focus frame), or alternatively to avoid being

overweight (why, prevention focus frame). We can also study if cognitive bridging can stimulate actual behavioral changes, such as recycling more water bottles or smoking fewer cigarettes. Additionally, we can consider goals at varying levels of abstraction and investigate cognitive bridging within the complex hierarchies of goals that individuals possess.

Another area to consider in future research is how logical the connection between the concrete and abstract elements must be. For example, smokers may be more willing to accept a message that suggests avoiding a cigarette (specific) to stay healthy (abstract goal) rather than to avoid dying (abstract goal), as the latter connection may yield more counter-arguing. Therefore, it is important to note that not all specific message cues or abstract message cues are equal, and they are situated within complex hierarchies of goals. Future work also should test how long a construal level induction lasts, and whether tasks, such as processing a message, wipe out an earlier manipulation.

These three studies investigated two processes of fostering cognitive bridging. The induced process increased abstraction and the likelihood of eliciting cognitive bridging outputs, which are more elaborative. The integrated process did not influence these factors. Therefore, these studies provide support for the induced process of construal level influence, while suggesting further investigation into the integrated process. Messages that contain logically-related abstract and concrete message cues should be considered in the design of public health campaigns, as they are able to foster the cognitive connection between an abstract goal and the specific means to achieve it. Future research should further highlight the types of behaviors that cognitive bridging can best address and seek to uncover further information about the underlying mechanisms by which it occurs.

Next, this work considers how concepts associated with construal level theory interact with concepts associated with psychological reactance theory. Specifically, Chapter 3 tests Proposition 2 from the theoretical model in Chapter 1, investigating whether threat to choice interacts with congruence and whether it is possible to deliver a message that features a high threat to choice by increasing abstraction and distance.

CHAPTER 3

Re-Construing Reactance: Tests of Theoretical Interactions Between Construal Level Theory and Psychological Reactance Theory

Strategic messages that are highly controlling tend to be less effective. Prior research on psychological reactance theory has shown that resistance to messages that threaten freedom of choice occurs as part of a motivational drive to reestablish this sense of freedom (Brehm, 1966; Burgoon, Alvaro, Grandpre, & Voulodakis, 2002; Clee & Wicklund, 1980; Dillard & Shen, 2005). Scholars have investigated a number of factors that interact with the threat to choice level of the message to influence state (or situational) reactance and message effectiveness, such as empathy (Shen, 2010), narrative formats (Moyer-Guse, 2008), and gain/loss frames (Quick & Bates, 2010). However, abstraction and distance are two concepts that have gone largely unexplored in research on psychological reactance theory, even as there are theoretical reasons to believe they might relate. As Wicklund, (1974) notes:

> the closer a person is to the decision point (or action point), the greater power a preference has to threaten decision freedom. There is good reason for this assumption. The preference has no implications for action when the decision point is viewed as an abstraction far into the future (p. 9).

As noted in earlier chapters, construal level theory holds that there is a connection between how close or far an item or decision context is perceived to be and how abstractly it is mentally represented. Prior work has not explored if or how construal level theory relates to psychological reactance theory. The purpose of the experiments below is to propose and test previously unexplored relationships linking threat to choice, distance, and abstraction using the theoretical frameworks of psychological reactance theory and construal level theory.

Study 1

Study 1 considers how construal level, psychological distance, and threat to choice level of the message relate. First, it is important to consider the concept of construal level orientation.

Construal Level Orientation

As noted in earlier chapters, construal level orientation refers to the abstraction level of an individual's current processing state. For example, a high CLO is associated with a more global processing style, higher-level values, and greater abstraction (seeing the forest), and a low CLO is associated with a more local processing style, means-oriented concerns, and greater specificity (seeing the trees) (Liberman & Trope, 2008).

One question that previous work has not yet addressed is if changing the level of abstraction at which a message is mentally processed results in a change in the level of state reactance. There is some evidence to indicate that a high construal level orientation might result in lower levels of state reactance. For example, a higher construal level orientation enables one to see the larger context, the entire forest instead of just one individual tree (Liberman & Trope, 2008). If one experiences a choice threatening situation from a high construal level orientation, one choice is threatened and many others remain unthreatened (one tree in the forest). Psychological reactance holds that the level of reactance is a function of the proportion of choices threatened, such that when a small proportion of choices is threatened, reactance is lower than when a large proportion is threatened (Brehm, 1966; Wicklund, 1974). Thus, we might expect state reactance to be lower when construal level orientation is high.

Additionally, research has shown that motivational focus associated with self-control is stronger at a higher construal level orientation (Fujita, Trope, et al., 2006; Freitas et al., 2004). Reactance has been described through a motivational framework, as a negative motivational state

(Wicklund, 1974). Therefore, a higher construal level orientation might be associated with lower levels of reactance.

> **H1: When CLO is high, state reactance will be lower than when CLO is low, regardless of the psychological distance and threat to choice level of the message.**

As noted above, construal level orientation also relates to the concept of psychological distance, which may also influence levels of state reactance or message effectiveness.

Psychological Distance

As described in Chapter 1, psychological distance refers to how close or far an item is perceived to be from oneself in the here and now (Trope & Liberman, 2010; Liberman & Förster, 2009). There are four integrated dimensions of psychological distance: temporal (time), spatial (physical location), social (social closeness), and hypotheticality (how definite) (Bar-Anan, Liberman, Trope & Algom, 2007). Distance has been mostly conceptualized in the reactance literature as a barrier that restricts or threatens freedom, rather than as a message feature that influences the level of state reactance (Wicklund, 1974). For example, when a candy is held further away, distance is a barrier restricting access to select that candy (Wicklund, 1974). However, Buller et al. (2000) considered how distance influences state reactance in research on sun protection behaviors, concluding reactance is more of a concern when trying to change immediate (close temporal distance) behaviors, rather than future (far temporal distance) behaviors.

As noted in Chapter 1, construal level orientation and psychological distance are congruent when construal level orientation is high and psychological distance is far or when construal level orientation is low and psychological distance is close. When psychological distance and construal level orientation are congruent, cognitive fluency and ease of processing

are greater (Kim, Rao, & Lee, 2009). As noted above, prior research has also shown that congruence can facilitate message effectiveness (Fujita et al., 2008). However, when the message is flawed in some way, such as featuring weak arguments, congruence reduces, rather than increases the effectiveness of the message (Fujita et al., 2008). This is because a message that is already likely to be resisted is processed more fluently, reducing even further the overall effectiveness of the message. While prior research has not yet considered whether congruence between construal level orientation and psychological distance interacts with the threat to choice level of the message, we might expect a similar two-way interaction. As noted above, research on reactance has shown that high threat to choice reduces the effectiveness of a message. Therein, when high threat to choice messages are processed more fluently as a result of congruence, effectiveness might decrease, not increase.

> **H2: A two-way interaction between congruence and threat to choice level of the message will emerge, such that when psychological distance and construal level orientation are congruent and threat to choice level is high, message effectiveness will be lowest.**

Congruence considers the relationship between construal level orientation and psychological distance, however, it does not take into account the differences between low/ close and high/ far congruent conditions. And, there is reason to believe that these will be different. As noted above, in Buller et al. (2000) state reactance is likely higher at close psychological distance. Furthermore, state reactance is hypothesized above to be higher at a low construal level orientation. Therefore, we might expect that when threat to choice level is high, construal level orientation is low, and psychological distance is close (congruent: low/ close), message effectiveness will be lowest. This is important as many persuasive messages are delivered in this condition.

H3: A three-way interaction will emerge between CLO, psychological distance and threat to choice level of the message, such that message effectiveness will be lowest when threat to choice is high, CLO is low and psychological distance is close.

Method

Design

Eighty-six students at a northeastern university completed the study in exchange for extra credit. Two individuals were removed from analysis for failing to follow directions on one of the tasks. The remaining 84 participants ranged in age from 18 to 23 years (M = 19.81; SD = 1.23); 28 were male and 56 were female. Additionally, 35 participants reported belonging to a Greek social organization on campus (fraternity or sorority), and 49 reported that they did not belong to one. They were recruited through an online, university-operated research pool, and an IRB-approved consent form was signed by every participant. Students who participated in Study 1 were not permitted to participate in Study 2.

The participants were randomly assigned to one of twelve conditions in a 3 (CLO: high/ low/ control) x 2 (Psychological Distance: close psychological distance/ far psychological distance) x 2 (Threat to choice: high threat to choice/ low threat to choice) experiment. Samples of the stimulus materials can be seen in Figure 6. The manipulations were designed and tested iteratively with six undergraduate research assistants, who advised that the scenario of installing monitors to watch over first-year students at Greek parties was an important issue on campus.

Manipulations

Construal level orientation. As noted above, construal level orientation refers to the processing style (abstract/ concrete) used in mental representations (Freitas et al., 2004; Fujita et al., 2006). Using the method established by Fujita et al. (2006), construal level orientation was

manipulated through a 40-word, category/ exemplar task. Participants all saw the same target words, including book, pen, and coin. Participants in the high construal level orientation condition were asked to generate a category for the target word, and participants in the low construal level orientation condition were asked to generate an exemplar for the target word. The control group did not complete either task. As noted above, two participants were removed from the study for failing to follow directions during this task.

Psychological distance. Psychological distance was manipulated by using all four parameters together (all close/ all far). The specific parameters of psychological distance were manipulated as follows: temporal (vote this week/ vote next year); spatial (Ithaca, NY/ Albuquerque, NM); social (private school/ state school); hypotheticality (vote definitely happening/ vote possibly happening).

Threat to choice. Threat to choice was manipulated as: high threat to choice (faculty members voting whether to require first-year monitors at Greek parties, with the monitors as university employees, such as a designated administrator) and low threat to choice (Greek student leaders voting whether to require first year monitors at Greek parties, with the monitors as other students, such as a member of the house). The website images all featured the same layout, color scheme, and design. Each one included the respective school's logo and text informing the participant about the vote (faculty or students voting; happening at close or far psychological distance). Contact information for either the University Faculty or Greek Life was manipulated in the high and low threat conditions. The wording of the materials was standardized, such that only the specific items being manipulated were changed.

Procedure

All participants completed an online pre-survey that measured their responses on the trait psychological reactance scale (Hong & Faedda, 1996). Participants also responded to demographic and Greek life affiliation questions.

Twenty-four hours after completing the online pre-survey, participants were sent a link to the remainder of the study. Participants were randomly assigned to receive one of three construal level orientation manipulations (high/low/control), described above. Participants were then presented with one of four psychological distance/ threat to choice manipulations in the form of the website image about first year monitors at Greek parties.

Following the presentation of the website image, participants completed manipulation checks and dependent measures of state reactance and message effectiveness and were debriefed.

Pre-test measures. Trait reactance refers to a general level of rebelliousness, regardless of state conditions (Hong & Faedda, 1996; Quick & Stephenson, 2008). The 11-item trait reactance scale (Hong & Faedda, 1996) asks participants to respond on a five-point Likert scale to what extent they *strongly disagree* (1) to *strongly agree* (5) with statements, including: *I become frustrated when I am unable to make free and independent decisions; I become angry when my freedom of choice is restricted;* and *I resist the attempts of others to influence me;* (n=84, M= 3.06, SD = .47, α = .73).

To measure issue importance, participants were asked to respond on a five-point Likert scale, (1) *not important at all* to (5) *very important*, to the question: *how important do you believe that social Greek organizations (such as fraternities and sororities) are to your social life on campus?* (n = 84, M = 3.04, SD = 1.33).

Post-test measures. Prior research has supported the finding that state reactance can be modeled through separate cognitive and affective outputs (Dillard & Shen, 2005; Quick &

Stephenson, 2007; Rains & Turner, 2007). To determine levels of state psychological reactance, cognitive and affective scales were developed using measures adapted from Dillard and Shen (2005) and Quick and Stephenson (2007). To measure the cognitive outputs of reactance, participants were asked to respond on a five-point Likert scale, (1) *strongly disagree* to (5) *strongly agree*, whether the website image *made me feel like the choice was mine* (reverse-coded), *threatened my freedom to choose, tried to make a decision for me, tried to manipulate me and tried to pressure me* (n = 84, M = 2.78, SD = .60, α = .69). To measure the affective outputs of reactance, participants were asked to respond on a five-point Likert scale, (1) *strongly disagree* to (5) *strongly agree*, whether the website image *made me angry, made me aggravated, made me annoyed,* and *made me irritated* (n = 84, M = 2.74, SD = .86, α = .94).

To determine levels of message effectiveness, participants were asked to respond on a five-point Likert scale, (1) *strongly disagree* to (5) *strongly agree*, to two statements designed to measure their level of agreement with the message: *I believe first-year monitors should be required at Greek Life parties in which first-year students are in attendance* and *I believe that first year monitors should NOT be required at Greek Life parties in which first-year students are in attendance* (reverse-coded) (n = 84, M = 2.64, SD = 1.02, r = .82).

Results

Manipulation Checks

Construal level orientation. As a manipulation check for construal level orientation, the responses to the category/ exemplar task were each coded, utilizing the procedure developed by Fujita et al. (2006), by two undergraduate research assistants, unaware of the theoretical basis of the study and asked to conceal condition. If the participant's response was an example of the target word, the coders scored it as -1, and if the target word was an example of the participant's

response, the coders scored it as 1. If the participant's response fit neither condition, the coders scored it with a 0. The ratings of the two coders were highly correlated (n = 2040; r = .93; Kappa = .88), and were averaged together. The scores were summed to create an abstraction score for each participant, ranging from -40 to +40, with a higher score representing a higher construal level orientation. As predicted, participants who provided category responses for the target words had a significantly higher abstraction score (n = 22, M= 35.50, SD = 5.84) than those who provided exemplar responses (n = 29, M= -36.14, SD = 4.97), t (49) = 47.24, p < .001.

Psychological distance. As a manipulation check for psychological distance, responses to two post-test questions measured on a scale ranging from 1 (*not at all*) to 7 (*a great deal*) were analyzed. As predicted, participants in the close psychological distance condition scored significantly higher in response to the question: *to what extent does the message you just saw affect students at Cornell University?* (n = 41, M = 5.51, SD = 1.40) than participants in the far psychological distance condition (n = 43, M= 3.60, SD = 1.81), t (79) = 5.41, p < .000, unequal variances assumed per Levene's test. Additionally, as expected, participants in the far psychological distance condition scored significantly higher in response to the question: *to what extent does the message you just saw affect students at the University of New Mexico at Albuquerque?* (n = 43, M = 5.53, SD = 1.37) than participants in the close psychological distance condition (n = 41, M= 1.68, SD = 1.19), t (82) = 13.72, p < .000).

Threat to Choice. As a manipulation check for threat to choice, participants responded to the item, *The website you just viewed mentioned a vote. Who was voting?* As expected, participants in the high threat to choice condition selected the answer *faculty* significantly more than they selected the response *students*, χ^2 (1, N = 40) = 15.35, p < .001. Additionally,

participants in the low threat to choice condition selected the answer *students* significantly more than they selected the response *faculty*, χ^2 (1, N = 44) = 18.70, $p < .001$.

Analyses

To test the first and third hypotheses, 3 (construal level orientation: high/ low/ control) x 2 (psychological distance: close/ far) x 2 (threat to choice: high/ low) ANCOVAs were conducted on the cognitive and affective measures of state reactance and on message effectiveness, while controlling for trait reactance and issue importance. The means and standard deviations for these analyses are detailed in Table 2. Observed power for the corrected models is: cognitive outputs of state reactance = .94; affective outputs of state reactance = .69; and message effectiveness = .86. To test the second hypothesis, a 2 (congruence: congruent/ incongruent) x 2 (threat level: high/low) ANCOVA was conducted on message effectiveness, while controlling for trait reactance and issue importance, and the observed power for the corrected model is .93. The means and standard deviations for this analysis are detailed on Figure 7.

Hypothesis 1 predicted participants at a low construal level orientation will score higher on state reactance than participants at a high construal level orientation, regardless of psychological distance and the threat to choice. A main effect was found for construal level orientation, F (2, 70) = 3.53, $p = .035$, $\eta^2_\rho = .092$, confirming that participants in the low construal level orientation condition scored significantly higher ($M = 2.93$, $SD = .59$) than participants in the high construal level orientation condition ($M = 2.58$, $SD = .57$) on the cognitive outputs of state reactance, t (49) = 2.13, $p = .038$. Participants in the control condition scored in the middle ($M = 2.79$, $SD = .60$). However, the main effect for construal level orientation was not found on the affective outputs of state reactance. Thus, hypothesis 1 is supported only for the cognitive outputs of state reactance.

A closer look at these ANCOVAs reveals some other interesting relationships. As predicted by psychological reactance theory, a main effect was found for threat to choice on the cognitive outputs of state reactance, F (1, 70) = 6.09, p = .016, η^2_ρ = .08, confirming that participants in the high threat to choice condition (M = 2.94, SD = .64) scored higher than participants in the low threat to choice condition (M = 2.65, SD = .52). As noted above, psychological reactance is expected to be higher at close psychological distance. An interaction approached significance for the cognitive outputs of state reactance between threat to choice level and psychological distance, F (1, 70) = 3.87, p = .053, η^2_ρ = .052. In other words, participants in the high threat to choice, close psychological distance condition (M = 3.12, SD = .67) reported higher levels of the cognitive outputs of state reactance than participants in the high threat to choice, far psychological distance condition (M = 2.77, SD = .58), t (39) = 1.74, p = .09, though this difference is partially significant. The data also reflect a 3-way interaction approaching significance between threat to choice level, psychological distance and construal level orientation on the cognitive outputs of state reactance, F (2, 70) = 3.07, p = .053, η^2_ρ = .08. As hypothesized above and discussed further below, the high threat to choice, close psychological distance, low construal level orientation condition presents a special case wherein state reactance is likely to be highest. Participants in this condition scored significantly higher on the cognitive measures of state reactance (M = 3.75, SD = .57) than participants in the high threat to choice, close psychological distance, high construal level orientation condition (M = 2.48, SD = .41), t (7) = 3.87, p = .006 and the high threat to choice, far psychological distance, low construal level orientation condition (M = 2.88, SD = .51), t (10) = 2.69, p = .023. This indicates it might be possible to decrease the cognitive outputs of state reactance by increasing psychological distance or by shifting to a high construal level orientation.

Hypothesis 2 predicted a two-way interaction between congruence and threat to choice level of the message, such that when construal level orientation and psychological distance are congruent (high and far or low and close) and threat to choice level is high, message effectiveness will be lowest. A significant two-way interaction was found, F (1, 45) = 4.98, p = .031, η^2_ρ = .10, supporting hypothesis 2. Participants in the congruent, high threat to choice level condition scored lowest on the message effectiveness scale, see Figure 7. As predicted, congruence decreases message effectiveness in the case of a high threat to choice message (M = 1.88, SD = .83), and increases it in the case of a low threat to choice message (M = 3.31, SD = 1.20), leading to a significant difference between these two conditions, t (19) = 2.95, p = .008. Participants in the incongruent conditions scored in the middle on message effectiveness.

Hypothesis 3 predicted a three-way relationship between construal level orientation, psychological distance and threat to choice level on message effectiveness. A significant three-way interaction was found, F (2, 70) = 3.18, p = .048, η^2_ρ = .083 (see Figure 8). As noted above, the high threat to choice, close psychological distance, low construal level orientation condition presents a unique circumstance, in that message effectiveness is expected to be lowest. Participants in this condition scored lower on message effectiveness (M = 1.50, SD = 1.00) than participants in the high threat to choice, close psychological distance, high construal level orientation condition (M = 2.80, SD = 1.04), t (7) = 1.90, p = .10, however, this difference only approaches significance providing marginal support for hypothesis 3.

The three-way interaction is qualified by a main effect for threat to choice on message effectiveness, F (1, 70) = 11.48, p = .001, η^2_ρ = .14, indicating that participants in the low threat to choice condition (M = 2.97, SD = 1.01) reported the message as more effective than those in the high threat to choice condition (M = 2.29, SD = .92). In the low threat to choice conditions,

congruence helps to explain the relationships. Participants in the congruent, high construal level, far psychological distance, low threat to choice condition (M = 3.60, SD = 1.14) scored higher on effectiveness than participants in the incongruent, high construal level, close psychological distance, low threat to choice condition (M = 2.31, SD = .80), t (11) = 2.41, p = .035.

Study 1 Discussion

The purpose of Study 1 was to introduce and examine some possible relationships between construal level orientation, psychological distance, and threat to choice level of the message. The results indicate that these variables work together to influence the cognitive outputs of state reactance and message effectiveness in some expected ways. As hypothesized, there is evidence to suggest that increasing construal level orientation can work to decrease the cognitive outputs of state reactance. It was also shown that the high threat to choice, low construal level, close psychological distance condition might present a special case, such that the cognitive outputs of state reactance are highest and message effectiveness is lowest. This is likely also related to the interaction found between congruence and threat to choice level of the message, wherein congruence decreases message effectiveness in the case of a high threat to choice message and increases it in the case of a low threat to choice message.

It is important to position the implications of this study within a larger context. This is the first study relating psychological reactance theory and construal level theory, and research on construal level theory and persuasion is in a nascent stage. As such, this is an area we are just beginning to understand. This first study should be viewed as an indication that this type of research is a worthwhile area to explore and as the start of theoretical development in this area. However, not all messages will operate in this way, and in particular, it is likely that these results are most generalizable to messages that feature a highly salient issue.

Through consultation with our undergraduate research assistants, the topic selected for this study was a very salient issue on our campus, and the importance of this issue was relevant to the results that were found. In the semester proceeding collection of this data, there was an alcohol/Greek life related death on the campus. As such, the data was collected right after first-year students were banned from Greek life parties and as the idea to install monitors was being discussed. While these factors are related to the ability to generate reactance on this topic, it is also clear that the proposed relationships should be tested in the context of a different topic and that issue importance should be considered more directly. Study 2 investigates these factors.

Study 2

The purpose of Study 2 was to attempt to replicate the key relationships identified in Study 1 and to consider more thoroughly the role of message importance. First, this study seeks to replicate the three-way interaction between construal level orientation, psychological distance and threat to choice level of the message on message effectiveness from Study 1.

> **H4: In replicating the findings from Study 1, a three-way interaction between construal level orientation, psychological distance and threat to choice level of the message will emerge, such that message effectiveness will be lowest (H4a) and state reactance will be highest (H4b) when threat to choice is high, construal level orientation is low and psychological distance is close.**

Study 2 also engages the concept of issue importance more directly. Therefore, it is essential to highlight this concept in regards to construal level theory and reactance.

Issue Importance

Within prior research linking construal level theory and attitude formation, the role of issue importance is still relatively underexplored. Kim et al. (2009) found that participants with expertise on an issue were less likely to rely upon the processing fluency achieved through

congruence in making their decisions, however while experts might be likely to view an issue as more important, expertise is not the same conceptually as issue importance. Concrete language has been shown to increase perceived importance of a message (Miller et al., 2007), and Wakslak (2012) found that construal level orientation interacts with issue importance to predict dissonance and attitude change.

If a message is perceived to be closer, or more personally relevant, it might be judged as more important. In conditions of close psychological distance, message importance should be higher than in far conditions, however, whether this will interact with construal level orientation and the threat to choice level of the message is currently unknown.

RQ1: At close psychological distance, will the message be deemed to be more importance than at far psychological distance, regardless of construal level orientation and threat to choice level of the message or will an interaction emerge?

Regarding psychological reactance theory, issue importance is typically thought to increase levels of reactance in choice threatening situations (Brehm & Brehm, 1981). After all, if one deems an issue to be important, freedom of choice is likely to matter more. However, Quick, Scott, & Ledbetter (2011) found contrary results indicating that issue involvement did not directly predict threat to freedom of choice or interact with threatening language. While issue involvement or importance is typically viewed as a moderator in studies on psychological reactance theory, one underexplored area is whether freedom threatening messages directly influence perceptions of message importance.

RQ2: When threat to freedom of choice is high, will the message be perceived as more important than when threat to freedom of choice is low, regardless of construal level orientation and psychological distance or will an interaction emerge?

