The Who, When, & Why of Self-Control Failure

Dissertation

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Abstract

The goal of this research is to explore the who, when, and why of self-control success vs. failure. Drawing from research on construal level theory (CLT; Trope & Liberman, 2003, 2010), my collaborators and I explore under what conditions people are likely to succeed or fail in self-control as well as what types of people are likely to succeed and fail. Studies 1-3 explore situation-level variables that might contribute to self-control (the “when” of self-control failure) and find that words compared to pictures lead to evaluative associations that are consistent with goals (Study 1), that words lead to stimulus categorization along goal-relevant dimensions (Study 2) and that pictures lead to stimulus categorization along temptation-relevant dimensions (Study 3). Studies 4-5 explore person-level variables that contribute to self-control outcomes (the “who” of self-control failure) and find that individuals with the ability to engage in high-level construal processing combined with an inability to engage in low-level construal processing report the most self-control success (Study 4) and evaluate temptations and goals in ways that facilitate long-term goal pursuit (Study 5). All five studies explore construal level as the mechanism that explains these effects (the “why” of self-control failure). The implications for construal level theory, self-control, and language are discussed.
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Chapter 1: Introduction

We all want things. And often, we cannot get those things in the here and now. Nearly half of Americans set a New Year’s resolution. Among the most common are losing weight, saving money, eating healthier, and exercising more (Norcross, Mrykalo, & Blagys, 2002). Goals like these generally cannot be attained in a one-time endeavor, but instead require sustained and prolonged effort. In short, they require self-control, or the prioritization of distant, valued goals over immediate, less valued goals (Fujita & Carnevale, 2012). People are capable of impressive feats of self-control, such as running a marathon or losing 100 pounds, but so too are they capable of failing in self-control even in high-stakes contexts, such as gambling away their life savings or driving drunk. Only 8% of those who make a New Year’s resolution report successfully achieving it while nearly 20% report giving up within the first week (Norcross, Mrykalo, & Blagys, 2002). Effective self-control is essential for achieving our cherished goals while poor self-control can be implicated in any number of destructive behaviors. Therefore, understanding the factors that contribute to self-control success vs. failure is essential. The goal of this research is to explore who fails in self-control, when people are likely to fail, and why such self-control failures occur.
Self-Control

Self-regulation is a broad term that describes the process of adopting, managing, and monitoring goals and standards (Carver & Scheier, 1982; 1990). Self-control is a specific kind of self-regulation in which a smaller, proximal reward (e.g., a donut) tempts people to abandon a larger, distal goal (e.g., weight-loss; Ainslie, 1975; Fujita, 2011; Mischel, Shoda, & Rodriguez, 1989). Successful self-control requires prioritizing the more valuable, distant outcomes over smaller, immediate ones. Pursuit of these distal goals, however, is frequently undermined by salient rewards that are immediately available in the environment. Although less valuable than the distal rewards, these proximal rewards are enticing because they can be attained and enjoyed immediately. For example, consider someone with a choice between receiving $50 today or $75 next month. While the $75 is more valuable, the smaller $50 option provides the reward of receiving the money immediately. Dieters face the same dual-motive conflict when faced with a choice of eating a donut vs. forgoing it in favor of an apple. The donut provides an immediate reward of hedonism whereas forgoing the donut in favor of an apple provides a more valued, but delayed, goal of weight loss. Self-control refers to the successful resolution of such decisions in favor of the valuable, distal goal at the expense of the less valuable, proximal reward (Ainslie, 1975; Fujita, 2011; Fujita & Carnevale, 2012; Mischel, Shoda, & Rodriguez 1989).

Self-control is distinct from the resolution of self-regulatory challenges that do not involve self-control. Consider, for example, a golfer attempting to sink a putt. This behavior requires careful regulation of hand-eye coordination and body movement to
serve an athletics goal. This behavior does not, however, involve a self-control conflict because there is no conflict between short-term and long-term motives. The golfer has no competing motivation to miss the shot (Fujita, 2011). Thus, although self-control entails self-regulation, self-regulation does not necessarily entail self-control.

**Self-control’s sensitivity to time.** One remarkable characteristic of self-control is its sensitivity to time (e.g., Ainslie, 1975; Hoch & Loewenstein, 1991; Kirby & Herrnstein, 1995; Rachlin, 1995; Rachlin & Green, 1972). When self-control decisions are separated from direct experience, people easily express preferences for the larger, distal option. As the decision approaches the here-and-now, however, people frequently experience preference reversals: at the critical moment of choice, despite their best intentions, people chose the smaller, proximal over the larger, distal reward. For example, research in temporal discounting documents a consistent preference for a larger, delayed reward over a smaller, sooner reward when both alternatives are in the future (e.g., $35 in a year and three months vs. $30 in a year). When, however, the smaller, sooner reward is available immediate ($35 in three months vs. $30 right now), preferences shift to the smaller, sooner reward – a process referred to as hyperbolic discounting (Ainslie, 1975). Similarly, a dieter may easily choose a healthy apple over a fattening donut when making a choice about what to eat next month, but is likely to switch shift preferences to the donut when deciding what to eat today. Several theoretical frameworks provide explanations for the time-sensitivity of self-control decision-making.