Method

Design

The study was completed by eighty-four undergraduate students at the same large northeastern university as in Study 1, and participants were precluded from participating in both studies. Five students were removed for failing to follow directions on one of the tasks. The remaining 79 participants ranged in age from 18 to 28 years (M = 20.24; SD = 1.63); 54 were female and 25 were male. In response to how important their college transcript is, 33 participants indicated it was "very important," 44 indicated it was "somewhat important," and two students said it was "not important at all." Participants were recruited through an online, university-operated research pool, and received extra credit. An IRB-approved consent form was signed by every participant.

The participants were randomly assigned to one of twelve conditions, similar to those in Study 1, and the procedures for the study were the same. The new stimulus materials (see Figure 9) were designed with undergraduate research assistants who advised that the issue of placing the median grade of each course on students' college transcripts was a salient issue of concern with students on campus. A recent op-ed in the campus paper had stated the plan was "detrimental to…students and leaves them at a potential disadvantage" (9/7/2011). The data were collected shortly after the university decided to restrict students from viewing the median grades on the Registrar's website, while keeping them on transcripts.

The manipulations for construal level orientation and psychological distance were the same as in Study 1, and threat to choice was similarly manipulated in the message. In the high threat to choice condition faculty members were voting without student input on mandatory reporting of median grades. In the low threat to choice condition, students were voting on optional reporting of median grades. Contact information for either the University Faculty or

Student Assemblies was manipulated in the high and low threat conditions, respectively, and matched Cornell University or the University of New Mexico.

Participants in Study 2 completed the same pre-test measure for trait reactance (n = 79, M = 3.08, SD = .52, α = .79) and the same post-test measures for the cognitive (n = 79, M = 2.56, SD = .77, α = .80) and affective (n = 79, M = 2.74, SD = 1.09, α = .96) outputs of state reactance.

One limitation in Study 1 was that the effectiveness measure only included one dimension, agreement with the position of the message. In the second study, a behavioral intention measure was included as part of message effectiveness. In order to determine levels of message effectiveness, participants were asked to respond on a five-point Likert scale (1) *Strongly Disagree* to (5) *Strongly Agree* to two questions: *I believe median grades should be reported on transcripts* and *I would oppose a vote to report median grades on transcripts (reverse-coded).* A scale was formed using these questions (n = 79, M = 2.42, SD = 1.06, α =.85).

To determine message importance, participants were asked*: how important is the message in the website to you* and *how concerned did the message make you feel*, and indicated on a seven-point Likert scale, (1) *not important at all* to (7) *very important*, and (1*) not concerned at all* to (7) *very concerned*, respectively. A scale was formed from these questions (n = 79, M = 4.52, SD = 1.47, α = .77).

Results

Manipulation Checks

Construal level orientation. As a manipulation check for construal level orientation, the responses to the category/ exemplar task were each coded, utilizing the same procedure as in Study 1. The ratings of the two coders were highly correlated (n = 2120; r = .93; *Kappa* = .86). As predicted, participants who provided category responses for the target words had a

significantly higher abstraction score (n = 28, M = 36.13, SD = 3.00) than the individuals who provided exemplar responses (n = 25, M = -37.14, SD = 4.09), t (51) = 74.93, p < .001.

Psychological distance. As predicted, participants in the close psychological distance condition scored significantly higher in response to the question: *to what extent does the message you just saw affect students at Cornell University?* (n = 42, M = 5.76, SD = 1.23) than participants in the far psychological distance condition (n = 37, M = 3.32, SD = 1.99), t (58) = 6.46, p < 001, *unequal variances assumed per Levene's test*. Additionally, as expected, participants in the far psychological distance condition scored significantly higher in response to the question: *to what extent does the message you just saw affect students at the University of New Mexico at Albuquerque?* (n = 37, M = 5.84, SD = 1.07) than participants in the close psychological distance condition (n = 42, M = 1.95, SD = 1.56), t (77) = 12.74, p < .001.

Threat to choice. As a manipulation check for threat to choice, participants responded to the item, *The website you just viewed mentioned a vote. Who was voting?* As expected, participants in the high threat to choice condition selected the answer *faculty* significantly more than they selected the response *students*, χ^2 (1, N = 40) = 13.09, p < .001. Additionally, participants in the low threat to choice condition selected the answer *students* significantly more than *faculty*, χ^2 (1, N = 39) = 17.10, p < .001.

Analyses

To test the hypotheses and research questions, 3 (construal level orientation: high/ low/ control) x 2 (psychological distance: close/ far) x 2 (threat to choice: high/ low) ANCOVAs were conducted on message effectiveness (observed power of the corrected model = .78), the cognitive (observed power of the corrected model = .99) and affective (observed power of the corrected model = .96) outputs of state reactance, and message importance (observed power of

the corrected model = .83), while controlling for trait psychological reactance. The means and standard deviations for these analyses are detailed in Table 2.

Hypothesis 4 predicted replication of the three-way interactions between construal level orientation, psychological distance and threat to choice. Regarding message effectiveness (H4a), a three-way interaction was partially significant, F (2, 66) = 2.71, p = .074, η^2_ρ = .076. As in Study 1, the high threat to choice, close psychological distance, low CLO condition scored lower on message effectiveness (M = 1.71, SD = .49) than participants in the high threat to choice, close psychological distance, high CLO condition (M = 2.58, SD = .86), though the difference merely approached significance, t (8) = 2.19, p = .06. Therefore, hypothesis 4a is marginally supported.

This analysis indicates a main effect for construal level orientation, F (2, 66) = 3.79, p = .028, η^2_ρ = .10. Participants in the high construal level orientation condition (M = 2.84, SD = 1.01) judged the message as more effective than those in the low construal level orientation condition (M = 2.12, SD = .96), and this difference is significant, t (51) = 2.65, p = .01. The control condition was in the middle (M = 2.27, SD = 1.09).

The three-way interaction does not emerge on the cognitive or affective outputs of state reactance, leaving hypothesis 4B unsupported. However, we do find a strong main effect for threat to choice on both the cognitive F (1, 66) = 42.32, p < .001, η^2_ρ = .39 and affective outputs F (1, 66) = 23.06, p < .001, η^2_ρ = .26 of state reactance. As predicted by psychological reactance theory, participants in the high threat to choice condition scored higher on the cognitive (M = 3.01, SD = .61), and affective (M = 3.26, SD = .97), outputs of state reactance, than participants in the low threat to choice condition, (M = 2.10, SD = .63 and M = 2.21, SD = .94, respectively).

These findings suggest the strong main effect of threat to choice dominated the influence of the other two variables. This indicates the pattern of relationships between threat to choice, construal level orientation, and psychological distance might vary based on their relative strengths. In other words, if threat to choice strongly elicits psychological reactance, the shift to a high construal level orientation or increasing psychological distance may not be enough to mitigate the influence of threat to choice. However, if the reactance response was not as strong, then distance and abstraction might interact with threat to choice.

Research question 1 asked whether message importance would be higher at close psychological distance. Indeed, a main effect for psychological distance on message importance, F (1, 66) = 5.50, p = .02, η^2_ρ = .08, confirms that participants in the close psychological distance condition (M = 4.95, SD = 1.35) perceived the message as more important than participants in the far psychological distance condition (M = 4.03, SD = 1.47). Therefore, in answer to research question 1, psychological distance has a direct effect on message importance, regardless of construal level orientation and threat to choice level of the message, and no interactions emerge.

Research question 2 inquired whether message importance would be higher when threat to choice is high. A main effect for threat to choice on message importance, F (1, 66) = 5.43, p = .02, η^2_ρ = .08, confirms that participants in the high threat to choice condition (M = 4.84, SD = 1.48) judged the message as more important than participants in the low threat to choice condition (M = 4.19, SD = 1.41). Therefore, in answer to research question 2, threat to choice has a direct effect on message importance, regardless of construal level orientation and psychological distance of the message, and no interactions emerge. It is noteworthy that we do not see a 2-way interaction between psychological distance and threat to choice on message importance, and this indicates that while participants in the close psychological distance, high threat to choice

condition (M = 5.16, SD = 1.32) scored particularly high on message importance, they are not the only condition to score similarly high. For example, participants in the close psychological distance, low threat to choice condition also scored relatively high (M = 4.73, SD = 1.38).

We also note that in Study 2, the interaction between congruence and threat to choice level of the message on message effectiveness F (1, 48) = .026, p = .87, η^2_ρ = .001 and the main effect of construal level orientation on the cognitive outputs of state reactance F (2, 66) = 1.69, p = .19, η^2_ρ = .05, do not emerge as significant. Therefore, these two findings from Study 1 are not replicated in Study 2. One possible explanation is that in order to have a main effect of construal level orientation on the cognitive outputs of state reactance, it is necessary for the low threat, low construal level orientation condition to also score particularly high on this measure, and in Study 2, it did not (M = 2.25, SD = .61).

Another interesting point worth considering is how the three dependent measures, state reactance, message effectiveness and message importance, in Study 2 relate to one another. As noted above, psychological reactance theory predicts that as levels of state reactance increase, message effectiveness decreases. A linear regression indicates a negative relationship between these two variables in Study 2, B = -.59, F (2, 76) = 8.52, p < .001, R^2 = .18, R^2adj = .16. It is important to consider whether this relationship was indirectly influenced by message importance. The results of analyses (see Figure 10) using Preacher & Hayes's (2008) Indirect macro and bootstrapping showed that the relationship between the cognitive outputs of state reactance and message effectiveness, with trait reactance as a covariate, was partially mediated by message importance (N of samples = 1,000; point estimate = -.19), with a 95% confidence interval establishing an indirect effect ranging from -.41 to -.07 (*a = .73, t = 3.55, p < .001; b = -.26, t = -3.39, p = .001; c = -.59, t = -4.12, p < .001; c' = -.41, t = -2.80, p = .007*). Furthermore, when

this analysis was repeated controlling for trait reactance, construal level orientation, and psychological distance, the results are very similar (N of samples = 1,000; point estimate = -.19), with a 95% confidence interval establishing an indirect effect ranging from -.40 to -.06 (*a = .73, t = 3.76, p < .001; b = -.26, t = -3.30, p = .002; c = -.59, t = -4.10, p < .001; c' = -.40, t = -2.70, p = .009*). Therefore, message importance partially mediates the relationship between the cognitive outputs of state reactance and message effectiveness. It does not, however, mediate the relationship between the affective outputs of state reactance and message effectiveness.

Study 2 Discussion

Study 2 was conducted in order to replicate key relationships from Study 1 and to explore more directly the role of message importance. As hypothesized, Study 2 was able to replicate the key 3-way interaction between construal level orientation, psychological distance and threat to choice level of the message, however in Study 2, this relationship approached significance. Study 2 also showed the same relationship between the high threat to choice, close psychological distance, low construal level orientation condition and the high threat to choice, close psychological distance, high construal level orientation condition, indicating it might be possible to increase message effectiveness by shifting to a higher construal level orientation.

Additionally, in Study 2, a main effect of construal level orientation on message effectiveness was found, such that participants in the high construal level orientation condition judged the message as more effective than participants in the low construal level orientation condition. Prior work on construal level theory has shown that different message attributes are salient at a high and low construal level orientations, with a high construal level orientation being associated with more value-oriented concerns (Fujita et al., 2008). Therefore, one possible explanation for this finding is that participants at a high construal level orientation were able to

consider the median grade message from a more value-oriented context and focus on the overall fairness of the issue. For example, they might recognize that students taking difficult courses might benefit from median grades. Of course, the nature of the issue likely pays a big role. Students might apply personal goals and an "is it good for me" rendering to the median grades decision, whereas in the case of Greek monitors, the model controlled for how important they personally viewed the issue.

In Study 2, we also considered how construal level orientation, psychological distance and threat to choice level of the message influenced message importance, finding that at a high threat to choice level or close psychological distance, participants judged the message as more important. In other words, an item that seems psychologically closer or that poses a bigger threat to choice might be seen as more concerning or important. Message importance was also shown to partially mediate the relationship between the cognitive outputs of reactance and message effectiveness, indicating the importance of considering this measure in studies on reactance.

While Study 2 supports some relationships from Study 1, it also highlights some differences that suggest the relationships between construal level theory and psychological reactance theory are quite complicated. For example, the main effect of construal level orientation on the cognitive outputs of state reactance and the 2-way interaction between congruence and threat to choice level of the message on message effectiveness were not replicated in this study. Indeed, it might be the case that that the pattern of relationships between threat to choice, psychological distance and construal level orientation are related to how strongly the message elicits state reactance, how effective it is and how important it is perceived to be. For example, in a message that elicits very high levels of state reactance, it might be the case that the threat to choice manipulation has a more powerful influence than the other factors.

Similarly, for a message that has strong personal outcomes, psychological distance could be more powerful, while a message that features a very value-laden message might relate most closely to CLO. In other words, it is quite possibly the case that the type of message matters greatly, and this is addressed further in the general discussion below.

General Discussion

The two studies above begin to explore the relationships between construal level theory and psychological reactance theory, highlighting the importance of considering the concepts of construal level orientation, psychological distance, and threat to choice in relation to one another. This work, while only a first step in this line of research, offers several implications.

Theoretical Implications

Theoretically, these studies suggest that state reactance occurs not simply because of a threat to freedom of choice, but rather that it is influenced by how we cognitively process that threat to freedom of choice. Furthermore, message effectiveness and message importance are influenced by threat to freedom of choice, construal level orientation, and psychological distance in complicated and conceptually interesting ways.

One of the biggest theoretical challenges identified through these studies is that the relationships between the three independent variables (construal level orientation, psychological distance, and threat to choice) are to some extent related to the relative strengths of the three dependent variables (state reactance, message effectiveness and message importance), to the type of message and to the larger context in which the decision is made. For example, we might expect different results with a message that elicits higher levels of state reactance in comparison to one that does not. A message advertising a popular musician performing a concert on campus would not likely generate state reactance or message resistance, and we can assume that the

pattern of relationships in this case would be very different. Similarly, a message that seems to be about a collective issue of concern with social consequences (Greek monitors) might differ from one that is based on individual consequences (median grades). These factors can be isolated in future work to further theoretical development.

In this study, we used two measures of state reactance, separating the cognitive and affective dimensions in recognition of Dillard & Shen's (2005) intertwined model. However, as the results above indicate, we do not find the same pattern of relationships between these two dimensions of state reactance. The cognitive outputs seem to be more directly influenced by construal level orientation and psychological distance than the affective outputs. One reason for this might be that cognitive outputs are more directly related to how the message is cognitively processed than the affective outputs. While this makes logical sense, future work should investigate this directly.

Limitations and Future Research

While these two studies start the discussion on the theoretical relationships between construal level theory and psychological reactance theory, they are not without their limitations. First, these studies each feature complicated experimental designs with relatively small samples. While the power of these models is for the most part strong, as noted above, clearly more work is needed with larger samples in order to more accurately understand these relationships. One challenge with seeking to replicate a study using the same message with a larger sample is that the nature of these salient issues is continually changing, as is the level of state reactance they are likely to generate. Future work should focus on establishing these relationships using larger samples, but it is important to collect this data within a fixed period of time in which the nature of the message is relatively constant.

The concepts studied can be measured in a number of different ways. For example, these studies confounded the manipulation of threat to choice by including a change in the consequences of the decision. While prior work has shown that manipulating consequences does not change levels of state reactance (Rains & Turner, 2007), future work should test these concepts while keeping the consequences of the decision consistent between the high and low threat to choice conditions. Additionally, there are many other measures of reactance, including thought-listing tasks and semantic-differential scales, and future studies might utilize additional measures of this concept. Study 2 sought to capture a more dimensional understanding of message effectiveness by including a behavioral intention question. Also, by analyzing message importance in Study 2, it is possible to separate agreement with the message from perceptions of importance. Still, this is not exhaustive, and scholars should investigate other dimensions of effectiveness.

Another limitation of this work, as suggested above, is that the nature of the message matters. These studies used two highly salient campus messages that were likely to be met with resistance. However, these messages were not appealing to behavior change in that they did not request the participant take specific directive action. Future work, should consider whether these relationships hold in the case of a directly persuasive message or one that features high personal risk, such as a health risk message. For example, one question future work might consider is whether it is possible to deliver a high risk message, such as "don't smoke," (smoking cessation campaign) or "don't eat that cookie," (healthy eating intervention) in a way that increases its effectiveness or decreases resistance to it. For example, could effectiveness of these types of messages be increased by shifting individuals to a high construal level orientation?

Practical Challenges and Message Development

Scholars and practitioners who study and develop persuasive messages, including pro-social and pro-health messages, often need to deliver messages that are likely to elicit state reactance. These studies have highlighted that when threat to choice is high, construal level orientation is low and psychological distance is close, the message is less likely to be effective. In other words, it might be possible for a high threat to choice message to find greater acceptance, or less resistance, if it is processed at a higher level of abstraction. This of course highlights two important points: how might construal level be shifted in a real-world context and is it appropriate to do so. A high level of specificity and personal relevance is necessary in communicating persuasive messages. After all, it is essential that the message seem relevant to its intended recipient. However, as noted in earlier chapters, it might be possible to connect between high and low levels of abstraction through a persuasive message, such as by using an induced bridging technique. Therefore, we might ask whether a message that uses an induced bridging technique and features a high threat to choice might elicit a lower level of psychological reactance and a higher level of message effectiveness than a message that just features concrete abstraction cues.

These studies introduce some ways that construal level orientation, psychological distance and threat to choice level of the message relate to one another in regards to state reactance, message effectiveness and perceived importance of the message. Scholars of persuasion should consider both the applicability of construal level theory and psychological reactance theory to their work and also how these theories might interrelate.

The next two chapters consider how the affordances of mobile technology can be harnessed for the design and delivery of interactive messages that help individuals connect their specific behavioral choices to their higher level goals. Chapter 4 provides a theoretical model for

this inquiry, and Chapter 5 presents three early pilot tests of one of the propositions articulated in Chapter 4.

CHAPTER 4

Construal Level Theory and Mobile Persuasion: A Theoretical Model

Mobile devices are defined as "communication device(s) that (use) wireless technology to send information or communication across distances to other devices or people. Cell phones are the most common" (Thackeray & Hunter, 2010, p. 577). Mobile phones are fully-loaded with sensors, actuators, and applications (Miller, 2012). Prior research has articulated the role of mobile phones in our society and the ritual and practice surrounding their use (e.g., Humphreys, 2005, 2007; Humphreys, Von Pape, & Karnowski, in press; Katz & Aakhus, 2002; Ling, 2008a; Ling & Campbell, 2009). This work concentrates on five specific affordances of mobile technology (egocentricity, context-awareness, interactivity, simultaneity, and memory) that are conceptually connected to construal level theory. For example, a software application (app) on the device can evaluate a user's state of being at the moment of a health-related decision and deliver appropriate messages designed to encourage a healthy choice.

As will be detailed in the section on mobile technology and the propositions below, the primary concepts associated with construal level theory are conceptually related to several affordances of mobile devices. Therefore, the goal of this work is to introduce these conceptual connections and articulate ways they can be harnessed to enhance the effectiveness of mobile persuasion. This chapter introduces eight theoretical propositions connecting mobile devices and construal level theory, including: *shifting* construal level orientation, which will be tested using mobile devices in Chapter 5; *bridging* construal level perception of choice, which was tested in a non-mobile environment in Chapter 2; and *traversing* psychological distance to choice. This chapter also addresses message success and resistance through this framework.

Review of Theoretical Concepts of Construal Level Theory

As detailed in earlier chapters, construal level theory offers a number of key concepts that are of interest to scholars of communication. The purpose of this section is to briefly review key concepts that are of particular importance in regards to mobile persuasion.

Psychological Distance

As noted in earlier chapters, psychological distance refers to how close or far an item is in temporal, spatial, social, or hypothetical distance. Of particular interest in regards to mobile technology is Liberman and Förster's (2009) concept of the "egocentric anchor," which was mentioned in Chapter 1. This concept holds that perceptions of distance must be made from oneself in this place and time in order for predictions associated with construal level theory to hold. For example, in one of their studies, some participants were asked to estimate the distance from the city in which they were located (Amsterdam), to a city about 100 miles away (Groningen). Others were asked to estimate the other way around. For those who estimated the egocentric distance (from Amsterdam to Groningen), their estimations were influenced by a manipulation of their construal level. For those who estimated the non-egocentric distance, their estimations were not influenced by the construal level prime. In other words, the concept of psychological distance in construal level theory is an egocentric perception of distance.

Construal Level

As noted above, the more psychologically distant an item, the more abstractly it is construed in one's mind (Liberman & Trope, 2008). Chapter 1 highlights how we can distinguish between construal level orientation and construal level perception of choice, with the former referring to how abstractly or concretely one is processing information and the latter referring to how a particular decision context is construed. Furthermore, it was mentioned that congruence between psychological distance and construal level relates directly to persuasion and behavior, in

that increased processing fluency due to congruence can increase the effectiveness of an otherwise strong message (Fujita et al., 2008; Kim et al., 2009).

Construal Level Theory and Decisions in Everyday Life

In considering construal level theory in regards to decisions in everyday life, one theoretical challenge is whether it is best to focus on long-range, abstract goals, or short-term, concrete goals (Fishbach & Ferguson, 2007; Fujita, Trope, et al., 2006). Construal level theory actually offers a prediction for both of these.

According to the concept of congruence described above, choices made at close psychological distance are typically perceived through a low construal level perception of choice. In these situations, congruent messages would be those that contain specific appeals. This is consistent with research on goal-setting theory, which suggests that success is best predicted by articulating specific goals (Latham & Locke, 1991; Locke & Latham, 2006). Research on implementation intentions has illustrated that establishing very specific plans can enhance goal completion (Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997). From a communication perspective, these findings suggest that messages featuring low abstraction or close distance cues (focused on a specific behavioral choice) would be more effective than ones at a high level of abstraction (focused on a higher level goal).

On the other hand, as noted in Chapter 1, scholars have also defined self-control as making decisions based on higher-level goals and have demonstrated that self-control is enhanced at higher levels of abstraction (Fujita & Han, 2009; Fujita & Roberts, 2010; Fujita & Sasota, 2011; Fujita, Trope, et al., 2006a). This predicts that reminding individuals of their higher level goals through messages that feature a high abstraction and far distance cues would be the most effective way to foster behavioral goals.

This challenge was addressed in Chapter 1 with the articulation of linking messages, and Chapter 2 tested one type of these linking strategies, bridging. The purpose of this chapter is to discuss how the affordances of mobile technology make these devices particularly suited to the design and delivery of persuasive messages that unravel this complexity.

Mobile Technology

Mobile devices, including their sensors, applications and actuators, have a number of affordances that make them theoretically and practically suited to manipulating and measuring concepts associated with construal level theory, and these can be harnessed to increase message effectiveness and behavioral outcomes. Specifically, five affordances are relevant to construal level theory: egocentricity, context-awareness, interactivity, simultaneity, and memory.

Egocentric Devices

One characteristic of mobile devices is that they are egocentric, in that they are tied to a person, rather than to a physical location (Humphreys, 2005; Ling, 2008a, 2008b). For example, it is not the phone in your office, but rather it is your phone, tied to you in different locations and across various dimensions of distance. The phone is linked to the "physical body" and "follows us around" (Light, 2009, p. 194). A user can separate from the device, for example, by deciding to leave the mobile phone home when attending religious services. However, for many users, the phone is the first thing they look at in the morning and the last thing they view before bed. Because the phone is linked to the user, it can evaluate the user during a behavioral decision, a concept known as experience sampling or ecological momentary assessment (Csikszentmihalyi & Larson, 1983; Pollak, Adams, & Gay, 2011; Shiffman, Stone, & Hufford, 2008).

Scholars have noted the importance of designing interventions that recognize that the device is with the user (Fogg, 2007; Gay, 2009). From the perspective of construal level theory,

this egocentricity is theoretically important. As noted above, construal level theory predictions have been shown to hold only when the perception of distance is egocentric (Liberman & Förster, 2009). Therefore, the ability of the device to sense the environment from the same perspective as the user is conceptually important and a key connection between construal level theory and mobile technology.

Context-Aware: Sensing, Integrating, and Restructuring Distance

It is not only the portability of the device that matters, but rather how its usage detects, integrates, and reshapes the environment, changing how we understand and use space, time and the larger context (Ito, Okabe, & Anderson, 2009; Ling & Campbell, 2009). Mobile phones are context-aware, meaning that applications, actuators, and sensors within the device, such as GPS, can detect environmental factors, including three dimensions of psychological distance - spatial location, time and social proximity (Chen, Hekler, Hu, Li, & Zhao, 2011; Gay, 2009). For example, your mobile device automatically delivers the time for a new city as your plane arrives at the gate. Using GPS, an application on your smartphone can detect that you are at a bakery and estimate that you are spatially close to a health decision. As distance from the here and now increases, an application on the device can track that three hours has passed or that you have moved to the other side of town. Social information can be sensed through call and text logs and mobile social networking applications.

In addition to sensing dimensions of psychological distance, applications, actuators, and sensors embedded within, or attached to, mobile phones serve as vehicles through which one can integrate and confound typical distinctions of distance, such as the dichotomy of close and far. For example, spatially far friends become socially close, as the mobile phone makes them "psychologically present in the current physical context" (Cumiskey, 2011, p. 23). On the other

hand, spatially close others become socially distanced as the user picks up a mobile call in their presence (Cumiskey, 2011; Humphreys, 2005; Ling, 2008b; Ling & Campbell, 2009; Thulin & Vilhelmson, 2009). Additionally, dimensions of psychological distance are integrated through applications on the device. For example, upon using Foursquare[3] to check into the convenience store (spatial), the user is informed: third check-in this week (temporal) and your friend John is also here (social).

We are accustomed to using mobile devices in ways that make connections across dimensions of psychological distance and in ways that connect close and far. This is theoretically important from the perspective of construal level theory. As noted above, construal level theory suggests the importance of and challenges associated with connecting close behavioral choices with long-term goals.

Interactivity, Simultaneity, and Memory

Interactivity, simultaneity and memory are also affordances of mobile technology (Gay, 2009; Kreps & Neuhauser, 2010). These capabilities are useful for mobile health applications, specifically ones relevant to construal level theory.

Interactivity. Interactivity means that the user and applications on the device are able to engage in two-way interactions. In Foursquare, if the user clicks the button to designate a location, the device responds by updating the user's status. This level of interactivity helps integrate the device into daily life. For example, in the mobile smoking cessation application STUB IT, the user sent *crave* messages, and the intervention immediately delivered a video response to provide support (Whittaker et al., 2011). As will be explored further below, this

[3] FourSquare is a popular location-based social networking application.

interactivity facilitates the ability of the device to influence the user at the moment of a behavioral decision.

Simultaneity. Simultaneity is another affordance of mobile technology. By simultaneity, we mean that the interaction with applications on the device can be immediate. For example, the user does not have to wait a few hours for FourSquare to confirm the location, and the STUB IT videos were sent as soon as the user indicated cravings. As described below, this affordance enables the device to communicate with the user in real-time.

Memory. Applications on mobile devices have the ability to store and recall information. In the Foursquare example above, the application knows not just that the user is at the convenience store now (close spatial and temporal psychological distance), but also that the user was there earlier in the week (farther temporal psychological distance). This affordance positions applications on the device to detect not only factors in the present moment, but to also track trends and patterns.

These affordances are important when considering how to utilize construal level theory in mobile persuasive interventions. In the next section, these connections are used to build a theoretical model.

Model of Construal Level Theory and Mobile Persuasion

This section integrates the above concepts associated with construal level theory and those associated with mobile technology to articulate eight propositions of the construal level theory of mobile persuasion. While some of these propositions can be applied more generally to persuasion, as seen in Chapter 1, mobile devices are particularly suited to test predictions related to construal level theory and to implement message interventions due to these conceptual connections.

Theoretical Assumptions

Before a set of formal propositions is offered, it is important to situate the larger context. To that end, several theoretical assumptions, derived from the concepts described above, are described.

Perceptions of choice. The first three assumptions relate to how a user perceives a behavioral choice. The first assumption is that *the user perceives a behavioral choice at a particular psychological distance*. The decision whether or not to eat the cake right in front of you is spatially close, and the cake in another room is spatially farther. The decision whether or not to eat the cake fresh from the oven is close in hypotheticality, and the cake that is still a box mix is farther in hypotheticality.

The second assumption of the model is that *a user construes the choice at a level of abstraction that is congruent with its psychological distance*. The cake right in front of you is high in specificity; you can see the ripples of the icing. The cake in another room is more abstract, construed as something sweet. The third assumption is that *neither the psychological distance of the choice nor the level of abstraction with which it is construed are inherent features of the choice itself. They are perceptions of the user, and can be altered.* In other words, a persuasive message can cause the user to perceive the cake as distant, a concept known as psychological distancing (Day & Bartels, 2006).

Choices at close psychological distance. The fourth through sixth assumptions relate to choices made at close psychological distance. The fourth assumption is that many *behavioral decisions are often made at close psychological distance in everyday life*. For example, typically the decision is made at close temporal and spatial distance (i.e., when being presented the piece of cake). The fifth assumption is that *these behavioral choices are often mentally represented*

congruently, at a low construal level perception of choice. In other words, when offered a piece of cake, the choice is often construed as whether or not to eat this particular piece of cake. Of course, this might differ for individuals following a strict diet, as the higher level dieting goal may be constantly salient for them. The sixth assumption is that *mobile technology is egocentrically connected to the user at a close psychological distance*. In other words, applications and sensors in the mobile device have the ability to sense distance dimensions from the perspective of the user. For example, one affordance of the device is to detect that it is 3 PM (temporal distance of the user from lunch and dinner) and the user has just walked into a bakery (spatial distance of the user from a tempting piece of cake). As will be developed further below, applications on the device can provide interactive support, including reminding the user a dinner event is scheduled in two hours.

Choices at a high construal level. The seventh and eighth assumptions relate to choices at a high construal level. The seventh assumption holds that *a high construal level orientation enhances self-control*. As cited above, at a high construal level orientation, high level goals are activated and temptations are viewed as threats to these goals. In other words, when focusing on a dieting goal (high construal level perception of choice), the cake (temptation) is seen as a threat to that goal. However, at a low construal level orientation, the focus is simply on whether or not to eat the cake, and the dieting goal is not necessarily activated. Therein, by making decisions at a high construal level perception of choice, the user will more likely be able to resist the cake.

The eighth assumption is that *in daily life, individuals do not typically perceive their decisions at a high construal level even though there are self-regulatory advantages to doing so.* As noted in the fourth and fifth assumptions, many behavioral choices in everyday life are made at close psychological distance and a low construal level perception of choice, even though we

have the ability to plan and prearrange choices. For example, it is possible for one to pack a healthy lunch the night before (farther psychological distance) so as not to be tempted by the pizza ordered for a lunch meeting. For someone who is seriously dieting, higher level goals may be activated and strong, and they may do this. That said, many choices are made at close psychological distance and a low construal level, making it difficult to resist temptations and exhibit self-control.

Distance and abstraction in messages. The ninth through eleventh assumptions concern persuasive messages. The ninth assumption holds that *persuasive messages can contain distance cues (close/ far)*. For example, a message that mentions tomorrow features a closer temporal distance cue than one that references next year. The tenth assumption holds that *persuasive messages can contain abstraction cues (high/ low)*. For example, a reminder about health goals contains a higher abstraction cue than a reminder not to eat cookies. The eleventh assumption holds that the *effectiveness of a persuasive message will be related to whether the distance and abstraction cues in the message are matched to and congruent with how the decision is perceived*. In other words, a message about packing sunscreen (low abstraction cue) is more effective for a vacation tomorrow (close temporal distance) than for a vacation a year away (far temporal distance).

These assumptions underlie the theoretical propositions of the construal level theory of mobile persuasion. It is important to consider them with respect to the propositions below.

Theoretical Propositions

Keeping the above assumptions in mind, eight propositions connect construal level theory to mobile technology. First, the user's construal level orientation, construal level perception of choice, and psychological distance to choice can be estimated by the mobile device, which is

egocentrically linked to the user. Next, three propositions connecting congruence to message effectiveness and resistance are articulated. Finally, four propositions highlight three message functions, *shifting, bridging,* and *traversing,* that can be used to address the message prediction complexities highlighted above. It is important to note that the term "message" is defined from a communication perspective, and may refer to both static and interactive messages. Please see Figure 11 for an illustration of the construal level theory of mobile persuasion.

Measurement. As noted above, ecological momentary assessment or experience sampling is defined as the ability of an application to evaluate the user in the context of behavioral decisions (Csikszentmihalyi & Larson, 1983; Pollak et al., 2011; Shiffman et al., 2008). The affordances of mobile technology that are highlighted above, including that the device is egocentrically anchored to the user, enable the sensors, actuators, and applications in the device to measure certain parameters, such as spatial location, and use these to estimate an individual's psychological distance, construal level orientation and construal level perception of choice. For example, the device can utilize the GPS to measure spatial distance and detect that the user has entered a bakery. A healthy eating application can translate this spatial measurement into an estimation of psychological distance, determining through an algorithm that the user has entered a bakery and, therefore, is likely to be close to a health decision. Furthermore, using the affordance of memory, the device can recall that at 3 PM each day the user has previously entered a bakery. These affordances generalize across many contexts. For example, an application to provide social support for smoking cessation can synthesize call and text logs to estimate with whom the user is socially closest at that moment and encourage social support at the time of day when the user reported they might feel the need for an afternoon smoking break.

It is also possible for the device to directly measure psychological distance, construal

level perception of choice and construal level orientation. For example, a mobile application can directly ask the user how far away the decision seems to be, and thus provide an operationalization of psychological distance (Liberman & Förster, 2009). Cognitive tasks can be adapted into mobile games that determine construal level at the moment of a decision. For example, in order to measure construal level perception of choice, a categorization game based on Vallacher and Wegner's (1989) behavioral information form (BIF) could be developed that determines whether the user is perceiving decisions based on value-oriented "why" actions (high construal level perception of choice) or means-oriented "how" actions (low construal level perception of choice). Of course, these direct measurements might be more intrusive, and therein less effective than simply estimating these constructs, as suggested above, based on ubiquitous sensing.

> **P1. Through the use of sensors, actuators, and applications, mobile devices can estimate or directly measure a user's construal level orientation, construal level perception of choice, and psychological distance to choice at the moment of a decision.**

Consider the example of a smoking cessation intervention. Using the GPS, the application can detect that the user has entered a store that is coded in a database as one that sells cigarettes. While the user might be at the store for some other purpose (e.g., to buy juice or candy), the application might assume that since the user is actively trying to quit smoking, support might be necessary. Or, the user can be prompted to indicate directly whether or not support is necessary, similar to the way that *crave texts* were used in the STUB-IT intervention (Whittaker et al., 2011). While it is possible, as noted above, for the application to deliver cognitive tasks that directly measure psychological distance, construal level orientation, and construal level perception of choice, it might be useful instead for the application to estimate

these factors. Since the user is at close spatial distance, the intervention might assume the decision is also being considered at close psychological distance and a low construal level perception of choice. The mobile application can store and later recall measurements in order to anticipate challenging decisions based on similar spatial, temporal, and social distance measures.

The reason that it is essential to estimate construal level orientation, construal level perception of choice, and psychological distance to choice is that these three psychological parameters can predict the type of persuasive messages that will be most effective. This argument is more fully articulated in the next proposition.

Message Effectiveness. As noted above, previous research has demonstrated that congruence between psychological distance and construal level can foster processing fluency that can lead to persuasion in the case of an otherwise effective message (e.g., Fujita et al., 2008; Kim et al., 2009). Proposition 2 therefore emphasizes the importance of aligning four parameters: construal level orientation, construal level perception of choice, psychological distance to the choice, and message cues. Theoretically, this is conceptually similar to proposition 1 from Chapter 1, however, a key distinction is that this proposition specifically addresses those messages delivered through mobile technology.

> **P2. Persuasive messages delivered through mobile technology will be most effective when the following four parameters are congruent and match in distance and abstraction: construal level orientation, construal level perception of choice, psychological distance to the choice, and message cues.**

While persuasive messages can be delivered without the use of mobile technology, it is the argument of this chapter that the affordances of the device enable an application to specifically select a message that is matched and congruent, and therefore likely to be more effective. Currently, Foursquare's 'vendor specials' do this. For example, upon check-in to a

local convenience store near this campus, the user is informed that one can receive a free frozen yogurt with purchase of another one (message with low abstraction cues). Therein, the persuasive message, in this case a deal for a 'buy-one-get one,' is delivered as the user is standing in the store (close spatial distance), at this moment (close temporal distance), staring at the frozen yogurt selection (close in hypotheticality). This is a message with low abstraction cues delivered in a situation of close psychological distance and low construal level perception of choice. If the arguments of the message are otherwise persuasive (Fujita et al., 2008), the message is likely to be effective. In contrast, if the four parameters are not congruent and matched, there may be barriers to the effectiveness of the message.

Message Resistance. Message resistance may occur if the four parameters are incongruent or do not match. For example, imagine the FourSquare user receives a message offering a 'buy-one-get-one free' frozen yogurt that can be redeemed in one week or at an establishment across town from where they are located. In these cases, the user is at farther temporal or spatial distance, respectively, from the decision, and the message is still featuring low abstraction cues. Thus, the message is incongruent and less likely to be effective than if the offer was delivered at close temporal and spatial distance. It is possible the user might hold onto the coupon for a week or rush across town for the free yogurt, however these factors create barriers to the success of the message. The ability of a mobile application to sense egocentric distance to the decision enables the application to select messages least likely to be resisted due to cue incongruence and cue mismatching.

> **P3. Resistance to messages delivered through mobile devices will occur when the following four parameters are not congruent or do not match in distance and abstraction: construal level orientation, construal level perception of choice, psychological distance to choice, and message cues.**

However, even when all four parameters are congruent, message resistance can still occur if the perceived threat to choice level of the message is high. Psychological reactance theory holds that when an individual perceives that freedom of choice is threatened, the person is motivated to restore that freedom (Brehm, 1966), and one way this is accomplished is by rejecting the message (Byrne & Hart, 2009). It is important to explain that this does not refer to a fear appeal, but rather to an appeal that threatens freedom of choice.

> **P4. When all four parameters are congruent and match at a low level of abstraction and close distance, resistance to a message delivered through mobile technology will occur if the perceived threat to choice level of the message is high.**

Recall the example of the quitting smoker, who has just entered a convenience store. An application on the device estimates, based on spatial distance and a *crave* text prompt, that the user's construal level orientation and construal level perception of choice are low and that the individual is at close psychological distance to the choice. Based on this information, it would appear that a message with low abstraction cues and close distance cues would be congruent and most effective. However, if the application were to deliver a message with a high perceived threat to choice, such as "do not buy cigarettes; walk out of the store right now," it is likely that this highly controlling message would threaten one's sense of freedom of choice, fostering an attempt to restore that freedom by rejecting the message (Byrne & Hart, 2009). As illustrated in Chapter 3, psychological reactance is particularly high when construal level orientation is low, psychological distance is close and threat to choice level is high (Katz, 2013; Katz, Byrne, & Kent, 2012). While this type of message resistance can occur outside of the context of mobile technology, as mentioned as part of proposition 2 in Chapter 1, an application on the mobile device can detect this type of situation and try a different approach, such as altering the way that the choice is perceived.

Messages can perform functions that alter the psychological parameters associated with how one perceives a decision. Chapter 1 highlighted a category of message functions called linking messages that help individuals connect their choices in the moment to their higher level goals. In the next three propositions, the role of mobile technology and linking messages is explored.

*Message Function: Shifting***.** The message function of *shifting* refers to when the message moves the user from a high to low or low to high construal level orientation. Messages that perform a shifting function contain an interactive cognitive task. As noted above, researchers have developed many ways to shift construal level orientation in the laboratory (eg. Freitas et al., 2004; Fujita et al., 2006), and these tasks can be adapted and embedded within a mobile application game. Due to the affordances of interactivity and the ability to measure or estimate the user's construal level orientation, mobile devices can deliver these types of tasks at the moment of a behavioral decision. Shifting a person into a high or a low construal level orientation has particular advantages for persuasion. For example, a high construal level orientation supports self-control (Fujita et al, 2006) and enables one to see more alternatives (Liberman & Trope 2008), while a low construal level orientation might enhance self-efficacy (Lutchyn & Yzer, 2011).

> **P5. Messages delivered through mobile technology can *shift* a user's construal level orientation from high to low or from low to high.**

In the example of the quitting smoker who is at the convenience store, shifting construal level orientation from a low to a high level can foster self-control. In the case of behavioral failure, such as smoking one cigarette, a high construal level orientation might help one to step back, recognize the weeks of prior success, and not think that all is lost. The next chapter tests a

shifting message using mobile technology.

*Message Function: Bridging***.** As noted above, behavioral choices are often made at close psychological distance and a low construal level perception of choice, such as eat the cake or don't eat the cake. However, many goals, such as 'be healthy,' 'lose weight,' and 'succeed,' are at a high construal level perception of choice. As tested in Chapter 2, the message function of *bridging* refers to when the message moves the user from a high to low or low to high construal level perception of choice. While Chapter 2 compared two bridging techniques that did not use mobile devices, mobile technology is particularly suited to deliver the function of bridging. These devices are connected to us at the moment of a behavioral decision and can store, retrieve and remind us of both our higher level goals and incremental success.

> **P6. Messages delivered through mobile devices can *bridge* a user's construal level perception of choice, connecting abstract goals (high construal level perception of choice) to concrete decisions (low construal level perception of choice) and the reverse.**

A bridging technique contains low abstraction cues that are matched to how the decision is being processed (specific choice), and connects them to high abstraction cues (higher level goals) that would have not been activated if the bridge hadn't been made. When the application on the device detects that the user has entered a bakery, a bridging message might be delivered that states: If *you just order coffee and an apple* (low abstraction cue; low construal level perception of choice), *then you will be taking a step toward your goal to eat healthy* (high abstraction cue; high construal level perception of choice).

Message Function - Traversing. Changing the distance at which one makes a decision can impact the choices one makes. For example, as mentioned briefly in Chapter 1, Lee, Kiesler, and Forlizzi (2011) ran a study in which some participants were encouraged to make decisions at

farther temporal distance, in this case selecting snacks in advance. Others in a control condition selected snacks at close temporal distance, in the moment (Study 1). Those who selected snacks in advance showed greater self-control by selecting more apples than those in the control condition

> **P7. Messages delivered through mobile technology can *traverse* a user's perceptions of psychological distance, bringing psychologically far decisions closer and psychologically close decisions farther.**

A message that increases or decreases the psychological distance from a decision traverses the perception of the user accordingly. A traversing message can be delivered with close distance cues that are matched to how the decision is being processed (close psychological distance), and then connect to far distance cues (far psychological distance) that would have been mismatched if traversing hadn't occurred. Affordances of the technology, including the ability to measure or estimate egocentric distance to the decision, enable applications on the device to deliver these types of messages. For example, a mobile application might detect that the user has entered the bakery and suggest that the user perceive the cake display as farther away than it actually is. On the other hand it is sometimes useful to consider psychologically far decisions as closer. For example, a mobile exercise application might remind the user that the gym is spatially closer than it seems to be.

Pathway to Persuasion. As noted above, construal level congruence and self-control are both important factors that lead to message effectiveness and behavioral compliance. *Shifting, bridging,* and *traversing* functions can be used to alter the perspective of the user, such that self-control is maximized and the message cues are congruent and matched to the decision context.

> **P8. *Shifting, bridging,* and *traversing* functions can be used both to deliver effective messages through mobile technology and to counter message resistance (see Table 3 for a list of**

specific predictions).

Consider again the example of the quitting smoker at the convenience store. As noted above, the device can use spatial distance measures to prompt the user to send a *crave* message if the user is at close psychological distance and at a low construal level perception of choice to a behavioral decision to purchase cigarettes. Rather than deliver a congruent and matched message with low abstraction and close distance cues, which as noted above is likely to generate psychological reactance, there are other options. For example, it is possible to use the *shifting, bridging* and *traversing* functions of messages to alter the state and perception of the quitter. The quitter can be shifted to a higher construal level orientation and bridged to perceive the choice at a high construal level perception of choice. As noted above, this is likely to generate greater self-control. Then, a persuasive message with high abstraction and far distance cues will be matched and congruent, and it is likely to be more effective.

These eight propositions identified several important connections between construal level theory and mobile technology. In the next chapter, P5 is tested through two experiments that use mobile technology to shift construal level orientation.

CHAPTER 5

Shifting Construal Level Orientation Through Mobile Technology

As discussed in earlier chapters, the concept of shifting refers to a message function that changes how abstractly or concretely an individual is processing information, and this can be used to aid in decision-making. The purpose of this chapter is to test a technique that was developed to shift construal level orientation through a mobile device.

Prior research on construal level theory has illustrated the benefits of making decisions from a high construal level, or a more abstract, mindset. Shifting individuals to a high construal level orientation has been shown to put them in touch with their higher level goals and to increase self-control (Fujita & Han, 2009; Fujita & Sasota, 2011; Fujita, Trope, et al., 2006a). For example, as noted earlier, dieters who were manipulated to a high construal level orientation were faster at pairing apples with positive words and candy with negative words in an implicit association task, but those manipulated to a low construal level were not (Fujita and Han, 2009). This is because when the individual is thinking abstractly, the higher level dieting goal is assessable and temptations, such as the candy, are viewed as threats to the goal. (Fujita & Carnevale, 2012; Fujita & Sasota, 2011). Overall, self-control has been modeled as operating in line with our long-term, higher level, more abstract goals (i.e. to be healthy), rather than immediate, concrete temptations (i.e. eat the cookie). This suggests that it would be useful to develop a way to shift individuals to think abstractly at the moment of a behavioral decision.

Designing the Application

Manipulating Abstraction

As mentioned in Chapter 1, shifting how abstractly or concretely an individual is thinking has been shown to change a number of other factors. For example, at a high construal level

orientation, judgments of distance are greater (Liberman & Förster, 2009), motivational control is enhanced (Fujita & Han, 2009; Fujita & Roberts, 2010; Fujita, Trope, et al., 2006), and higher level goals are more salient (Freitas, et al., 2004).

There are several types of cognitive tasks that have been used to shift construal level orientation in the laboratory. In one task, participants are provided with a series of 40 target words, and are encouraged to provide either category words or exemplar words for the target words, shifting them to a high or low construal level orientation, respectively (Fujita, Trope, et al., 2006). For example, participants see the target word SODA, and provide either a category, such as beverage, or an exemplar, such as Diet Pepsi. This technique of shifting construal level orientation was used in Chapter 3 for the studies on Re-Construing Reactance. Other methods of shifting construal level orientation ask participants to respond to why and how questions to shift them to a higher or lower construal level orientation. Studies 1 and 2 in Chapter 2 use this approach, including one manipulation validated specifically through this work and one validated by Freitas et al. (2004).

Design Considerations

In selecting a construal level orientation manipulation to be adapted to the mobile environment, a number of key points were considered. These considerations include visual display, task duration, and ease of use.

Visual Display. First, the screens on mobile devices are becoming increasingly larger as mobile phones and tablets merge into phablets. The visual display affordances of these devices are a major strength, and were an important factor to consider when developing an application to shift construal level orientation. Indeed, the question at issue was how best to make use of the screen. The tasks mentioned above, including the category/exemplar task and the why/how task,

were not suited to be visual tasks, and in fact, they each require a lot of typing, which is more difficult to do on mobile devices, most of which do not have a keyboard.

Task Duration. The second consideration was task duration. Construal level orientation manipulations are typically tasks that take a while. This shifting application needs to be able to be delivered within the context of a behavioral decision. Since the individual would stop in the context of daily life, such as upon arriving at a bakery, it was necessary that the shifting manipulation not be too long in duration.

Ease of Use. The third consideration was ease of use. Both the task itself and the interface needed to be easy to use. Additionally, since participants might vary in their level of computer expertise, the application should be user-friendly and not require advanced understanding of the device.

In considering these three design principles, the Navon Composite Letter task was selected for mobile adaptation. Based on Navon's (1977) composite letters (see Figure 12), this global/local processing task features large letters made of smaller letters and has been used in prior work to manipulate construal level (Liberman & Förster, 2009; Wakslak & Trope, 2009). Participants identify larger letters if they are shifted to a high construal level orientation and the smaller letters if they are shifted to a low construal level. The task is perceptual, rather than conceptual, making use of the visual display affordances of the device. Additionally, specific choices were made in the adaptation of the task, as detailed below, to keep the task brief and make it easy to use.

Building the mCLO Application

The purpose of the mCLO application is to shift how abstractly or concretely an individual is thinking through a task delivered on a mobile device. Qualtrics was selected as a

platform to present the composite letter images and to collect the responses from the participants (see Figure 13). Qualtrics facilitates the presentation of visual information and has a newly developed mobile compatibility feature that confirms when materials can be read easily using a mobile device. The two studies below use different Navon task procedures. In Study 1, Liberman & Förster's (2009) Navon technique was adapted. Their Navon letter task was previously administered via computer, and therefore, it was considered a more direct adaptation to the mobile environment. In Study 2 and Study 3, Wakslak and Trope's (2009) Navon task was adapated. Their manipulation is very simple in its design, and adapted easily to the mobile environment.

Study 1

The purpose of Study 1 was to test mCLO, a task designed to shift how abstractly or concretely somebody is thinking. The following hypotheses and research questions guided this first study. The behavioral identification form (BIF) and a category/exemplar measure were used to measure cognitive abstraction.

H1. Participants shifted to a high construal level through mCLO will score higher on the behavioral identification form (BIF) than participants shifted to a low construal level through mCLO.

H2. Participants shifted to a high construal level through mCLO will score higher on a category/exemplar measure than participants shifted to a low construal level through mCLO.

RQ1. Will mCLO be as effective at shifting participants to a high construal level as a perceptual task delivered by pen and paper?

RQ2. Will mCLO be as effective at shifting participants to a high construal level as a semantic task delivered by pen and paper?

RQ3. What are some challenges associated with shifting participants to a high construal level through mobile technology?

Study 1

Method

Participants were placed into one of six conditions using random assignment in a 2 (construal level: high construal level/ low construal level) x 3 (mCLO/ paper-pen perceptual task/ paper-pen semantic task) experiment. The study was completed by 244 participants in the lobby of a large university library. Twelve participants were removed from analysis for stopping during the study (i.e. stopping to talk with friends who walked by or checking their phones). The remaining 232 students ranged in age from 18 to 40 years (M = 21.07; SD = 3.12); 152 indicated that they were female and 80 indicated that they were male. Participants were invited to participate if they approached the experiment table, and they were each paid $3 cash for completing the 10 minute study. Each participant signed an IRB-approved consent form.

Procedure

All participants used iPads to complete the study, however, those assigned to a paper/pen task also completed tasks that were not on the iPad. The iPad was used as a mobile device in this study, with the idea that the application could be tested on smaller screens in later studies. First, participants provided demographic information, including age and gender. Next, they were randomly assigned to receive one of the six construal level manipulations. Participants completed the behavioral identification form and the category/exemplar measure. They were fully debriefed.

Construal Level Manipulations

Participants were assigned to one of three types of construal level manipulations: (1) mCLO, which is a mobile perceptual task; (2) a paper-pen perceptual task; (3) a paper-pen semantic task.

mCLO (mobile perceptual task). Participants in the mCLO condition completed a letter identification task based on Navon's (1977) composite letters. This global/local processing task features large letters made of smaller letters and has been used in prior work to manipulate construal level (Liberman & Förster, 2009; Wakslak & Trope, 2009). Participants viewed 24 composite letters from Liberman and Förster, 2009, one at a time at 300 DPI. Those in the high construal level condition saw H made of F, L made of F, H made of T, and L made of T. They were asked: *Which letter do you see?* The choices were either H or L. Therefore, participants manipulated to a high construal level were always identifying the larger letter. Participants manipulated to a low construal level saw F made of H, F made of L, T made of H, and T made of L. They were also asked: *Which letter do you see?* The choices were also either H or L. Therefore, participants manipulated to a low construal level were always identifying the smaller letter.

Paper-Pen Perceptual Task. Participants in the paper-pen perceptual task condition also completed a letter identification task based on Navon's (1977) composite letters. These participants received instructions on the iPad to ask the researcher for the paper/pen task. They were then handed a clipboard with the actual manipulation used in Wakslak and Trope (2009). Dr. Wakslak provided these materials. In the Wakslak & Trope (2009) procedure, all participants saw the same composite letters. They saw 23 different composite letters, four to a page (one appeared twice to make 24). Those in the high construal level condition were instructed to

identify the larger letters, and those in the low construal level condition were instructed to identify the smaller ones.

Paper-pen semantic task. Participants in the paper-pen semantic task condition completed the Freitas et al. (2004) construal level manipulation, which has been used in prior work (Carrera, Muñoz, Caballero, Fernández, & Albarracín, 2012; Sanna, et al., 2010). These participants received instructions on the iPad to ask the researcher for the pen/paper task. They were then handed a clipboard with the manipulation. Participants who were manipulated to a high construal level responded to *why do you improve or maintain your physical health*, and they were asked to respond to seven *why* questions (in the last four questions, they were asked to respond *why* to each prior response they gave). For example, if they say *to live a long time*, they would next indicate *why* they wanted *to live a long time*. Participants manipulated to a low construal level responded to *how do you improve or maintain your physical health,* and again responded to seven *how* questions (in the last four questions, they were asked to respond how to each prior response they gave). For example, if they said *by exercising outdoors*, they would next indicate *how* they *exercise outdoors*. This is the same manipulation that was used in Chapter 2, Study 2.

Measures

Behavioral Identification Form. The behavioral identification form (BIF), based on action identification theory, contains 25 items and measures how abstractly or concretely one interprets actions (Vallacher & Wegner, 1989). For example, locking a door can be construed as putting a key in the lock (low construal level) or securing the house (high construal level). While initially developed as a trait measure, it has been used as a dependent measure and manipulation check in research on construal level theory (Agrawal & Wan, 2009; Eyal & Epley, 2010; Freitas

et al., 2009, 2008; Fujita, Henderson, et al., 2006; Fujita & Roberts, 2010; Fujita, Trope, et al., 2006; Kim & John, 2008; Lee et al., 2010; Levy, Freitas, & Salovey, 2002; Liberman & Trope, 1998; Schmeichel & Vohs, 2009; Wakslak & Trope, 2009; Yan & Sengupta, 2012). Participants viewed text describing 25 actions and selected one of two choices as to the best way to describe that item. For example, the participants viewed text that stated*: painting a room,* and they had to select from *applying brush strokes* (low construal level) or *making the room look fresh* (high construal level). Participants received a 0 for every low construal level selection and a +1 for every high construal level selection, and these were added together so that each participant has one BIF score, ranging from 0 to +25, (n = 232, M = 14.42, SD = 4.84).

Category-Exemplar Measure. The category/exemplar measure is based on prior work which has demonstrated that categories are more abstract than examples (Fujita et al., 2006). This measure adapts 10 target words from Fujita, Trope, et al.'s (2006) category/exemplar manipulation used to shift construal level. In this dependent measure adaptation, participants view 10 of his target words and are asked to select *the word or short phrase you think relates best to the target word.* For example, participants would view the target word *soda*, and they would be asked to select either *Pepsi* (low construal level) or *Beverage* (high construal level) as the one which relates best. They receive a -1 for every low construal level selection and a +1 for every high construal level selection. These scores are added to yield one category/exemplar measure score ranging from -10 to +10, (n = 232, M = 2.03, SD = 5.02).

Results

Manipulation check abstraction scores (perceptual tasks). The composite letter tasks were scored, with participants receiving a +1 for every large letter they correctly identify, a -1 for every small letter they correctly identify and a 0 if they do not correctly identify either the large

or small letter. As expected, participants who were shifted to a high construal level orientation using mCLO (n = 40, M = 23.98, *S.D.* = .16) had higher manipulation check abstraction scores than participants who were shifted to a low construal level orientation using mCLO, (n = 39, M = -24.00, *S.D.* = .00) F (1, 77) = 3,589,331.61, $p < .001$, $\eta^2_\rho = 1.00$. Those participants who completed the paper-pen perceptual task also had similar results. As expected, participants who were shifted to a high construal level orientation using the paper-pen perceptual task (n = 39, M = 24.00, *S.D.* = .00) had higher manipulation check abstraction scores than participants who were shifted to a low construal level orientation using the paper-pen perceptual task, (n = 39, M = -20.28, *S.D.* = 12.95), F (1, 76) = 455.93, $p < .001$, $\eta^2_\rho = .86$.

Manipulation check abstraction scores (semantic tasks). The Linguistic Category Model (LCM) provides a method of coding text, specifically verbs and adjectives, to determine the level of abstraction of the text (Coenen et al., 2006; Fiedler, 2008; Freitas et al., 2004; Trope & Liberman, 2010). Using the LCM (Coenen, et al., 2006), a coder, asked to conceal condition and unaware of the hypothesis, analyzed responses to the *why* or *how* questions. Participants who were manipulated to a high construal level by answering *why* questions scored higher (n = 38, M = 19.08, *S.D.* = 4.52) on this manipulation check abstraction measure than participants manipulated to a low construal level by answering *how* questions (n = 37, M = 15.57, *S.D.* = 4.32), F (1, 73) = 11.80, $p = .001$, $\eta^2_\rho = .14$.

Hypotheses and Research Questions. Hypothesis 1 predicted that participants shifted to a high construal level through mCLO will score higher on the behavioral identification form (BIF) than participants shifted to a low construal level through mCLO. While the means are in the correct direction, there is no significant difference in BIF scores between participants shifted to a high construal level orientation (n = 40, M = 13.78, *S.D.* = 5.35) and those shifted to a low

construal level orientation (n = 39, M = 11.85, *S.D.* = 5.99) through mCLO, F (1, 77) = 2.28, p = .135, η^2_ρ = .03. Therefore, hypothesis 1 is not supported.

The second hypothesis predicted that participants shifted to a high construal level through mCLO will score higher on a category/exemplar measure than participants shifted to a low construal level through mCLO. However, there was no difference between participants shifted to a high construal level orientation (n = 40, M = 1.45 *S.D.* = 5.42) and those shifted to a low construal level orientation (n = 39, M = 2.15, *S.D.* = 5.53) through mCLO, F (1, 77) = .327, p = .57, η^2_ρ = .004. Therefore, hypothesis 2 is not supported.

In response to research question 1, mCLO was compared to the perceptual paper-pen task to see whether one was more effective than the other at shifting construal level orientation. As already mentioned above, mCLO did not yield significant differences on the two dependent measures. The paper-pen perceptual task is more established and has been successfully used in prior research (Wakslak & Trope, 2009). Specifically, participants shifted to a high construal level orientation (n = 39, M = 16.00, *S.D.* = 4.27) had higher scores on the behavioral identification form than those shifted to a low construal level orientation (n = 39, M = 14.31, *S.D.* = 4.34), although this difference merely approaches significance F (1, 76) = 3.01, p = .087, η^2_ρ = .04. On the other hand, participants shifted to a high construal level orientation using the paper-pen perceptual task (n = 39, M = .97, *S.D.* = 4.63) did not differ significantly on the category/exemplar dependent measure from those shifted to a low construal level orientation (n = 39, M = 2.31, *S.D.* = 4.93), F (1, 76) = 1.52, p = .22, η^2_ρ = .02. Therefore, in response to research question 1, mCLO is not more effective than the paper-pen perceptual task at shifting construal level orientation. However, in this study, the paper-pen perceptual task was not particularly effective either.

Research question 2 asked whether mCLO is as effective at shifting participants as a semantic task delivered by pen and paper. This semantic task has been successfully used in numerous studies (Freitas et al., 2009, 2004). Participants shifted to a high construal level orientation (n = 38, M = 15.32, $S.D.$ = 4.15) did not differ from those shifted to a low construal level orientation (n = 37, M = 15.38, $S.D.$ = 3.60) on the behavioral identification form, F (1, 73) = .005, p = .95, η^2_ρ = .00. They also did not differ on the category/exemplar dependent measure, with participants in the high construal level orientation condition (n = 38, M = 2.32, $S.D.$ = 4.95) and those in the low construal level orientation condition (n = 37, M = 3.03, $S.D.$ = 4.59), yielding similar scores, F (1, 73) = .42, p = .52, η^2_ρ = .01. Therefore, in response to research question 2, while the mCLO task was not effective at shifting construal level orientation, the more established, semantic task delivered by pen and paper was also ineffective in this study.

Research question 3 asked what challenges are associated with shifting participants using a mobile perceptual task, such as mCLO. This first study identified three primary challenges that are detailed in the Study 1 discussion below. The challenges are: there are no rigorous manipulation checks for the perceptual tasks, the dependent measures are adapted from a trait measure and a manipulation, and the context in which the manipulation takes place can matter.

Study 1 Discussion

Study 1 was the first attempt to manipulate construal level orientation using the mCLO application. The results do not indicate that it successfully influenced responses on the behavioral identification form or the category/exemplar task. However, as the more established semantic task was similarly unsuccessful, this suggests that there might be other challenges.

Three challenges were identified in this first attempt to manipulate construal level orientation through mobile technology. First, the manipulation checks are not as strong as they

should be. The manipulation check for mCLO and the paper-pen perceptual task showed the participants did what they were supposed to do. In other words, they demonstrate the participants identified the correct letters. However, these manipulation checks do not really show if they are thinking more or less abstractly. Liberman and Förster (2009) do not report manipulation checks in their Study 1 that used the perceptual task that was adapted to mCLO. Procedurally, theirs differed a bit, as they had participants push buttons to indicate letter selection, but they do not report any manipulation checks or reaction-time indices. Similarly, Wakslak and Trope (2009) did not report a manipulation check in their Study 4a, which used the paper-pen perceptual task manipulation. Therefore, one of the challenges is that there are not strong manipulation checks for construal level orientation when using perceptual tasks and the manipulation is often assumed to have taken place because of the influence on an outcome variable.

The dependent measures present a second challenge to this study. One dependent measure utilized in this study was adapted from a manipulation and the other was designed and validated as a trait measure. However, the behavioral identification form, which is the one that was originally validated as a trait measure, has been used extensively as a dependent variable in prior work (Agrawal & Wan, 2009; Fujita, Henderson, et al., 2006; Fujita & Roberts, 2010; Fujita, Trope, et al., 2006; Lee et al., 2010; Liberman & Trope, 1998; Schmeichel & Vohs, 2009; Wakslak & Trope, 2009; Yan & Sengupta, 2012). In other words, prior studies have successfully found differences on this measure between those participants manipulated to a high construal level orientation and those manipulated to a low construal level orientation (Fujita, Henderson, et al., 2006a; Fujita, Trope, et al., 2006a; Yan & Sengupta, 2012). That said, the standards for the use of the behavioral identification form as a dependent measure or manipulation check are inconsistent. While most of the prior work has coded the responses in the way we did and

summed them, there are some studies that have taken the average of this sum, which mathematically calculates the same statistically (Agrawal & Wan, 2009; Freitas et al., 2009, 2008; Wakslak & Trope, 2009), some studies have used only a portion of the questions (Fujita, Henderson, et al., 2006; Liberman & Trope, 1998), and one study changed the forced-response choice into a 7-point scale (Fujita & Roberts, 2010).

Another challenge in researching construal level theory is that cognitive abstraction is typically measured through cognitive byproducts, rather than directly. For example, participants may perceive egocentric distance differently, suggesting abstraction was effectively manipulated (Liberman & Förster, 2009). The third challenge identified through this study is the one that presents the biggest practical challenge. This study was conducted in a noisy library during finals week, and it is possible that shifting construal level orientation requires a quiet setting. This of course would make it difficult to use mCLO in a real-world setting, and therefore presents a challenge to the implementation of the theory.

Study 2 and Study 3 take steps to address these concerns. Study 2 introduces new dependent variables, including one that has be used in prior research and one that features an open-ended response that facilitates LCM coding.

Study 2

Study 2 introduced two new dependent measures in order to address a concern raised in Study 1. The two new dependent measures are a probability estimate scale and an open-ended response. Often, manipulations of construal level orientation are assumed based on different results on other dependent measures, wherein the difference is theoretically explained by a change in cognitive abstraction. For example, in Wakslak and Trope (2009), participants who were manipulated to a high construal level orientation reported that events were less likely to

occur. This makes theoretical sense, as increasing abstraction should result in perceptions of further hypothetical distance. At far hypothetical distance, events should seem less probable. Therefore, this probability estimate measure has been used in prior research as a dependent variable. The first prediction of this study is that this finding can be replicated when mCLO is used to manipulate construal level orientation.

> **H1. Participants shifted to a high construal level orientation through mCLO will score lower on a probability estimate measure than participants shifted to a low construal level orientation through mCLO.**

As noted above, one of the challenges with prior research on construal level theory is that it is difficult to measure exactly how abstractly or concretely individuals are processing information. One measure that was used successfully in Chapter 2 to code an open-ended response is the Linguistic Category Model (Coenen et al., 2006). Those who are processing information more abstractly should respond with text that is more abstract.

> **H2. Participants shifted to a high construal level orientation through mCLO will respond more abstractly in an open-ended forum than participants shifted to a low construal level orientation.**

Method

The study was completed by 82 participants on Amazon Mechanical Turk (mTurk). Three participants were removed from analysis for not following directions on the composite letter task described below. The remaining 79 participants ranged in age from 19 to 81 years (M = 32.48; SD = 12.70); 50 indicated that they were male and 29 indicated that they were female. Participants received a small compensation through Amazon Mechanical Turk. Each participant indicated approval on an IRB-approved consent form.

Procedure

All participants completed the study through mTurk, using their own devices. Of the participants, 26 used a desktop computer, 49 used a laptop computer, and 4 used a mobile phone. Therefore, this study did not test the manipulation in a truly mobile environment, even though mCLO was used. First, participants provided demographic information, including age and gender. Next, they were randomly assigned to receive either the high construal level orientation or the low construal level orientation mCLO task. Participants completed the dependent measures, including the probability estimate scale and the open-ended response. They were fully debriefed.

Construal Level Manipulations

Participants completed the mCLO task in order to manipulate construal level orientation. In this study, Wakslak and Trope's (2009) version of the Navon (1977) letters were digitized and used. Participants viewed 24 composite letters (23 different ones). Those manipulated to a high construal level orientation were asked to identify the large letter, and those manipulated to a low construal level orientation were asked to identify the small letter.

Measures

Probability Estimate Scale (PES). The probability estimate scale (PES) was originally used in Study 3 of Wakslak and Trope (2009), as a dependent variable. As noted above, in their study, participants at a higher construal level orientation rated events less likely to occur, which is predicted by construal level theory. Participants responded to six scenarios, such as *Jack is looking through his mail. How likely is he to get a credit-card offer in the mail?* and *Kaila commutes by car to work every day. How likely is she to get a dent in her car?* They indicated how likely they thought the event would occur on a scale from (1) *very unlikely* to (7) *very likely*. These scores were added together to yield one probability estimate measure for each participant,

(n = 79, M =4.32, SD = .61). The alpha on this measure was not strong α = .57. Deleting two measures improved reliability slightly, α = .61, and dropping further items did not improve reliability. Therefore, a revised measure with four items was also created (n = 79, M = 3.31, SD = 1.04). Results for this DV report both the full measure, for theoretical reasons, and the reduced-item measure.

Open-ended Response. As noted above, one of the challenges presented by construal level theory is that there are not many dependent measures that directly capture how abstractly or concretely an individual is thinking. Therefore, participants were asked to provide an open response to the prompt, *Describe yourself in two sentences*. One independent coder conducted an analysis using the Linguistic Category Model, yielding an LCM abstraction measure, (n = 79, M =3.10, SD = .57)[4].

Results

Manipulation check abstraction scores. As a manipulation check, scores on the composite letter tasks were calculated. Participants received a +1 for every large letter they correctly identify, a -1 for every small letter they correctly identify and a 0 if they do not correctly identify either the large or small letter. Participants who were shifted to a high construal level orientation using mCLO (n = 46, M = 23.93, *S.D.* = .44) had higher manipulation check abstraction scores than participants who were shifted to a low construal level orientation using mCLO, (n = 33, M = -24.00, *S.D.* = .00), F (1, 77) = 386,135.51, $p < .001$, $\eta^2_\rho = 1.00$.

Hypotheses and Research Questions. Hypothesis 1 predicted that participants shifted to a high construal level orientation using mCLO would score lower on the probability estimate

[4] The coder used has experience with LCM coding and has been reliable with other coders in prior work. However, best practice would employ a second coder for this data set. This was not done as the findings of the first coder did not support the hypothesis.

measure than participants shifted to a low construal level orientation using mCLO. This first hypothesis is not supported, as there was no significant difference between participants manipulated to a high construal level orientation (M = 3.75, $S.D.$ = .93), (M = 3.33, $S.D.$ = 1.21) or a low construal level orientation (M = 3.64, $S.D.$ = .67), (M = 3.29, $S.D.$ = .76), on either the six-item, F (1, 77) = .33, p = .57, η^2_ρ = .004, or four-item probability measure, F (1, 77) = .03, p = .86, η^2_ρ = .00, respectively.

Hypothesis 2 predicted that participants shifted to a high construal level orientation through mCLO would have higher LCM abstraction scores on their open-ended response than participants shifted to a low construal level orientation through mCLO. There was no difference in LCM abstraction scores between those participants shifted to a high construal level orientation (M = 3.07, $S.D.$ = .65) and a low construal level orientation (M = 3.15, $S.D.$ = .42), F (1, 77) = .45, p = .50, η^2_ρ = .006. Therefore, hypothesis 2 is not supported.

Study 2 Discussion

Once again, in Study 2, mCLO did not successfully influence the dependent variables. There was no difference in scores on the probability measure and on the LCM abstraction scores for the open response. There are a number of limitations that could be responsible for these findings. First, this study was conducted on Amazon Mechanical Turk, and while it appeared from their open responses that participants were paying close attention to the study, it is possible that they could have been distracted.

As noted above, Study 2 was designed with the intention of addressing the challenge presented by the lack of strong dependent measures in the literature on construal level theory. This study used two different dependent measures, including one that was used in prior research and one that facilitated LCM coding. However, neither one worked in this study.

It is important to note that when Wakslak and Trope (2009) used their dependent measure, only two of their items actually yielded statistically significant differences for construal level orientation. Furthermore, they separated the items into two scales with a positive and negative valence and did not report alpha ratings on these scales. In this dataset, however, dividing the scales by valence or conducting univariate analyses on each individual question did not yield any significant differences. Furthermore, the valence-separated scales had alphas below the .5 level. Finally, this measure was intended not as a manipulation check, but rather as a theoretical extension on hypothetical distance, so to yield a difference, it requires not only a shift in cognitive abstraction but also, as predicted by construal level theory, a change in hypothetical distance perceptions.

Furthermore, the second measure was challenged as well. Coding open responses with the linguistic category analysis is a rigorous approach to measuring abstraction, however, this approach requires the participant to first react to a stimulus or prompt. As seen in Chapter 2 with the induced pathway, it is likely that abstraction or distance cues in the stimulus or prompt will override the abstraction level caused by the manipulation. In other words, one possible explanation is that reading the question, which was a very abstract, high construal level prompt, induced a level of abstraction uniformly, regardless of how abstractly or concretely the individual was manipulated through mCLO. Theoretically, this is the same mechanism as the induced process described in Chapter 2, which was demonstrated in three different studies each containing a different manipulation of construal level orientation. Essentially, reading the prompt served as a "message," inducing a particular level of abstraction, regardless of how abstractly or concretely the individual was manipulated to think.

It is important to note that the number of participants differed for each experimental condition, however, as the analyses were one-way ANOVAs, without interaction factors, this is not a concern. Therefore, the results are statistically sound. The unequal groups are a consequence of using mTurk. On mTurk, it is not uncommon for participants to start and quickly abandon a study. However, Qualtrics, which was used to randomly distribute the conditions, is not aware when somebody abandons the study. More participants left the low construal level orientation condition, and it might be that finding the smaller letters in the composites was a more challenging task for them and so they were more likely to abandon the study.

As noted above, another possible explanation for the ineffectiveness of the mCLO application is that participants in the first two studies were in environments that could have been distracting. Therefore, in Study 3, mCLO is tested in a laboratory environment.

Study 3

Study 3 tested mCLO into a laboratory, in order to address the concern that participants might have been distracted by doing the study in the library or on mTurk. The data used for this study was part of a larger experiment on construal level theory and persuasion, different measures of which are reported in Chapter 2, Study 3. In this current study, mCLO is tested on two dependent variables, the behavioral identification form (BIF) and a categorization task previously used in Fujita, Trope, et al. (2006).

> **H1. Participants shifted to a high construal level orientation through mCLO will score higher on the behavioral identification form than participants shifted to a low construal level orientation through mCLO.**
>
> **H2. Participants shifted to a high construal level orientation through mCLO will score higher on the Fujita, Trope, et al. (2006) categorization task than participants shifted to a low construal level orientation through mCLO.**

Design

The design for this study was previously reported in Chapter 2, Study 3. Participants received a construal level orientation manipulation using mCLO and then an image manipulation. However, for the purposes of this chapter on shifting, only the construal level orientation manipulation is of interest. Therefore, only a subset of the data from this larger experiment is used. Specifically, only data from those participants who saw low abstraction cues are used in this report, so as to keep the image constant and so as not to include any participants who received an induced bridging technique. Participants were told that they were completing a few short studies, and the dependent measures, including the behavioral identification form and the Fujita, Trope, et al. (2006) categorization task, were labeled as different studies.

This study was completed by 47 university students using iPads in a quiet laboratory space. They were asked to put their phones away and focus only on the study. They all complied with this request. There were five participants removed from analysis because they had completed an earlier version of the larger study on an older recruitment system. The remaining 42 participants were 18 to 39 years old (M = 20.33; SD = 3.14); 27 were female and 15 participants were male.

Manipulation

Construal level orientation. Again, participants completed a letter identification task based on Navon's (1977) composite letters. The mCLO manipulation was the same as in Study 2 and is a digitized version of Wakslak and Trope's (2009) task. Participants viewed 24 composite letters (23 different composite letters, with one repeated) one at a time at 200 pixels in height and 300 DPI. Those in the high construal level orientation condition were instructed to identify the

larger letters, and those in the low construal level orientation condition were instructed to identify the smaller ones. A separate control group received neither task.

Measures

Behavioral Identification Form (BIF). The behavioral identification form (BIF) was measured the same way as in Study 1. Participants received a 0 for every low construal level selection and a +1 for every high construal level selection, and these were added together so that each participant has one BIF score, ranging from 0 to +25, (n = 42, M = 11.02, SD = 4.33).

Fujita, Trope, et al. (2006) Categorization Task. As in Fujita, Trope, et al. (2006), Study 3A, participants were shown eight target activities, including *Sweeping the floor, Attending a family reunion, Skydiving, Making an expensive purchase, Staying home to study, Recycling, Teaching,* and *Meeting new people***.** For each item, they were asked to select between two possible descriptions, one that is more abstract, and one that is more concrete. For example, for *making an expensive purchase*, the participants were asked to select between *swiping a credit card* (low construal level) and *doing something for one's pleasure* (high construal level). As in the behavioral identification form, participants received a 0 for every low construal level selection and a +1 for every high construal level selection, and these were added together so that each participant had one categorization score, ranging from 0 to +8 (n = 42, M = 4.10, SD = 1.69).

Results

Manipulation check abstraction scores. As a manipulation check, scores on the composite letter tasks were calculated. Participants received a +1 for every large letter they correctly identify, a -1 for every small letter they correctly identify and a 0 if they do not correctly identify either the large or small letter. Participants had 100% accuracy on this task.

Those who were shifted to a high construal level orientation using mCLO (n = 12, M = 24.00, *S.D.* = .00) had higher manipulation check abstraction scores than participants who were shifted to a low construal level orientation using mCLO, (n = 10, M = -24.00, *S.D.* = .00), $\eta^2_\rho = 1.00$[5].

Hypotheses and Research Questions. Hypothesis 1 predicted that participants shifted to a high construal level orientation using mCLO would score higher on the behavioral identification form than participants shifted to a low construal level orientation using mCLO. Once again, there was no significant difference between participants manipulated to a high construal level orientation (M = 10.92, *S.D.* = 4.34), a low construal level orientation (M = 12.30, *S.D.* = 3.97), or the control condition (M = 10.45, *S.D.* = 4.57) on the behavioral identification form, F (2, 39) = .60, p = .55. Therefore, hypothesis 1 is not supported.

Hypothesis 2 predicted that participants shifted to a high construal level orientation through mCLO would have higher scores on the Fujita, Trope, et al. (2006) categorization task. There was no difference in scores on this measure between those participants shifted to a high construal level orientation (M = 3.75, *S.D.* = 1.71), a low construal level orientation (M = 4.10, *S.D.* = 1.79), or the control condition (M = 4.30, *S.D.* = 1.69), F (2, 39) = .38, p = .68. Therefore, hypothesis 2 is not supported.

Discussion

In Study 3, participants who received a high construal level orientation manipulation using mCLO did not differ from those who received a low construal level orientation manipulation using mCLO on the dependent measures of the behavioral identification form or the Fujita, Trope, et al. (2006) categorization task. Both of these groups did not differ from the

[5] The ANOVA could not calculate than F-statistic for this analysis as there was no variability in data in each condition and the two conditions were exactly opposite. The F-statistic approaches infinity. The two conditions are clearly different.

control group. Therefore, it appears once again, that mCLO did not influence the dependent measures, even with this study conducted inside a quiet laboratory.

It is important to acknowledge that there were more participants in the control group because this data was culled from a larger study, as noted above. However, this does not compromise the statistical analysis, as a one-way ANOVA with no interaction terms was used.

Another limitation is that because this data was culled from a larger study, the participants did see an image before completing the dependent measures. Since all participants in this report saw the same exact image that did not include an induced bridging technique, we might expect that the effect would be distributed the same across all of the randomly assigned construal level orientation conditions. However, as discussed in Chapter 2, the induced processing model would suggest that seeing this image might induce a low construal level orientation. In other words, the image they see is potentially wiping out the prior influence of any construal level orientation manipulation. This would explain the null findings.

General Discussion

Across three studies, the mCLO application was tested. In all cases, participants manipulated to a high construal level orientation condition did not differ from those manipulated to a low construal level orientation condition on any of the dependent measures utilized. There are definite limitations to each of these three studies, and it is possible to continue trying incrementally more rigorous tests of this application. However, it is also important to acknowledge that mCLO may not actually work. Therefore, an important step in considering the application design would be to articulate some specific design and theoretical principles moving forward.

First, mCLO does not include a task that requires deep processing. While identifying the letters may take some cognitive work, it is not as rigorous as some of the other construal level orientation manipulations that require participants to answer questions (Freitas et al., 2004) or provide categorization information (Fujita, Trope, et al., 2006a). Therefore, in considering the redesign of mCLO, it is important to think about a deeper task. That said, a task that involves depth of processing might not be a visual task that makes use of the affordances of the mobile device.

Second, we might consider whether it actually makes sense to try to shift abstraction within the context of a behavioral decision in daily life. After all, shifting how abstractly or concretely somebody is thinking might require a quiet environment, such as a laboratory, which would render it useless in the real-world context of decision-making. Perhaps, helping individuals connect to their higher level goals through bridging or distancing themselves psychologically through traversing might be a better way to foster decision-making in daily life. A mobile application could be developed that fosters bridging and traversing to improve decision-making.

How abstractly or concretely an individual is thinking has implications for the type of decisions they make. It is an interesting theoretical and design challenge to try to find a way to foster cognitive abstraction within the context of daily life, using mobile devices that are contextually-aware. This chapter also highlights other challenges associated with the dependent measures and manipulation checks available in work on construal level theory, and that topic, among others is further addressed in the next chapter.

CHAPTER 6

Construal Level Theory and the Field of Communication

The purpose of this manuscript was to introduce and test a number of new concepts and theoretical predictions associated with construal level theory and persuasion. This work started with a theoretical overview that proposed two different pathways to message effectiveness, one based on congruence and the other based on motivation. Next, three studies on cognitive bridging all demonstrate that the induced, rather than the integrated pathway, is the best method of fostering the connection between abstract goals and the means to achieve them. Chapter 3 featured two studies that showed when construal level orientation is low, psychological distance is close and threat to choice level is high, psychological reactance is likely to be high and message effectiveness low. This work further suggested that it might be possible to effectively deliver a message that contains a high threat to choice level, as long as the individual is processing at a high construal level orientation. Chapter 4 presented a theoretical model connecting the affordances of mobile technology to construal level theory, and Chapter 5 included three small experiments testing a small piece of this model, P5, focused on shifting construal level orientation. This last chapter will mention some possible theoretical connections to the study of persuasion, explore possible areas of future inquiry, and conclude with a vision for my research program going forward.

Integration with Persuasion

Construal level theory can help us to better understand key concepts and relationships in the study of persuasion. For example, it is important to consider how construal level theory might relate to established models of persuasion, such as the elaboration likelihood model and

the theory of planned behavior. It also is important to consider whether everybody has the same mental renderings of abstraction and distance, or whether certain groups, such as youth, differ.

Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) highlights a continuum between two pathways of message processing: a central route that involves effortful consideration and a peripheral route that relies on heuristics and automatic processing (Petty & Cacioppo, 1986). The model holds that when an individual is motivated and capable of elaborating on an argument, a more effortful approach will be taken. Scholars have distinguished between construal level theory and the ELM by claiming a high construal level orientation does not represent a less effortful form of processing (Fujita et al., 2008; Trope & Liberman, 2010). They have noted that prior work has not found a difference in effort or involvement between a high and a low construal level and that it is possible to elaborate at both a high and low construal level (Fujita et al., 2008; Trope & Liberman, 2010).

However, as noted above, construal level congruence leads to more fluent processing, which appears to be less effortful. For example, novices relied upon the *feels correct effect*, while experts were found to consider the issues more carefully (Kim et al., 2009). We might consider, therefore, that construal level congruence can facilitate less deliberative decisions that might map onto the ELM's peripheral route. Furthermore, it is possible that processing has to be more effortful in order for a message to have an induced congruent representation. Future research should be conducted to test these ideas, and to further investigate the relationship between construal level theory and the elaboration likelihood model.

The Theory of Planned Behavior

The theory of planned behavior states that efficacy, norms, and attitudes contribute to behavioral intentions (Ajzen, 1991; Fishbein & Yzer, 2003). Studies investigating the theory of planned behavior alongside construal level theory have highlighted efficacy as a low construal level concept, and norms and attitudes as high construal level concepts (Lutchyn and Yzer, 2011; Kovac and Rise, 2011). For example, individuals generated more efficacy statements at close temporal distance and more normative beliefs and attitudes at far temporal distance (Lutchyn and Yzer, 2011). In another study, participants' intentions to quit smoking in 6 months (far distance) were more highly correlated with value-oriented components of the theory of planned behavior (attitudes, norms) than participants' intentions to quit smoking in one month (close distance) (Kovac & Rise, 2011). These studies highlight that efficacy and perceived behavioral control are low construal level concepts that are means-oriented.

Youth Persuasion

Scholars have long considered how youth process persuasive messages differently than adults (Buijzen & Valkenburg, 2003; Valkenburg & Cantor, 2001; Wackman & Wartella, 1977). We may expect that the framework connecting construal level theory and persuasion will differ for youth. For example, scholars have noted that spatial distance is the only dimension of psychological distance that is perceptual (you can see it) (Williams & Bargh, 2008). Since young children are perceptually-bound in their understanding of the world, from a developmental perspective, this means that spatial distance was learned first (Wackman & Wartella, 1977). We might expect, therefore, that youth will not have the same integrated concept of psychological distance as adults. Furthermore, they are still developing the ability to think abstractly and this means that they are typically operating at a more concrete level and are unable to make the same connections between specific and abstract items as adults. Therefore, among other differences,

we might expect that linking messages will be less effective for youth. While the predictions proposed above are designed to guide exploration of construal level theory and persuasion for adults, an adjusted framework is necessary for considering these relationships among youth.

Research Agenda

Several areas of inquiry are necessary in order to achieve a disciplinary understanding of construal level theory from the perspective of the field of communication. First, the propositions in each chapter above should be directly tested. Chapter 2, Chapter 3, and Chapter 5 test key propositions from Chapter 1 and Chapter 4, but they only start the exploration. These propositions can be tested further, and they should be boundary-tested, to consider under which conditions they hold. There are so many different elements that can be studied, and these should be broken apart conceptually and tested iteratively.

That said, the theoretical models presented suggest real world implications, with the idea that these propositions can be integrated to improve the design and delivery of health interventions or mobile applications. There are a number of research-related factors associated with mobile applications that must be considered. For example, it is essential that the mobile device be utilized in ways that fully acknowledge its affordances. Furthermore, theoretical development in this area would be furthered if studies on mobile interventions reported data relevant to psychological distance, such as when a message was sent (temporal) and where the user was (spatial) upon receiving it. Currently, this information is not always reported. Additionally, mobile health interventions should capture meta-data for user-generated materials, including spatial and temporal information for messages and photos. Additionally, a system of common measures for mobile health research should be developed in order to further theoretical development in this area (Klasnja et al., 2011).

It is also important to draw upon what we already know about the study of persuasion. For example, as mentioned above, we can consider how construal level theory relates to other models of persuasion, including the ELM and the theory of planned behavior. Furthermore, we can consider how concepts associated with construal level theory are already being tested and then consider further theoretical interactions. For example, the variable of social distance is an important parameter in the study of social influence, and it is an important concept in the study of construal level theory. Therefore, we can think about what the literature says about social influence through the lens of construal level theory and consider possible interactions. And, then we can complicate this by asking whether psychological reactance is an issue when a socially close other uses more concrete language, rather than more abstract language. Extrapolating from the findings in Chapter 3, we have evidence to suggest this might be the case. This type of inquiry can be conducted for all of the specific concepts associated with construal level theory and all of the many ways that they are already being studied in research on persuasion and strategic communication.

Additionally, in future work, the role of distance, abstraction and motivation cues in messages should be investigated further. These are concepts that are of particular interest to communication scholars. Investigating message cues can extend the theoretical understanding beyond the scope of what those working in other fields, such as psychology, are doing. Some initial questions to consider are: To what extent does cue matching and cue congruence influence message effectiveness? How do message cue factors, such as the framing of the message, the credibility of the source, and the timing of message delivery, interact with the abstraction, distance and motivation cues in the message to influence persuasion? These questions just

scratch the surface of the many ways that we can think about message cues in regards to construal level theory.

Finally, there are two particular, and related, challenges associated with studying construal level theory that have been identified in this work. Future research should focus on addressing these in a thoughtful manner. First, as noted above, one of the common dependent variables used in prior work to measure cognitive abstraction, the behavioral identification form, was developed as and validated as a trait measure. We might question how rigorous this measure is as a dependent measure, and whether we might develop and validate other dependent measures. As shown in Chapter 2, coding open-ended responses using the Linguistic Category Model has the benefit of measuring how abstractly one is responding, however, it has the added challenge that participants must actually respond to something (either a prompt question or message), which might be further influencing them.

And that, of course, is the second challenge. Depending upon the manipulation of construal level orientation, the manipulation check might be very rigorous or very superficial. For example, the Freitas, et al (2004) why/ how manipulation and others based off of it, provide open-ended responses that can be coded using the linguistic category model, and therefore, are quite rigorous. On the other hand, manipulations based on the Navon (1977) composite letter tasks offer only a superficial manipulation check, such as whether or not the person accurately identified the letter. Future research should explore the concept of construal level orientation and consider how to validate more rigorous manipulation checks. For example, implicit measures, such as IAT and Stroop, have been used in the study of construal level theory, and these might offer interesting manipulation checks that future research can explore (Bar-anan et al., 2006, 2007).

As scholars embark on this research agenda, it is clear that construal level theory has the potential to change how we think about the study of persuasion, and the field of communication has unique contributions to make to construal level theory, which are likely to extend and transform the theory itself. The next section discusses an approach to future research.

A Visionary Approach

This dissertation starts my exploration on these topics, and outlines a complete research program that could easily take a lifetime to explore. Furthermore, each study brings answers, but also more questions. Therefore, this section architects a vision for how I will continue to approach this research program.

Applicable Theoretical Extensions

The first principle that will guide my future work is called applicable theoretical extensions. This means that with every study, I will ground my ideas in theory and work to make incremental theoretical extensions, while also thinking about the larger impact of the work. In other words, the goal will be that each project can have a sound broader impact statement that fits in line with my previous work and has a clear trajectory to future studies.

Centrality of the Field

The second principle guiding my research program is the assumption that the field of communication is central to the study of construal level theory. As mentioned above, it is very easy for scholars in communication to see themselves as working on a theory from psychology, however, one of the guiding principles of my research program will be to bring communication into the center. The theoretical extensions and vocabulary developed to explain construal level theory within our field should be adapted as canon, and scholars in other fields should cite our

work. Therefore, I will position my research program as operating from within the center of the literature, not the periphery.

The Theory is a Starting Point

The third principle that will guide my research program is the idea that theory is a starting point from which creative extension can occur. One challenge for scholars, especially newer scholars, is that they sometimes view a theory as a fixed set of concepts and relationships. They are afraid to break the theory apart and recreate it. However, I see theory as simply the starting point upon which we can continue to layer concepts and change relationships. This complexity can be tested and evaluated and reformulated to render the core of the theory changed. I will approach this research program with the perspective that theory is the starting point and I have the power to rework it.

This manuscript presented 6 chapters, including 8 experiments and 2 theoretical models that connect construal level theory to the study of persuasion. This work demonstrates that abstraction and distance are not static concepts; they are dynamic. Close can be linked to far and concrete can be linked to abstract in order to help us connect specific behavioral choices to long-term, abstract goals. I have only started to test the predicted relationships in this work, and I plan to continue this research program in the future.

References

Agrawal, N., & Wan, E. W. (2009). Regulating Risk or Risking Regulation? Construal Levels and Depletion Effects in the Processing of Health Messages. *Journal of Consumer Research*, *36*(3), 448–462. doi:10.1086/597331

Ainslie, G., & Herrnstein, R. J. (1981). Preference reversal and delayed reinforcement. *Animal Learning & Behavior*, *9*(4), 476–482.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.

Allison, P. D. (2012). *Logistic Regression Using SAS: Theory and Application*. Carey, N.C.: SAS Institute and Wiley.

Bar-anan, Y., Liberman, N., & Trope, Y. (2006). The Association Between Psychological Distance and Construal Level : Evidence From an Implicit Association Test. *Journal of Experimental Psychology*, *135*(4), 609 – 622. doi:10.1037/0096-3445.135.4.609

Bar-anan, Y., Liberman, N., Trope, Y., & Algom, D. (2007). Automatic Processing of Psychological Distance : Evidence From a Stroop Task. *Journal of Experimental Psychology*, *136*(4), 610 – 622. doi:10.1037/0096-3445.136.4.610

Batra, R., & Ray, M. L. (1986). Situational Effects of Advertising Repetition: The Moderating Influence of Motivation, Ability, and Opportunity to Respond. *Journal of Consumer Research, Inc.*, *12*(4), 432–445.

Benning, T. M., Breugelmans, E., & Dellaert, B. G. C. (2012). Consumers' evaluation of allocation policies for scarce health care services: Vested interest activation trumps spatial and temporal distance. *Marketing Letters*, *23*(3), 531–543. doi:10.1007/s11002-011-9158-x

Bewick, V., Cheek, L., & Ball, J. (2005). Statistics review 14: Logistic regression. *Critical Care*, *9*(1), 112–118. doi:doi:10.1186/cc3045

Brehm, J. W. (1966). *A Theory of Psychological Reactance*. New York, NY: Academic Press.

Brehm, S. S., & Brehm, J. W. (1981). *Psychological Reactance: A Theory of Freedom and Control*. New York: Academic Press.

Buijzen, M., & Valkenburg, P. M. (2003). The Unintended Effects of Television Advertising: A Parent-Child Survey. *Communication Research*, *30*(5), 483–503. doi:10.1177/0093650203256361

Buller, D. B., Burgoon, M., Hall, J. R., Levine, N., Taylor, A. M., Beach, B., … Melcher, C. (2000). Long-term effects of language intensity in preventive messages on planned family solar protection. *Health Communication*, *12*(3), 261–75. doi:10.1207/S15327027HC1203_03

Burgoon, M., Alvaro, E., Grandpre, J., & Voulodakis, M. (2002). Revisiting the theory of psychological reactance: Communicating threats to attitudinal freedom. In J. P. Dillard & M. Pfau (Eds.), *The Persuasion Handbook: Developments in Theory and Practice* (pp. 213–227). London: Sage Publications.

Byrne, S., & Hart, P. S. (2009). The boomerang effect: a synthesis of findings and a preliminary theoretical framework. In *Communication Yearbook*. New York: Routledge, Taylor and Francis Group.

Carrera, P., Caballero, A., Muñoz, D., González-Iraizoz, M., & Fernández, I. (2014). Construal level as a moderator of the role of affective and cognitive attitudes in the prediction of health-risk behavioural intentions. *The British Journal of Social Psychology / the British Psychological Society*, 1–19. doi:10.1111/bjso.12058

Carrera, P., Muñoz, D., Caballero, A., Fernández, I., & Albarracín, D. (2012). The present projects past behavior into the future while the past projects attitudes into the future: How verb tense moderates predictors of drinking intentions. *Journal of Experimental Social Psychology*, *48*(5), 1196–1200. doi:10.1016/j.jesp.2012.04.001

Chen, F., Hekler, E., Hu, J., Li, S., & Zhao, C. (2011). Designing for context-aware health self-monitoring, feedback, and engagement. *... of the ACM 2011 Conference on ...*, 1–4. Retrieved from http://dl.acm.org/citation.cfm?id=1958927

Chiou, W.-B., Wu, W.-H., & Chang, M.-H. (2013). Think abstractly, smoke less: a brief construal-level intervention can promote self-control, leading to reduced cigarette consumption among current smokers. *Addiction (Abingdon, England)*, *108*(5), 985–92. doi:10.1111/add.12100

Cho, H., & Salmon, C. T. (2007). Unintended Effects of Health Communication Campaigns. *Journal of Communication*, *57*(2), 293–317. doi:10.1111/j.1460-2466.2007.00344.x

Chou, H., & Lien, N. (2011). The effects of incentive types and appeal regulatory framing in travel advertising. *Service Industries Journal*, (September 2012), 37–41.

Churchill, S., Good, A., & Pavey, L. (2014). Promoting the avoidance of high-calorie snacks: the role of temporal message framing and eating self-efficacy. *Appetite*, *80*, 131–136. doi:10.1016/j.appet.2014.05.008

Clark, a. E., & Semin, G. R. (2008). Receivers' Expectations for Abstract Versus Concrete Construal: Conversational Relevance as a Determinant of Construal Level. *Journal of Language and Social Psychology*, *27*(2), 155–167. doi:10.1177/0261927X07313645

Clee, M. A., & Wicklund, R. A. (1980). Consumer Behavior and Psychological Reactance. *Journal of Consumer Research*, *6*(4), 389–405.

Coenen, L. H. M., Hedebouw, L., & Semin, G. R. (2006). *The Linguistic Category Model (LCM)*.

Csikszentmihalyi, M., & Larson, R. (1983). The Experience Sampling Method. *New Directions for Methodology of Social and Behavioral Sciences*, *15*, 41–56.

Cumisky, K. M. (2011). Mobile Symbiosis: A Precursor to Public Risk-Taking Behavior? In R. Ling & S. W. Campbell (Eds.), *Mobile Communication: Bringing us together, tearing us apart*. New Brunswick, NJ: Transaction Publishers.

Day, S., & Bartels, D. (2006). Representation across time: generalizing temporal effects on perceived similarity. In *28th Annual Conference of the Cognitive Science Society* (pp. 1204–1209). Vancouver. Retrieved from http://csjarchive.cogsci.rpi.edu/Proceedings/2006/docs/p1204.pdf

Dhar, R., & Kim, E. (2007). Seeing the Forest or the Trees: Implications of Construal Level Theory for Consumer Choice. *Journal of Consumer Psychology*, *17*(2), 96–100. doi:10.1016/S1057-7408(07)70014-1

Dillard, J. P., & Shen, L. (2005). On the Nature of Reactance and its Role in Persuasive Health Communication. *Communication Monographs*, *72*(2), 144–168. doi:10.1080/03637750500111815

Elliott, W., Rennekamp, K., & White, B. (2014). Does Concrete Language in Disclosures Increase Willingness to Invest? *Available at SSRN 2430504*. Retrieved from http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2430504

Eyal, T., & Epley, N. (2010). How to seem telepathic: enabling mind reading by matching construal. *Psychological Science*, *21*(5), 700–5. doi:10.1177/0956797610367754

Fiedler, K. (2007). Construal Level Theory as an Integrative Framework for Behavioral Decision-Making Research and Consumer Psychology. *Memory*, *17*(2), 101–106.

Fiedler, K. (2008). The Implicit Meta-Theory That Has Inspired and Restricted LCM Research: Why Some Studies Were Conducted but Others Not. *Journal of Language and Social Psychology*, *27*(2), 182–196. doi:10.1177/0261927X07313656

Fiedler, K., & Mata, A. (2012). The art of exerting verbal influence through powerful lexical stimuli. *Small Group Meeting on Social Cognition and Communication*, 1–33. Retrieved from http://www.sydneysymposium.unsw.edu.au/2012/chapters/FiedlerEASP2012.pdf

Fishbach, A., & Ferguson, M. J. (2007). The Goal Construct in Social Psychology. In A. W. Kruglanski & T. E. Higgins (Eds.), *Social Psychology: Handbook of Basic Principles* (pp. 1–78).

Fishbach, A., & Trope, Y. (2005). The substitutability of external control and self-control. *Journal of Experimental Social Psychology*, *41*(3), 256–270. doi:10.1016/j.jesp.2004.07.002

Fishbach, A., Zhang, Y., & Trope, Y. (2010). Counteractive evaluation: Asymmetric shifts in the implicit value of conflicting motivations. *Journal of Experimental Social Psychology*, *46*(1), 29–38. doi:10.1016/j.jesp.2009.09.008

Fishbein, M., & Yzer, M. C. (2003). Using Theory to Design Effective Health Behavior Interventions. *Communication Theory*, *13*(2), 164–183. doi:10.1111/j.1468-2885.2003.tb00287.x

Fogg, B. J. (2007). *Mobile Persuasion: 20 Perspectives of the Future of Behavior Change*. (B. Fogg, Ed.). Stanford: Stanford Captology Media.

Förster, J., & Higgins, E. T. (2005). How global versus local perception fits regulatory focus. *Psychological Science*, *16*(8), 631–6. doi:10.1111/j.1467-9280.2005.01586.x

Freitas, A. L., Clark, S. L., Kim, J. Y., & Levy, S. R. (2009). Action-construal levels and perceived conflict among ongoing goals: Implications for positive affect. *Journal of Research in Personality*, *43*(5), 938–941. doi:10.1016/j.jrp.2009.05.006

Freitas, A. L., Gollwitzer, P., & Trope, Y. (2004). The influence of abstract and concrete mindsets on anticipating and guiding others' self-regulatory efforts. *Journal of Experimental Social Psychology*, *40*(6), 739–752. doi:10.1016/j.jesp.2004.04.003

Freitas, A. L., Langsam, K. L., Clark, S., & Moeller, S. J. (2008). Seeing oneself in one's choices: Construal level and self-pertinence of electoral and consumer decisions. *Journal of Experimental Social Psychology*, *44*(4), 1174–1179. doi:10.1016/j.jesp.2008.02.011

Freling, T. H., Vincent, L. H., & Henard, D. H. (2014). When not to accentuate the positive: Re-examining valence effects in attribute framing. *Organizational Behavior and Human Decision Processes*, *124*(2), 95–109. doi:10.1016/j.obhdp.2013.12.007

Fujita, K., & Carnevale, J. J. (2012). Transcending Temptation Through Abstraction: The Role of Construal Level in Self-Control. *Current Directions in Psychological Science*, *21*(4), 248–252. doi:10.1177/0963721412449169

Fujita, K., Eyal, T., Chaiken, S., Trope, Y., & Liberman, N. (2008). Influencing Attitudes Toward Near and Distant Objects. *Journal of Experimental Social Psychology*, *227*(21), 9044–9062. doi:10.1016/j.jesp.2007.10.005

Fujita, K., & Han, H. A. (2009). Moving beyond deliberative control of impulses: the effect of construal levels on evaluative associations in self-control conflicts. *Psychological Science*, *20*(7), 799–804. doi:10.1111/j.1467-9280.2009.02372.x

Fujita, K., Henderson, M. D., Eng, J., Trope, Y., & Liberman, N. (2006). Spatial distance and mental construal of social events. *Psychological Science*, *17*(4), 278–82. doi:10.1111/j.1467-9280.2006.01698.x

Fujita, K., & Roberts, J. C. (2010). Promoting prospective self-control through abstraction. *Journal of Experimental Social Psychology*, *46*(6), 1049–1054. Retrieved from http://www.sciencedirect.com/science/article/pii/S0022103110001290

Fujita, K., & Sasota, J. A. (2011). The effects of construal level on asymmetric temptation-goal cognitive associations, *29*(2), 125–146.

Fujita, K., Trope, Y., Liberman, N., & Levin-Sagi, M. (2006). Construal levels and self-control. *Journal of Personality and Social Psychology*, *90*(3), 351–67. doi:10.1037/0022-3514.90.3.351

Gay, G. (2009). *Context-Aware Mobile Computing: Affordances of Space, Social Awareness, and Social Influence*. *Synthesis Lectures on Human-Centered Informatics* (Vol. 2, pp. 1–62). doi:10.2200/S00135ED1V01Y200905HCI004

Gilbert, D. T., Lieberman, M. D., Morewedge, C. K., & Wilson, T. D. (2004). The Peculiar Longevity of Things Not So Bad. *Psychological Science*, *15*(1), 14–19. doi:10.1111/j.0963-7214.2004.01501003.x

Gollwitzer, P. M. (1999). Implementation Intentions. *American Psychologist*, *54*(7), 493–503.

Gollwitzer, P. M., & Brandstatter, V. (1997). Implementation Intentions and Effective Goal Pursuit. *Journal of Personality and Social Psychology*, *73*(1), 186–199.

Gray, & Kinnear. (2012). *IBM SPSS Statistics 19 Made Simple*. New York, NY: Psychology Press.

Hansen, J., & Wänke, M. (2010). Truth from language and truth from fit: the impact of linguistic concreteness and level of construal on subjective truth. *Personality & Social Psychology Bulletin*, *36*(11), 1576–88. doi:10.1177/0146167210386238

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Communication Monographs*, *76*(4), 408–420. doi:10.1080/03637750903310360

Holland, R. W., Aarts, H., & Langendam, D. (2006). Breaking and creating habits on the working floor: A field-experiment on the power of implementation intentions. *Journal of Experimental Social Psychology*, *42*(6), 776–783. doi:10.1016/j.jesp.2005.11.006

Hong, S.-M., & Faedda, S. (1996). Refinement of the Hong Psychological Reactance Scale. *Educational and Psychological Measurement*, *56*(1), 173–182. doi:10.1177/0013164496056001014

Humphreys, L. (2005). Cellphones in public: social interactions in a wireless era. *New Media & Society*, *7*(6), 810–833. doi:10.1177/1461444805058164

Humphreys, L. (2007). Mobile Social Networks and Social Practice : A Case Study of Dodgeball Mobile Social Networks and Social Practice : A Case Study of Dodgeball Mobile Social Networks and Social Practice : A Case Study of Dodgeball, *13*, 1–19.

Humphreys, L., Von Pape, T., & Karnowski, V. (n.d.). Evolving mobile media ecology: Uses and conceptualizations of the mobile Internet by American and German college students. *Journal of Computer-Mediated Communication*, *18*(3).

Ijzerman, H., & Semin, G. R. (2009). The thermometer of social relations: mapping social proximity on temperature. *Psychological Science*, *20*(10), 1214–20. doi:10.1111/j.1467-9280.2009.02434.x

Ito, M., Okabe, D., & Anderson, K. (2009). Portable Objects in Three Global Cities: The Personalization of Urban Spaces. In R. Ling & S. W. Campbell (Eds.), *The Reconstruction of Space and Time: Mobile Communication Practices2* (pp. 67–88). New Brunswick, NJ: Transaction Publishers.

Katz, J. E., & Aakhus, M. (2002). *Perpetual Contact*. (J. E. Katz & M. Aakhus, Eds.). Cambridge, MA: Cambridge University Press.

Katz, S. J. (2013). Construal Level Theory and Psychological Reactance Theory: A Test of Theoretical Interactions and their Influence on Message Salience and Message Effectiveness. In *International Communication Association2*. London, United Kingdom.

Katz, S. J., Byrne, S., & Kent, A. I. (2012). Re-construing Reactance: A Test of Theoretical Interactions Between Construal Level Theory and Psychological Reactance Theory. In *National Communication Association*. Orlando, FL.

Kees, J. (2010). Temporal framing in health advertising: The role of risk and future orientation. *Journal of Current Issues and Research in Advertising*, *32*(1), 33–46.

Kim, H., & John, D. R. (2008). Consumer response to brand extensions: Construal level as a moderator of the importance of perceived fit. *Journal of Consumer Psychology*, *18*(2), 116–126. doi:10.1016/j.jcps.2008.01.006

Kim, H., Rao, A. R., & Lee, A. Y. (2009). It's Time to Vote: The Effect of Matching Message Orientation and Temporal Frame on Political Persuasion. *Journal of Consumer Research*, *35*(6), 877–889. doi:10.1086/593700

Kim, K., Zhang, M., & Li, X. (2008). Effects of Temporal and Social Distance on Consumer Evaluations. *Journal of Consumer Research*, *35*(4), 706–713. doi:10.1086/592131

Klasnja, P., Consolvo, S., & Pratt, W. (2011). How to Evaluate Technologies for Health Behavior Change in HCI Research. In *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems* (pp. 3063–3072).

Kovac, V. B., & Rise, J. (2011). Predicting the intention to quit smoking in a norwegian sample: an extended theory of planned behaviour in light of construal level theory. *Nordic Psychology*, *63*(3), 68–82.

Kreps, G. L., & Neuhauser, L. (2010). New directions in eHealth communication: opportunities and challenges. *Patient Education and Counseling*, *78*(3), 329–36. doi:10.1016/j.pec.2010.01.013

Krüger, T., Fiedler, K., Koch, A. S., & Alves, H. (2014). Response category width as a psychophysical manifestation of construal level and distance. *Personality & Social Psychology Bulletin*, *40*(4), 501–12. doi:10.1177/0146167213517009

Latham, G. P., & Locke, E. A. (1991). Self-Regulation through Goal Setting. *Organizational Behavior and Human Decision Processes*, *50*, 212–247.

Ledgerwood, A., Wakslak, C. J., & Wang, M. A. (2010). Differential information use for near and distant decisions. *Journal of Experimental Social Psychology*, *46*(4), 638–642. doi:10.1016/j.jesp.2010.03.001

Lee, A. Y., Keller, P. A., & Sternthal, B. (2010). Value from Regulatory Construal Fit: The Persuasive Impact of Fit between Consumer Goals and Message Concreteness. *Journal of Consumer Research*, *36*(5), 735–747. doi:10.1086/605591

Lee, M., Kiesler, S., & Forlizzi, J. (2011). Mining behavioral economics to design persuasive technology for healthy choices. *Proceedings of the ACM 2011 Annual Conference on*

Human Factors in Computing Systems, 325–334. Retrieved from http://dl.acm.org/citation.cfm?id=1978989

Lee, S., & Oh, H. (2013). Effective Communication Strategies for Hotel Guests' Green Behavior. *Cornell Hospitality Quarterly*, *55*(1), 52–63. doi:10.1177/1938965513504029

Lee, Y. (2010). The effects of mental construal and perceived risk in response to loss-versus gain-framed health-related messages. In M. K. Brady & M. D. Hartline (Eds.), *Marketing Theory and Applications* (Vol. 21).

Levy, S. R., Freitas, A. L., & Salovey, P. (2002). Construing action abstractly and blurring social distinctions: Implications for perceiving homogeneity among, but also empathizing with and helping, others. *Journal of Personality and Social Psychology*, *83*(5), 1224–1238. doi:10.1037//0022-3514.83.5.1224

Liberman, N., & Förster, J. (2009). Distancing from experienced self: how global-versus-local perception affects estimation of psychological distance. *Journal of Personality and Social Psychology*, *97*(2), 203–16. doi:10.1037/a0015671

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, *75*(1), 5–18. Retrieved from http://psycnet.apa.org/?fa=main.doiLanding&doi=10.1037/0022-3514.75.1.5

Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science (New York, N.Y.)*, *322*(5905), 1201–5. doi:10.1126/science.1161958

Liberman, N., Trope, Y., Mccrea, S., & Sherman, S. (2007). The effect of level of construal on the temporal distance of activity enactment. *Journal of Experimental Social Psychology*, *43*(1), 143–149. doi:10.1016/j.jesp.2005.12.009

Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal Level Theory and Consumer Behavior. *Journal of Consumer Psychology*, *17*(2), 113–117. doi:10.1016/S1057-7408(07)70017-7

Light, A. (2009). Negotiations in Space: The Impact of Receiving Phone Calls on the Move. In R. Ling & S. W. Campbell (Eds.), *The Reconstruction of Space and Time: Mobile Communication Practices* (pp. 191–214). New Brunswick, NJ: Transaction Publishers.

Ling, R. (2008a). *New Tech, New Ties: How Mobile Communication is Reshaping Social Cohesion*. Cambridge, MA: The MIT Press.

Ling, R. (2008b). Taken for granted: the infusion of the mobile phone in society. *Interactions*, *November/D*, 55–58. Retrieved from http://dl.acm.org/citation.cfm?id=1409054

Ling, R., & Campbell, S. W. (2009). Introduction: The Reconstruction of Space and Time: Mobile Communication Practices. In R. Ling & S. W. Campbell (Eds.), *The Reconstruction of Space and Time: Mobile Communication Practices* (pp. 1–16). New Brunswick, NJ: Transaction Publishers.

Locke, E. A., & Latham, G. P. (2006). New Directions in Goal-Setting Theory. *Current Directions in Psychological Science*, *15*(5), 265–268. doi:10.1111/j.1467-8721.2006.00449.x

Lutchyn, Y., & Yzer, M. (2011). Construal level theory and theory of planned behavior: time frame effects on salient belief generation. *Journal of Health Communication*, *16*(6), 595–606. doi:10.1080/10810730.2011.551991

McCrea, S. M., Liberman, N., Trope, Y., & Sherman, S. J. (2008). Construal level and procrastination. *Psychological Science*, *19*(12), 1308–14. doi:10.1111/j.1467-9280.2008.02240.x

Menegatti, M., & Rubini, M. (2013). Convincing similar and dissimilar others: the power of language abstraction in political communication. *Personality & Social Psychology Bulletin*, *39*(5), 596–607. doi:10.1177/0146167213479404

Miller, C. H., Lane, L. T., Deatrick, L. M., Young, A. M., & Potts, K. a. (2007). Psychological Reactance and Promotional Health Messages: The Effects of Controlling Language, Lexical Concreteness, and the Restoration of Freedom. *Human Communication Research*, *33*(2), 219–240. doi:10.1111/j.1468-2958.2007.00297.x

Miller, G. (2012). The Smartphone Psychology Manifesto. *Perspectives on Psychological Science*, *7*(3), 221–237. doi:10.1177/1745691612441215

Moyer-Guse, E. (2008). Toward a Theory of Entertainment Persuasion : Explaining the Persuasive Effects of Entertainment-Education Messages. *Communication Theory*, *18*, 407–425. doi:10.1111/j.1468-2885.2008.00328.x

Myrseth, K. O. R., Fishbach, A., & Trope, Y. (2009). Counteractive Self-Control: When Making Temptation Available Makes Temptation Less Tempting. *Psychological Science*, 1–5.

Nan, X. (2007). Social Distance, Framing, and Judgment: A Construal Level Perspective. *Human Communication Research*, *33*(4), 489–514. doi:10.1111/j.1468-2958.2007.00309.x

Navon, D. (1977). Forest Before Trees: The Precedence of Global Features in Visual Perception. *Cognitive Psychology*, *9*, 353–383.

Park, H., Lee, H., & Song, J. A. N. (2005). "I Am Sorry to Send You SPAM." *Human Communication Research*, *31*(3), 365–398.

Petty, R. E., & Cacioppo, J. T. (1986). The Elaboration Likelihood Model of Persuasion. *Advances in Experimental Social Psychology*, *19*, 123 – 162.

Pick-alony, R., Liberman, N., & Trope, Y. (2014). High Level of Construal and Psychological Distance Reduce Melioration. *Journal of Behavioral Decision Making*, *27*(4), 291–300. doi:10.1002/bdm

Pollak, J. P., Adams, P., & Gay, G. (2011). PAM : A Photographic Affect Meter for Frequent , In Situ Measurement of Affect. *Proceedings of the 29th ACM SIGCHI Conference on Human Factors in Computing Systems*, 725–734.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. doi:10.3758/BRM.40.3.879

Quick, B. L., & Bates, B. R. (2010). The use of gain- or loss-frame messages and efficacy appeals to dissuade excessive alcohol consumption among college students: a test of psychological reactance theory. *Journal of Health Communication*, *15*(6), 603–28. doi:10.1080/10810730.2010.499593

Quick, B. L., Scott, A. M., & Ledbetter, A. M. (2011). A close examination of trait reactance and issue involvement as moderators of psychological reactance theory. *Journal of Health Communication*, *16*(6), 660–79. doi:10.1080/10810730.2011.551989

Quick, B. L., & Stephenson, M. T. (2007). Further Evidence That Psychological Reactance Can Be Modeled as a Combination of Anger and Negative Cognitions. *Communication Research*, *34*(3), 255–276. doi:10.1177/0093650207300427

Quick, B. L., & Stephenson, M. T. (2008). Examining the Role of Trait Reactance and Sensation Seeking on Perceived Threat, State Reactance, and Reactance Restoration. *Human Communication Research*, *34*(3), 448–476. doi:10.1111/j.1468-2958.2008.00328.x

Rains, S. a., & Turner, M. M. (2007). Psychological Reactance and Persuasive Health Communication: A Test and Extension of the Intertwined Model. *Human Communication Research*, *33*(2), 241–269. doi:10.1111/j.1468-2958.2007.00298.x

Sanna, L. J., Lundberg, K. B., Parks, C. D., & Chang, E. C. (2010). Think and act globally, think and act locally: Cooperation depends on matching construal to action levels in social dilemmas. *Journal of Experimental Social Psychology*, *46*(6), 1126–1129. doi:10.1016/j.jesp.2010.05.018

Scannell, L., & Gifford, R. (2011). Personally Relevant Climate Change: The Role of Place Attachment and Local Versus Global Message Framing in Engagement. *Environment and Behavior*, *45*(1), 60–85. doi:10.1177/0013916511421196

Schmeichel, B. J., & Vohs, K. (2009). Self-affirmation and self-control: affirming core values counteracts ego depletion. *Journal of Personality and Social Psychology*, *96*(4), 770–82. doi:10.1037/a0014635

Shen, L. (2010). Mitigating Psychological Reactance: The Role of Message-Induced Empathy in Persuasion. *Human Communication Research*, *36*(3), 397–422. doi:10.1111/j.1468-2958.2010.01381.x

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological Momentary Assessment. *Annual Review of Clinical Psychology*, *4*, 1–32.

Silvera, D. H., Pfeiffer, B. E., Kardes, F. R., Arsena, A., & Justin Goss, R. (2014). Using imagine instructions to induce consumers to generate ad-supporting content. *Journal of Business Research*, *67*(7), 1567–1572. doi:10.1016/j.jbusres.2014.01.017

So, J., & Nabi, R. (2013). Reduction of Perceived Social Distance as an Explanation for Media's Influence on Personal Risk Perceptions: A Test of the Risk Convergence Model. *Human Communication Research*, *39*(3), 317–338. doi:10.1111/hcre.12005

Steinhart, Y., Carmon, Z., & Trope, Y. (2013). Warnings of adverse side effects can backfire over time. *Psychological Science*, *24*(9), 1842–7. doi:10.1177/0956797613478948

Steinhart, Y., Mazursky, D., & Kamins, M. a. (2013). The "Temporal-Processing-Fit Effect": The Interplay Between Regulatory State, Temporal Distance, and Construal Levels. *Social Cognition*, *31*(3), 315–335. doi:10.1521/soco.2013.31.3.315

Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology*, *66*, 742–752.

Tabashnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (Fifth Edit., pp. 243–310). New York, NY: Pearson.

Talke, K., & Snelders, D. (2013). Information in Launch Messages: Stimulating the Adoption of New High-Tech Consumer Products. *Journal of Product Innovation Management*, *30*(4), 732–749. doi:10.1111/jpim.12017

Thackeray, R., & Hunter, M. (2010). Empowering Youth: Use of Technology in Advocacy to Affect Social Change. *Journal of Computer-Mediated Communication*, *15*(4), 575–591. doi:10.1111/j.1083-6101.2009.01503.x

Thulin, E., & Vilhelmson, B. (2009). Mobile Phones: Transforming the Everyday Social Communication Practice of Urban Youth. In R. Ling & S. W. Campbell (Eds.), *The Reconstruction of Space and Time: Mobile Communication Practices* (pp. 137–158). New Brunswick, NJ: Transaction Publishers.

Trope, Y., & Fishbach, A. (2000). Counteractive Self-Control in Overcoming Temptation. *Journal of Personality and Social Psychology*, *79*(4), 493–506.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*(3), 403–421. doi:10.1037/0033-295X.110.3.403

Trope, Y., & Liberman, N. (2010). Construal-Level Theory of Psychological Distance. *Psychological Review*, *117*(2), 440 – 463. doi:10.1037/a0018963

Valkenburg, P. M., & Cantor, J. (2001). The development of a child into a consumer. *Journal of Applied Developmental Psychology*, *22*(1), 61–72. doi:10.1016/S0193-3973(00)00066-6

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, (57), 660 – 671. Retrieved from http://psycnet.apa.org/journals/psp/57/4/660/

Vallacher, R.R. & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review*, *94*(1), 3–15.

Van Ginkel-Bieshaar, M. N. G. (2012). *The Impact of Abstract versus Concrete Product Communications on Consumer Decision-making Processes*. Erasmus Universiteit Rotterdam.

Wackman, D. B., & Wartella, E. (1977). A Review of Cognitive Development Theory and Research and the Implication for Research On Children's Responses To Television. *Communication Research*, *4*(2), 203–224. doi:10.1177/009365027700400205

Wakslak, C. J. (2012). The experience of cognitive dissonance in important and trivial domains: A Construal-Level Theory approach. *Journal of Experimental Social Psychology*, 1–4. doi:10.1016/j.jesp.2012.05.011

Wakslak, C. J., Nussbaum, S., Liberman, N., & Trope, Y. (2008). Representations of the self in the near and distant future. *Journal of Personality and Social Psychology*, *95*(4), 757–73. doi:10.1037/a0012939

Wakslak, C. J., & Trope, Y. (2009). Cognitive consequences of affirming the self: The relationship between self-affirmation and object construal. *Journal of Experimental Social Psychology*, *45*(4), 927–932. doi:10.1016/j.jesp.2009.05.002

Wakslak, C. J., & Trope, Y. (2009). The effect of construal level on subjective probability estimates. *Psychological Science*, *20*(1), 52–8. doi:10.1111/j.1467-9280.2008.02250.x

White, K., Macdonnell, R., & Dahl, D. W. (2011). It's the Mind-Set That Matters : The Role of Construal Level and Message Framing in Influencing Consumer Efficacy and Conservation Behaviors. *Journal of Marketing Research*, *XLVIII*(June), 472–485.

Whittaker, R., Dorey, E., Bramley, D., Bullen, C., Denny, S., Elley, C. R., … Salmon, P. (2011). A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. *Journal of Medical Internet Research*, *13*(1), 1–9. doi:10.2196/jmir.1553

Wicklund, R. A. (1974). *Freedom and Reactance*. Potomac, MD: Lawrence Erlbaum Associates, Publishers.

Williams, L. E., & Bargh, J. A. (2008). Keeping One's Distance: The Influence of Spatial Distance Cues on Affect and Evaluation. *Psychological Science*, *19*(3), 302–308. doi:10.1111/j.1467-9280.2008.02084.x.Keeping

Wright, S., Manolis, C., Brown, D., Guo, X., Dinsmore, J., Chiu, C.-Y. P., & Kardes, F. R. (2011). Construal-level mind-sets and the perceived validity of marketing claims. *Marketing Letters*, *23*(1), 253–261. doi:10.1007/s11002-011-9151-4

Yan, D., & Sengupta, J. (2012). The Influence of Base Rate and Case Information on Health-Risk Perceptions : A Unified Model of Self-Positivity and. *Journal of Consumer Research*, 0–17. doi:10.1086/666596

Zhao, M., & Xie, J. (2011). Effects of Social and Temporal Distance on Consumers' Responses to Peer Recommendations. *Journal of Marketing Research*, *48*(3), 486 –496.

Zhao, X., & Nan, X. (2010). Influence of Self-Affirmation on Responses to Gain- Versus Loss-Framed Antismoking Messages. *Human Communication Research*, *36*(4), 493–511. doi:10.1111/j.1468-2958.2010.01385.x

Figure 1. Pathways to Message Effectiveness, Chapter 1, Propositions 1- 6

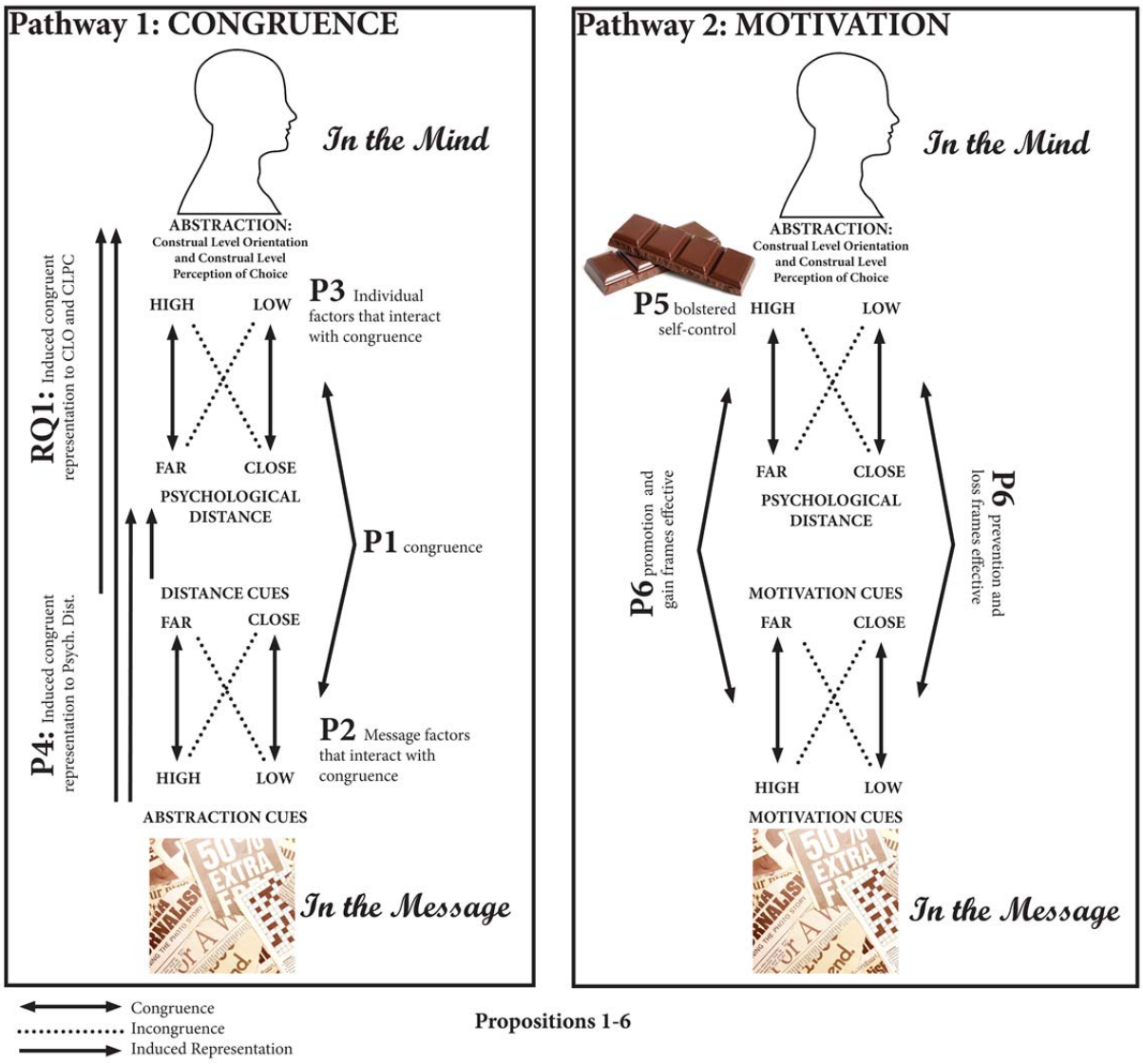


Figure 2. Diagram of Linking Messages, Chapter 1, Proposition 7

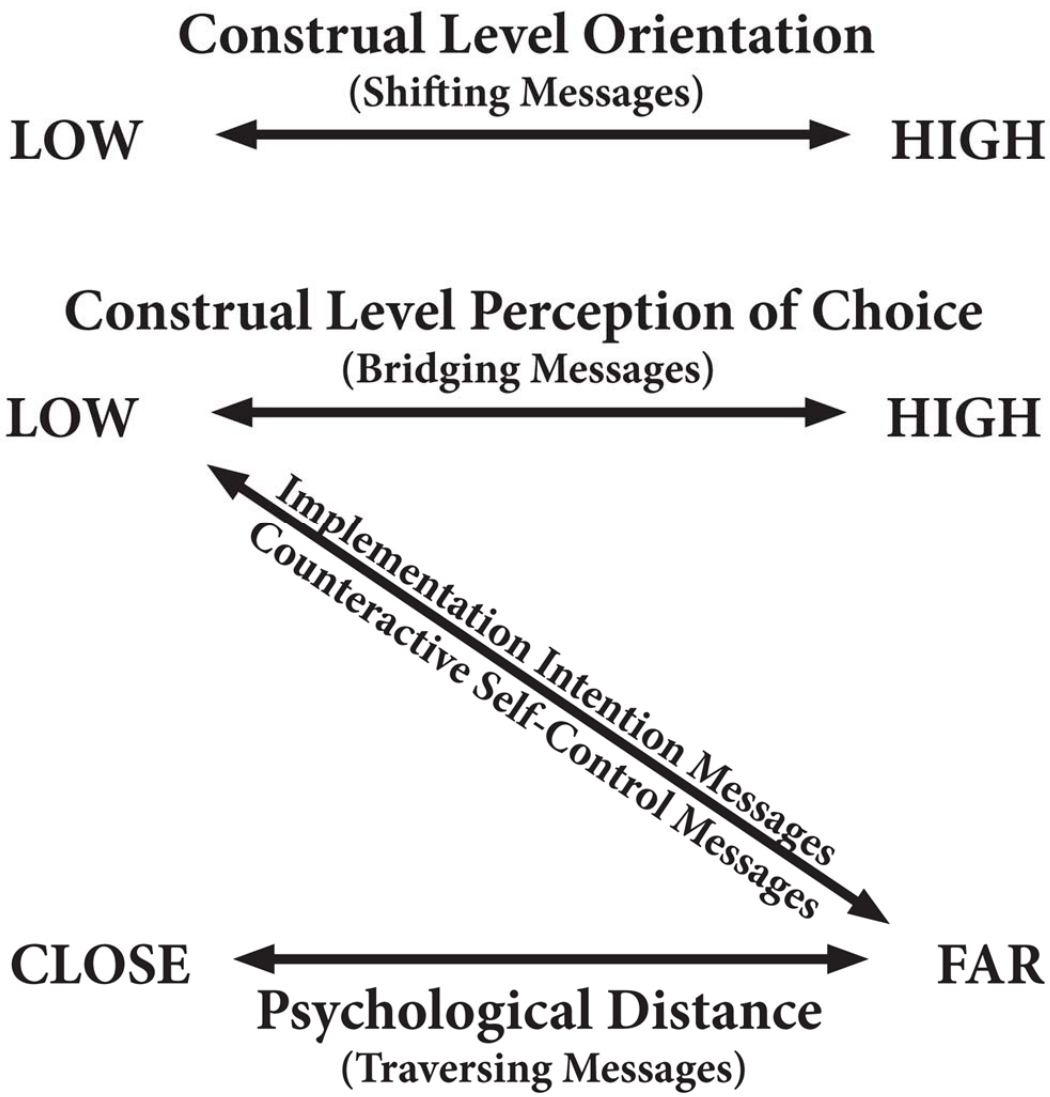


Figure 3. Model of integrated and induced processing, Chapter 2

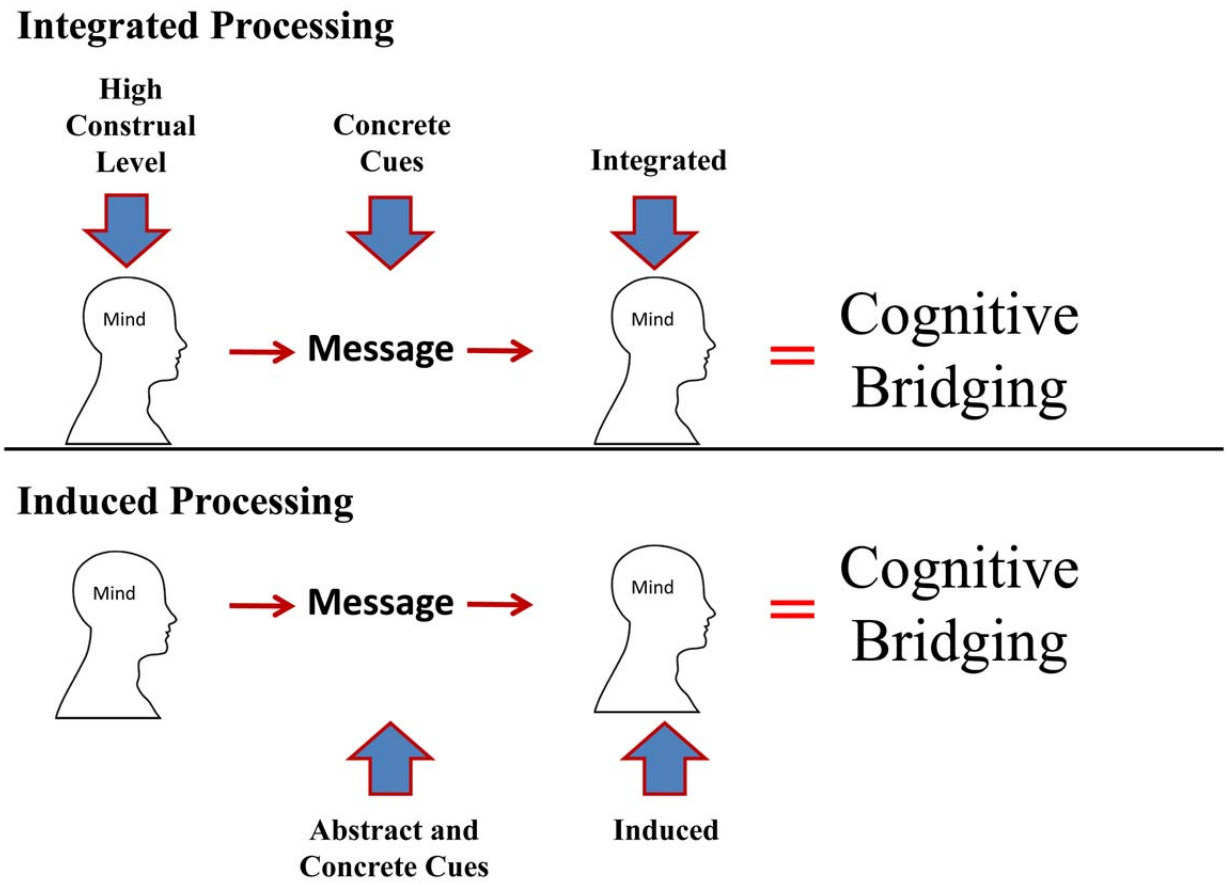


Figure 4. Likelihood of producing cognitive bridging outputs in comparison to non-bridging reference group, Chapter 2 - Study 1 and Study 2 (H1a, H1b)

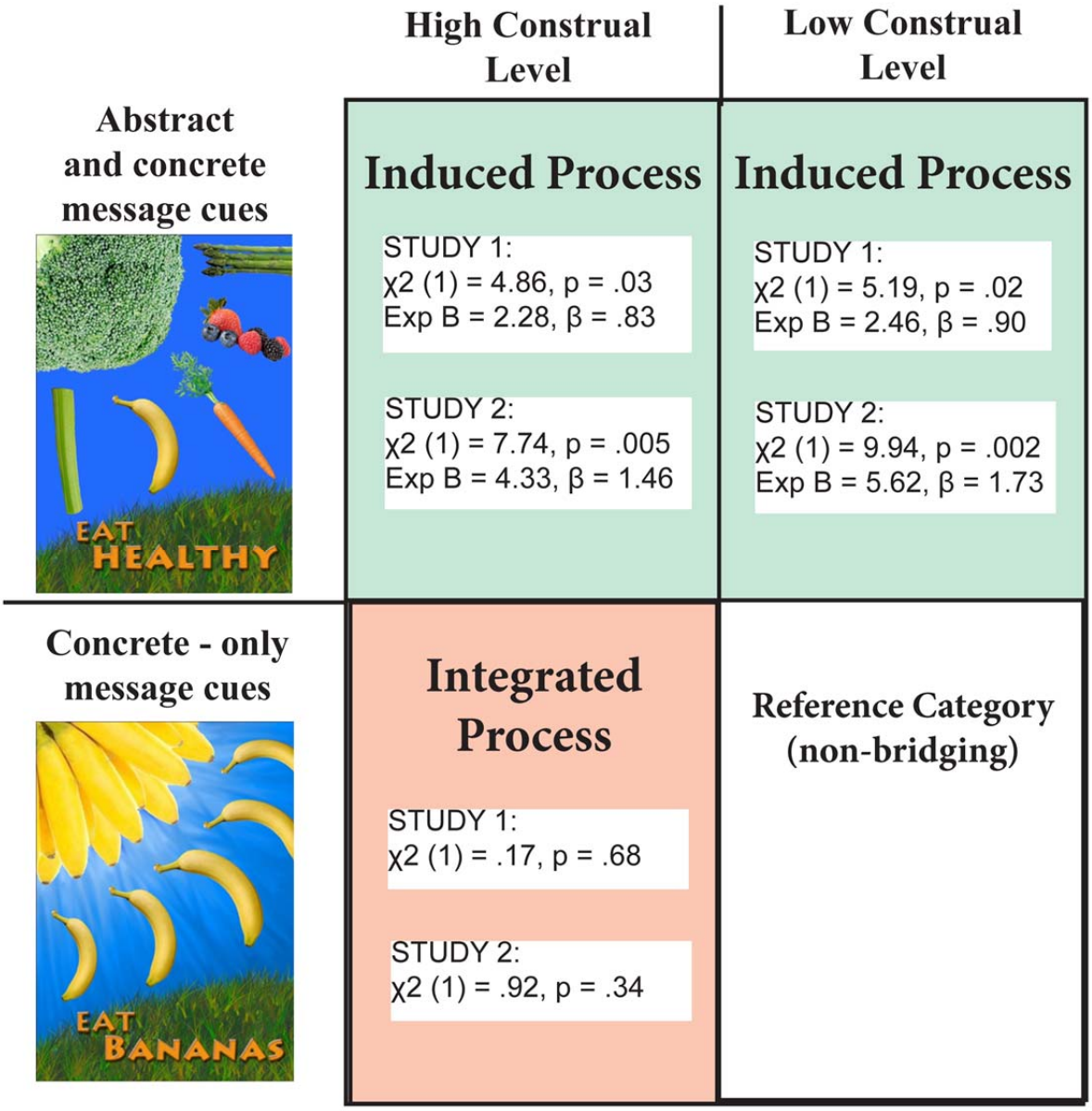


Table 1. Means and standard deviations for message affinity and importance (H3a, H3b) and LCM abstraction scores (H4a, H4b), Chapter 2 - Study 1, 2, 3

	STUDY 1						STUDY 2						STUDY 3					
	Message Affinity		Message Importance		LCM Abstraction		Message Affinity		Message Importance		LCM Abstraction		Message Affinity		Message Importance		LCM Abstraction	
	M	*S.D.*	*M.*	*S.D.*	*M.*	*S.D.*	*M*	*S.D.*	*M.*	*S.D.*	*M.*	*S.D.*	*M*	*S.D.*	*M.*	*S.D.*	*M.*	*S.D.*
Low Construal Level Orientation, Concrete-only Message Cues (Reference Group)	3.24	0.93	3.06	0.90	2.01	0.76	3.18	0.87	3.00	0.99	1.97	0.71	3.90	0.88	3.70	0.68	2.40	0.49
High Construal Level Orientation, Concrete-only Message Cues (Integrated Bridging)	3.28	0.91	3.14	0.84	2.04	0.70	3.26	0.97	3.21	0.86	2.18	1.03	3.50	0.91	3.17	0.72	2.45	0.76
Low Construal Level Orientation, Abstract and Concrete Message Cues (Induced Bridging)	3.03	0.94	3.69	0.82	2.34	0.59	3.23	1.06	3.49	0.89	2.55	0.51	2.95	1.12	3.76	0.89	2.89	0.74
High Construal Level Orientation, Abstract and Concrete Message Cues (Induced Bridging)	3.06	0.98	3.68	1.01	2.62	0.60	2.84	0.96	2.97	0.96	2.37	0.52	3.22	0.97	3.89	0.60	2.66	0.45
Low Construal Level Orientation, Abstract and Concrete Message Cues, New Message (Induced Bridging)													3.30	0.92	3.65	0.75	2.87	0.49
High Construal Level Orientation, Abstract and Concrete Message Cues, New Message (Induced Bridging)													3.29	1.12	3.63	0.82	2.79	0.51
Control CLO, Concrete-only Message Cues													3.20	1.01	3.15	0.75	2.46	0.60
Control CLO, Abstract and Concrete Message Cues, New Message (Induced Bridging)													3.50	0.91	3.75	1.14	2.85	0.46
Control CLO, Abstract and Concrete Message Cues (Induced Bridging)													2.76	1.15	3.53	0.87	2.82	0.82

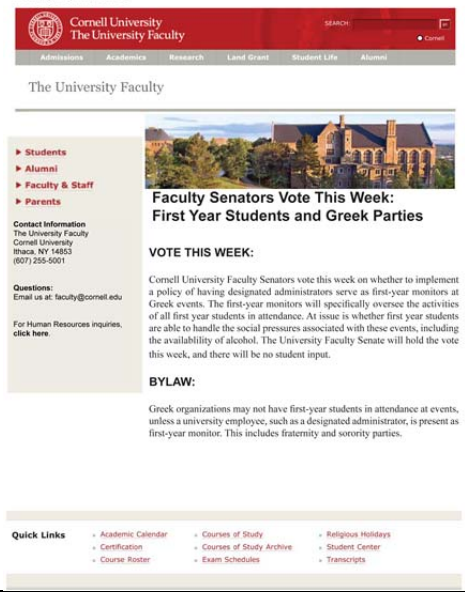
Figure 5. Likelihood of producing cognitive bridging outputs in comparison to non-bridging reference group, Chapter 2 - Study 3 (H1a, H1b)

	High Construal Level	Low Construal Level	Control Construal Level
Abstract and concrete message cues 	**Induced Process** χ^2 (1) = 6.28 p = .01 (Exp B = 28 β = 3.33	**Induced Process** χ^2 (1) = 5.42 p = .02 Exp B = 14.86 β = 2.70	**Induced Process** χ^2 (1) = 3.15 p = .076 Exp B = 8 β = 2.08
Abstract and concrete message cues 	**Induced Process** χ^2 (1) = 4.21 p = .04 Exp B = 10.4 β = 2.34	**Induced Process** χ^2 (1) = 7.26 p = .007 Exp B = 24 β = 3.18	**Induced Process** χ^2 (1) = 6.44 p = .01 Exp B = 24 β = 3.18
Concrete - only message cues 	**Integrated Process** χ^2 (1) = .19 p = .66 Exp B = 1.78 β = .58	**Reference Category (non-bridging)**	**Non-Bridging** χ^2 (1) = .01 p = .92 Exp B = 1.14 β = .13

Figure 6. Examples of Stimulus Materials - Chapter 3, Study 1

STUDY 1: High Threat to Choice, Far Psychological Distance

STUDY 1: High Threat to Choice, Close Psychological Distance



STUDY 1: Low Threat to Choice, Far Psychological Distance

Study 1: Low Threat to Choice, Close Psychological Distance

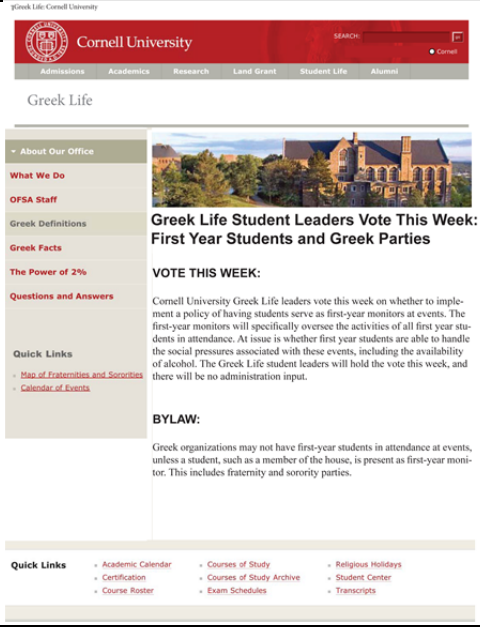


Figure 7. Message effectiveness as a function of construal level congruence and threat to choice level of the message, Chapter 3 - Study 1 (H2)

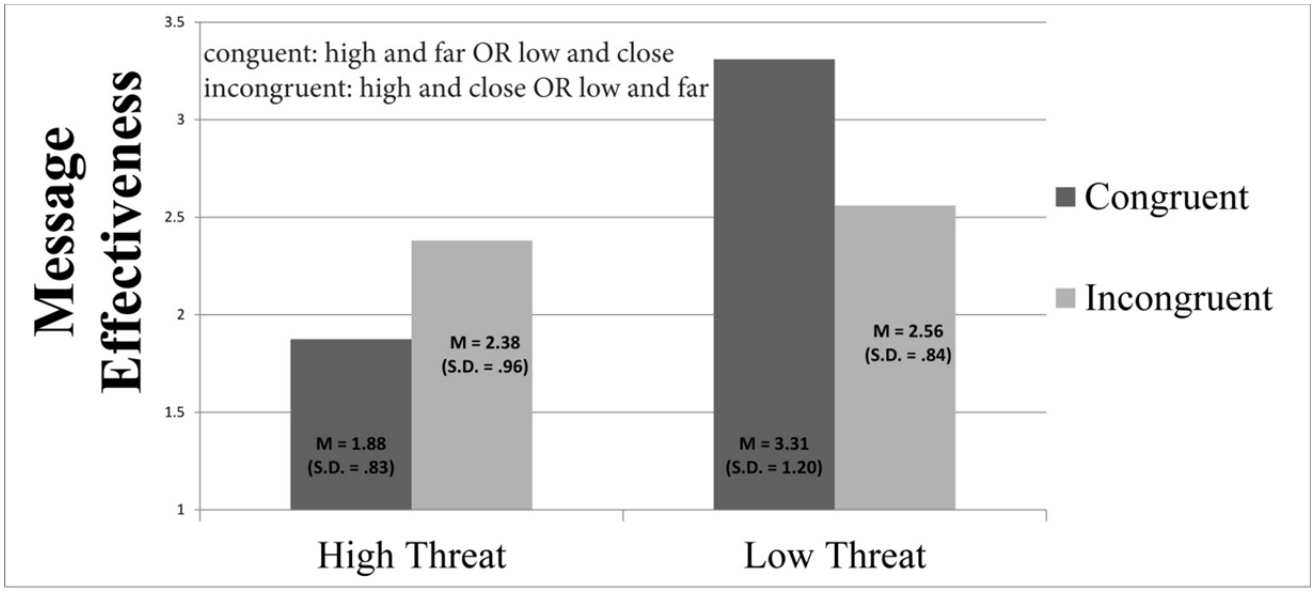


Table 2. Means and Standard Devisions for Threat to Choice x Construal Level Orientation x Psychological Distance, Chapter 3 – Study 1 and Study 2

			STUDY 1 Greek Monitors			Study 2 Median Grades			
			Cognitive Outputs of State Reactance	Affective Outputs of State Reactance	Message Effectiveness	Cognitive Outputs of State Reactance	Affective Outputs of State Reactance	Message Effectiveness	Message Importance
Threat to Choice	**Psychological Distance**	**Construal Level Orientation**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**
High Threat to Choice	Far Psychological Distance	Low Construal Level	2.88 (.51)	3.25 (.79)	2.13 (.88)	2.88 (1.09)	2.95 (1.37)	2.50 (1.66)	4.70 (1.48)
		High Construal Level	2.85 (.77)	2.88 (.72)	2.25 (.50)	2.84 (.34)	2.89 (1.16)	2.94 (1.21)	3.89 (1.65)
		Control	2.64 (.60)	2.64 (1.24)	2.44 (1.21)	3.45 (.75)	3.81 (.90)	1.25 (.29)	5.38 (1.44)
		Total	2.77 (.58)	2.92 (.99)	2.29 (.96)	2.99 (.71)	3.11 (1.17)	2.44 (1.35)	4.44 (1.60
	Close Psychological Distance	Low Construal Level	3.75 (.57)	3.75 (.74)	1.50 (1.00)	3.23 (.48)	3.39 (.69)	1.71 (.49)	5.36 (.69)
		High Construal Level	2.48 (.41)	2.35 (.38)	2.80 (1.04)	2.87 (.62)	3.46 (.95)	2.58 (.86)	5.08 (1.72)
		Control	3.18 (.56)	2.90 (.63)	2.35 (.63)	2.96 (.55)	3.33 (.80)	2.11 (1.05)	5.06 (1.53)
		Total	3.12 (.67)	2.93 (.75)	2.29 (.90)	3.02 (.54)	3.39 (.77)	2.11 (.89)	5.16 (1.32)
	Total	Low Construal Level	3.17 (.67)	3.42 (.78)	1.92 (.93)	3.08 (.77)	3.21 (1.00)	2.04 (1.14)	5.08 (1.08)
		High Construal Level	2.64 (.59)	2.58 (.59)	2.56 (.85)	2.85 (.45)	3.12 (1.09)	2.80 (1.07)	4.37 (1.73)
		Control	2.93 (.63)	2.78 (.95)	2.39 (.92)	3.11 (.63)	3.48 (.83)	1.85 (.97)	5.15 (1.45)
		Total	2.94 (.64)	2.93 (.88)	2.29 (.92)	3.01 (.61)	3.26 (.97)	2.26 (1.12)	4.84 (1.48)
Low Threat to Choice	Far Psychological Distance	Low Construal Level	2.93 (.45)	2.81 (.63)	2.78 (.87)	2.12 (.58)	1.95 (.76)	2.20 (.45)	3.00 (1.12)
		High Construal Level	2.52 (.46)	2.40 (.55)	3.60 (1.14)	2.23 (.33)	2.16 (.63)	2.63 (1.03)	3.56 (1.43)
		Control	2.70 (.51)	2.56 (.62)	3.00 (.80)	2.07 (.59)	1.92 (.52)	3.00 (.84)	4.25 (.94)
		Total	2.75 (.48)	2.63 (.61)	3.05 (.92)	2.15 (.47)	2.03 (.61)	2.63 (.86)	3.63 (1.25)
	Close Psychological Distance	Low Construal Level	2.58 (.48)	2.34 (1.05)	3.13 (1.27)	2.33 (.65)	2.72 (1.06)	2.19 (1.00)	5.13 (1.06)
		High Construal Level	2.55 (.66)	2.72 (1.07)	2.31 (.80)	1.52 (.41)	1.80 (1.04)	3.30 (.84)	3.90 (.82)
		Control	2.47 (.56)	2.54 (1.04)	3.33 (1.03)	2.14 (.96)	2.39 (1.37)	2.43 (1.24)	4.86 (1.86)
		Total	2.54 (.55)	2.53 (1.02)	2.89 (1.10)	2.06 (.77)	2.38 (1.17)	2.55 (1.10)	4.73 (1.38)
	Total	Low Construal Level	2.76 (.49)	2.59 (.86)	2.94 (1.06)	2.25 (.61)	2.42 (1.00)	2.19 (.80)	4.31 (1.49)
		High Construal Level	2.54 (.57)	2.60 (.89)	2.81 (1.11)	1.95 (.50)	2.02 (.79)	2.88 (.98)	3.69 (1.20)
		Control	2.60 (.53)	2.55 (.79)	3.14 (.89)	2.11 (.78)	2.17 (1.05)	2.69 (1.07)	4.58 (1.48)
		Total	2.65 (.52)	2.58 (.83)	2.97 (1.00)	2.10 (.63)	2.21 (.94)	2.59 (.98)	4.19 (1.41)
Total	Far Psychological Distance	Low Construal Level	2.91 (.46)	3.02 (.73)	2.47 (.91)	2.50 (.92)	2.45 (1.17)	2.35 (1.16)	3.85 (1.53)
		High Construal Level	2.67 (.60)	2.61 (.64)	3.00 (1.12)	2.55 (.46)	2.54 (.99)	2.79 (1.10)	3.74 (1.51)
		Control	2.67 (.54)	2.60 (.97)	2.71 (1.05)	2.62 (.94)	2.68 (1.17)	2.30 (1.11)	4.70 (1.23)
		Total	2.76 (.53)	2.77 (.82)	2.67 (1.01)	2.56 (.73)	2.55 (1.06)	2.54 (1.11)	4.03 (1.47)
	Close Psychological Distance	Low Construal Level	2.97 (.76)	2.81 (1.15)	2.58 (1.40)	2.75 (.73)	3.03 (.94)	1.97 (.81)	5.23 (.88)
		High Construal Level	2.52 (.56)	2.58 (.87)	2.50 (.89)	2.25 (.87)	2.70 (1.28)	2.91 (.89)	4.55 (1.46)
		Control	2.91 (.65)	2.77 (.79)	2.72 (.91)	2.60 (.84)	2.92 (1.15)	2.25 (1.11)	4.97 (1.63)
		Total	2.80 (.67)	2.72 (.92)	2.61 (1.05)	2.56 (.81)	2.90 (1.10)	2.32 (1.01)	4.95 (1.35)
	Total	Low Construal Level	2.93 (.59)	2.93 (.91)	2.52 (1.11)	2.65 (.80)	2.80 (1.06)	2.12 (.96)	4.68 (1.35)
		High Construal Level	2.58 (.57)	2.59 (.77)	2.70 (1.00)	2.44 (.65)	2.61 (1.09)	2.84 (1.01)	4.05 (1.52)
		Control	2.79 (.60)	2.68 (.88)	2.71 (.97)	2.61 (.86)	2.83 (1.14)	2.27 (1.09)	4.87 (1.47)
		Total	2.78 (.60)	2.74 (.86)	2.64 (1.02)	2.56 (.77)	2.74 (1.09)	2.42 (1.06)	4.52 (1.47)

Figure 8. Message effectiveness as a function of construal level orientation, psychological distance and threat to choice level of the message, Chapter 3 - Study 1 (H3)

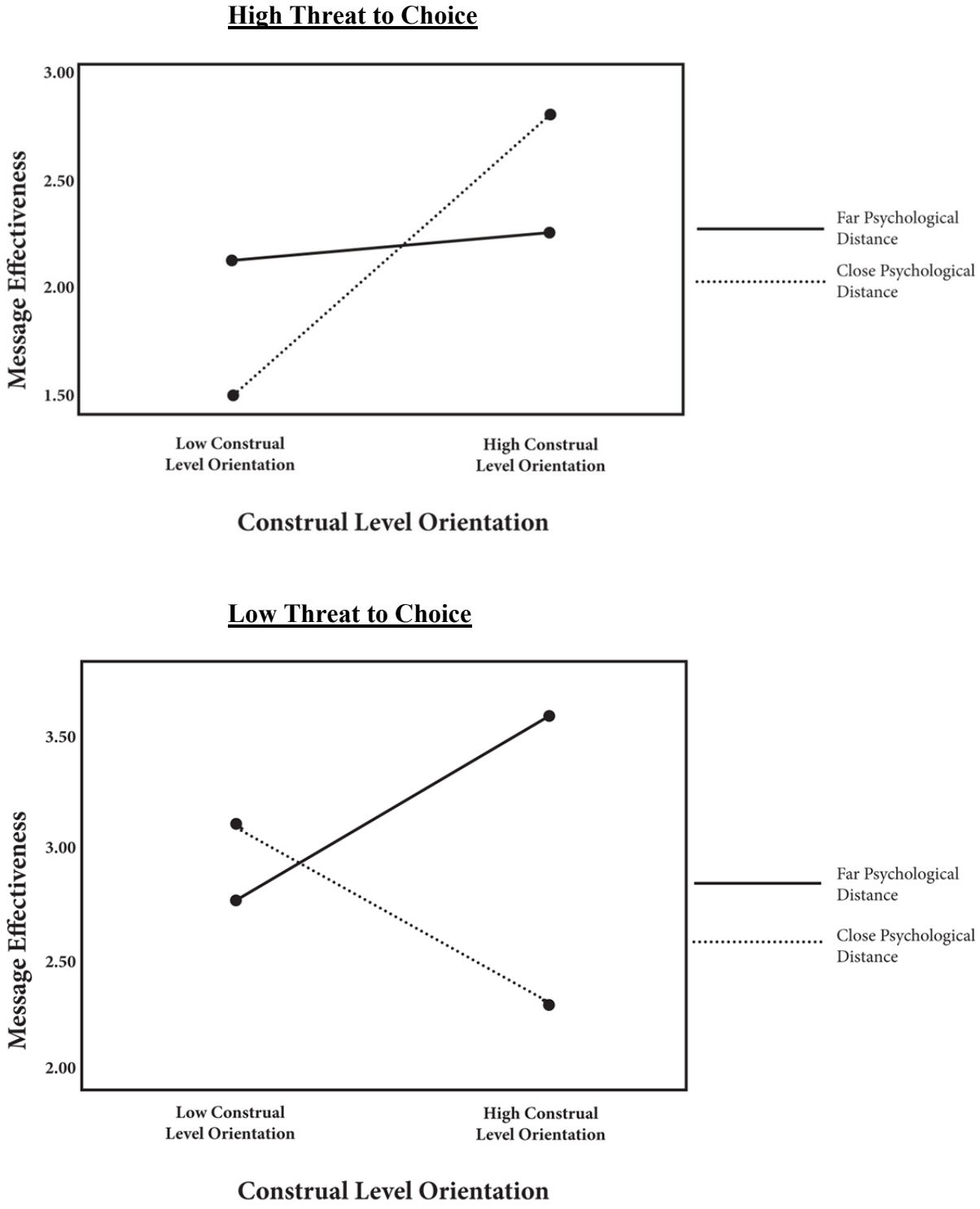
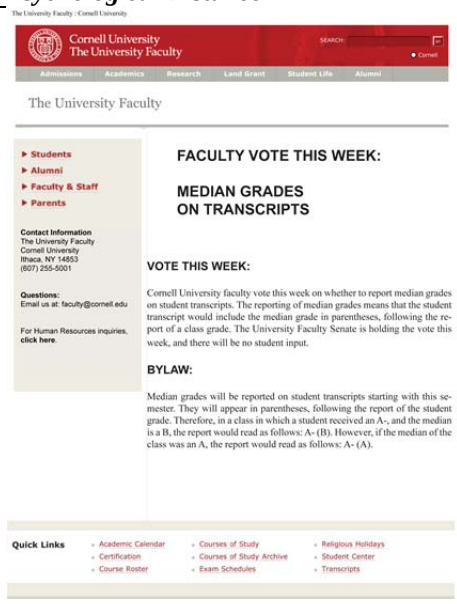


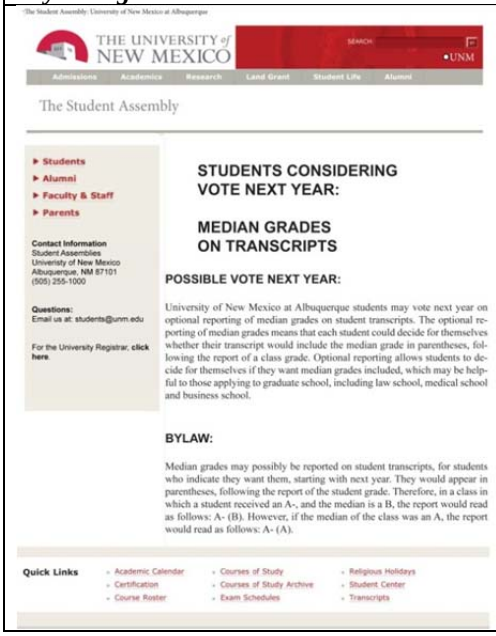
Figure 9. Examples of Stimulus Materials, Chapter 3 - Study 2

STUDY 2: High Threat to Choice, Far Psychological Distance

Study 2: High Threat to Choice, Close Psychological Distance



Study 2: Low Threat to Choice, Far Psychological Distance



Study 2: Low Threat to Choice, Close Psychological Distance

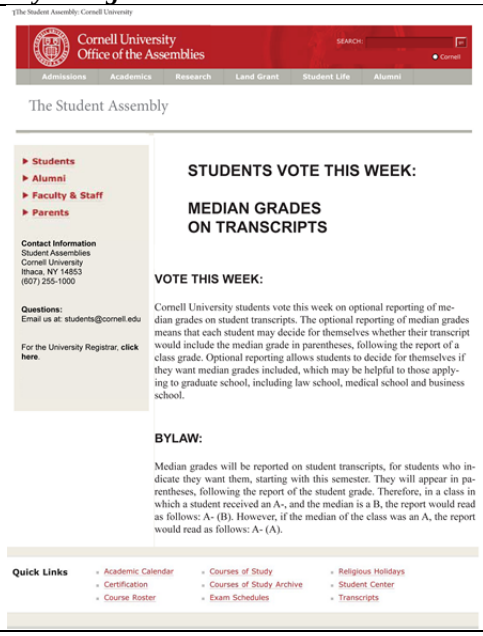
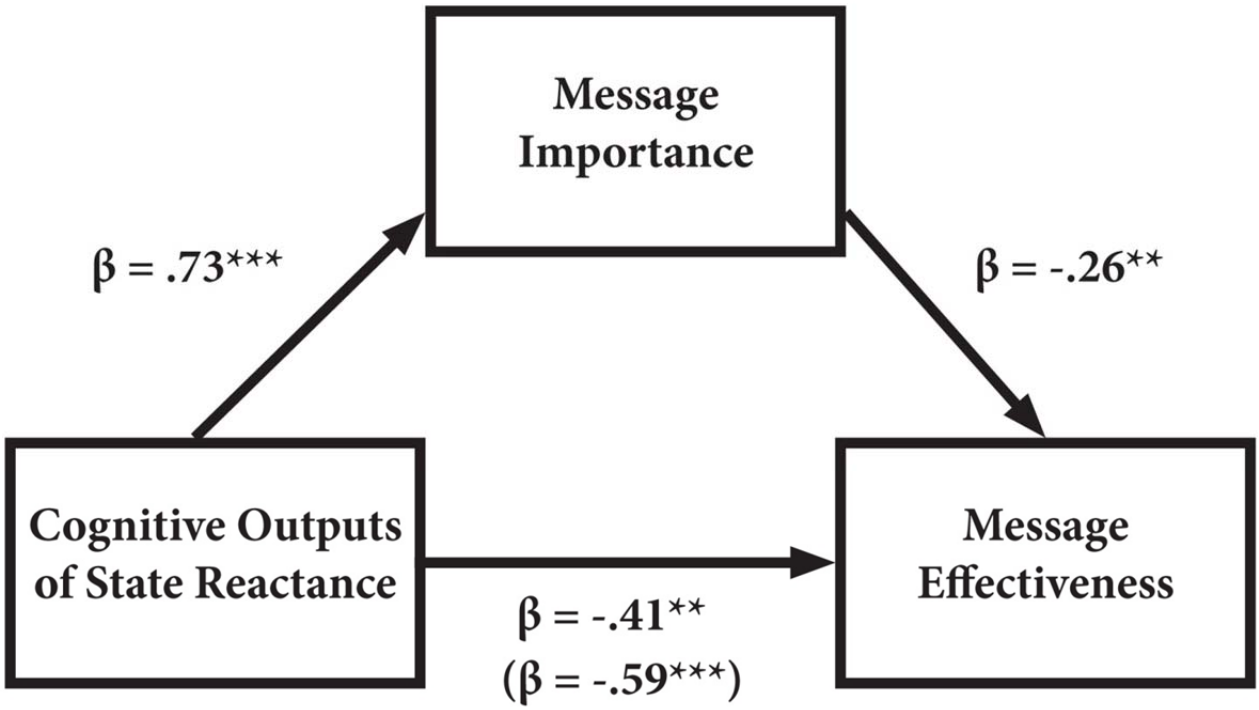


Figure 10. Message importance partially mediates the relationship between the cognitive outputs of state reactance and message effectiveness, Chapter 3 – Study 2



The direct relationship is indicated in parentheisis.
The relationships that take into account the mediation are not in parenthesis.
This analysis controls for trait reactance.
NOTE: *p < .05; **p < .01; ***p < .001

Figure 11. Construal Level Theory of Mobile Persuasion, Chapter 4

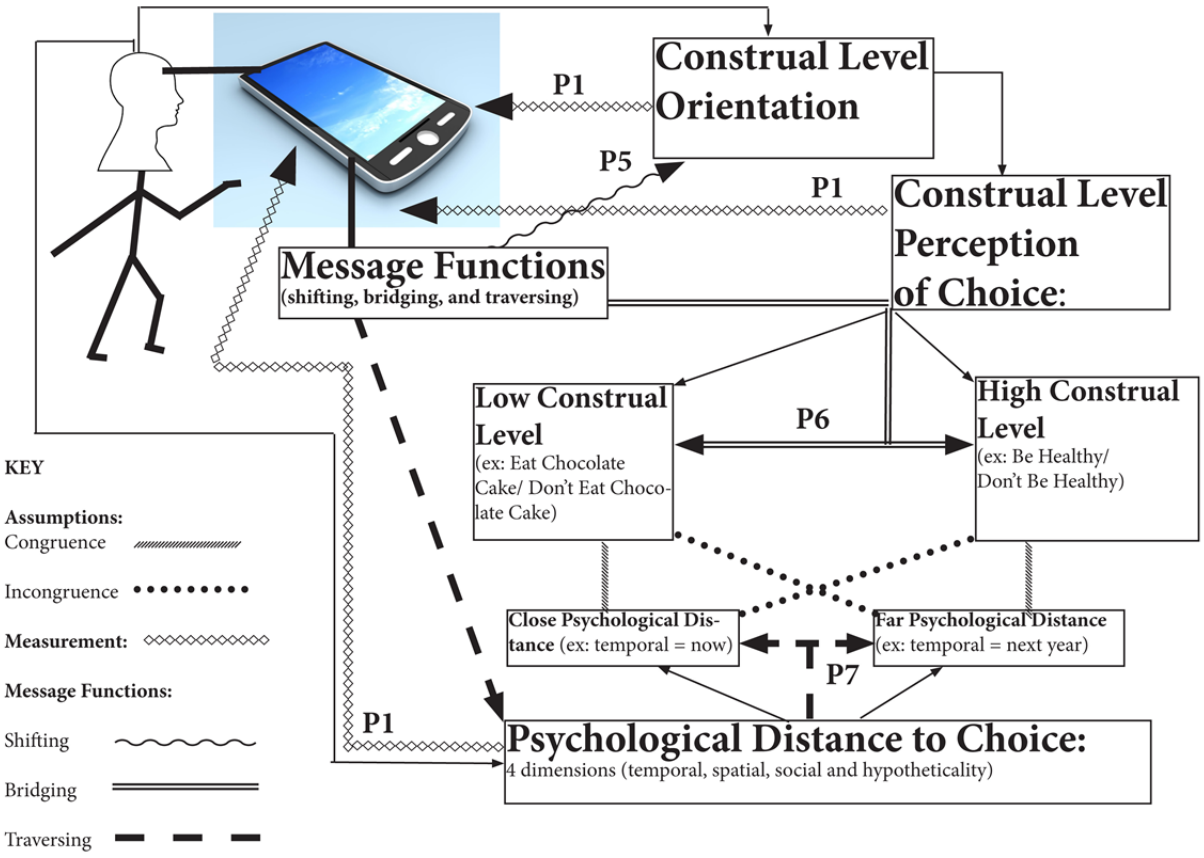


Table 3. Selection of Message Effectiveness Predictions Based on Congruence, Chapter 4

Construal Level Orientation	**Construal Level Perception of Choice**	**Psychological Distance**	**Message Cues***	**Message Effectiveness**	**Proposition**
High CLO	High CLPC	Far PD	High Abstraction Cue/ Far Distance Cue	SUCCESS	P2
High CLO	High CLPC	Far PD	Low Abstraction Cue/ Close Distance Cue	RESISTANCE	P3
Low CLO	Low CLPC	Close PD	Low Abstraction Cue/ Close Distance Cue	SUCCESS	P2
Low CLO	Low CLPC	Close PD	Low Abstraction Cue/ Close Distance Cue Threat to freedom of choice	RESISTANCE	P4
Low CLO	Low CLPC	Close PD	High Abstraction Cue/ Far Distance Cue	RESISTANCE	P3

*unless indicated, these message factors are assumed to be otherwise effective (i.e. strong arguments, not weak arguments).

Figure 12. Navon Composite Letter used in the design of mCLO, Chapter 5

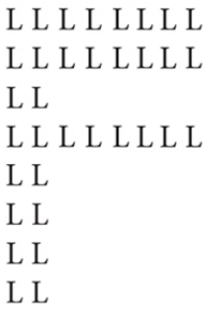


Figure 13. Example of the mCLO application running through Qualtrics, Chapter 5

Glossary

This glossary includes terms introduced through this work.

Bridging – connecting a low construal level perception of choice and a logically-related high construal level perception of choice. In other words, connecting a behavioral choice to an abstract goal.

Construal level orientation – how abstractly or concretely one is processing information

Construal level perception of choice – how abstractly or concretely one is viewing a decision context (i.e. eat the apple vs. not eat the apple is a low construal level perception of choice; while eat health vs. don't eat healthy is a high construal level perception of choice).

Induced processing – the effectiveness of the message is a result of the processing of the message, and it does not matter how abstractly or concretely the individual is initially thinking.

Integrated processing - the effectiveness of the message is a result of the integration of abstraction and distance in the mind and abstraction, distance, and motivation cues in the message.

Shifting – changing construal level orientation; manipulating the individual to process information more or less abstractly.

Traversing – changing how close or far an item is perceived to be.