**Self-control as the effortful inhibition of impulses.** Many theoretical models describe self-control as an over-riding of some impulsive response. These models suggest
that cues in the immediate environment provoke thoughts, feelings, and behaviors that promote securing more immediate, tempting rewards. That is, in the absence of cues that prompt sensitivity to when a reward can be attained, people’s preferences are driven instead by the reward value (i.e., people pursue the goal they want the most). When, however, cues such as time activate impulses to achieve a reward immediately, preferences shift away from goal value and towards goal immediacy (i.e., people pursue the goal they can get the soonest). Such impulses undermine goal-directed behavior and threaten self-control. For example, food cues prompt dieters to feel hungrier and eat larger amounts of unhealthy foods (Federoff, Polivy, & Herman, 1997, 2003). Similarly, smokers report more positivity towards smoking when presented with a lit cigarette vs. a roll of tape after they have abstained from smoking for some time (Sayette & Hufford, 1997; Sayette, Martin, Wertz, Shiffman, & Perrott, 2001). These findings demonstrate that the presence of temptations activate impulses to indulge in those temptations. Furthermore, research indicates that impulses that are harder to inhibit are more likely to lead to self-control failure. For example, those with stronger associations between positivity and smoking and drinking are more likely to smoke and drink excessively (e.g., de Houwer, Custers, & DeClerq, 2006; Wiers & Stacy, 2006).

These models describe self-control as a conscious effort to inhibit or prevent these impulses from influencing behavioral decisions. Whereas impulses are hypothesized to operate without conscious intention and effort, the over-riding of these impulses is believed to require conscious intention and sufficient cognitive and motivational resources. The notion that effortful inhibition of impulses requires cognitive resources is
supported by research demonstrating that people are more likely to fail at self-control when their cognitive resources are taxed vs. untaxed (Hofmann, Friese, & Strack, 2009). For example, people are more likely to choose unhealthy chocolate cake rather than healthy fruit salad as a snack when rehearsing a seven-digit number string vs. a two-digit number string (Shiv & Fedorikhin, 1999).

Such effortful inhibition models also suggest that self-control requires sufficient energy resources. Research on ego depletion proposes that self-control draws on a limited energy resource. Once this resource is depleted by an act of self-control, there is less of this resource available to fuel the next self-control attempt. This resource depletion makes people more likely to fail in a subsequent unrelated self-control conflict (Baumeister & Heatherton, 1996; Muraven, Tice, & Baumeister, 1998; Muraven & Baumeister, 2000). In a classic demonstration of ego depletion effects, research participants first successfully engaged in self-control behavior by eating radishes instead of cookies, while another group of participants was permitted to eat the far tastier cookies. Those who exerted self-control on the first task – eating radishes instead of cookies – displayed reduced ability to engage in self-control behavior on a subsequent task that also required self-control – persisting on a challenging problem-solving task (Baumeister, Bratslavsky, Muraven, & Tice, 1998).

**Self-control as the cooling of emotions.** Another theoretical framework for self-control focuses on whether information is processed affectively (via a “hot” system) vs. cognitively (via a “cool” system; Mischel, Shoda, & Rodriguez, 1989; Metcalfe & Mischel, 1999). When processing of self-control decisions is dominated by the “hot”
system, choices are likely to be based on emotional responses which overweight the
salience of proximal rewards and promote self-control failure, whereas “cool” system
processing of self-control conflicts is likely to focus on rational deliberations that give
greater weight to distal rewards and promote self-control success. Previous research
shows that processing a self-control conflict cognitively rather than affectively can
promote self-control success (Mischel & Baker, 1975). For example, children were better
able to delay gratification in order get a larger, delayed reward (i.e., two marshmallows in
15 minutes instead of one marshmallow immediately) when instructed to think of the
marshmallows cognitively (i.e., as fluffy white clouds) vs. when instructed to think of
them affectively (i.e., the appetitive qualities of the marshmallows).

An alternative approach to understanding self-control comes from construal level
theory (CLT). The CLT perspective focuses on abstraction level rather than on level of
emotionality or automaticity.

**Construal Level**

Construal level theory (Trope & Liberman, 2003, 2010) posits that informational
inputs are subjectively construed on a continuum of abstraction (from low to high levels
of abstraction). Much research evidence suggests that it is a subjective understanding of
the world, rather than any of its objective features that influences decisions and behaviors
(e.g., Griffin & Ross, 1991). For example, a football fan may perceive his team’s play as
a “hard hit” while a fan of the opposing team may construe the same maneuver as a “dirty
play” (Hastorf & Cantril, 1954). Low-level construal highlights the specific, incidental
features of a stimulus that differentiate it from similar stimuli, whereas high-level
construal focuses on the abstract, essential features of a stimulus that do not change from one example to the next.

Central to CLT is the notion of psychological distance (e.g., Liberman & Trope, 2008; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2010). Low-level construal uses the here and now of direct experience as a de facto reference point. When objects or events are psychologically proximal, people tend to have rich, contextual details available. People process such information in a way that extracts the peripheral, situation-specific features that separate each unique event from similar others. As events recede from the here and now, such unique information often becomes unavailable. Lacking specific details, people process such information at a higher level of construal, extracting the primary, central, decontextualized features of that object or event that do not tend to vary across instances. High-level construal therefore facilitates processing of information that is removed from the here and now. CLT research has identified a number of dimensions along which events may be considered distal or proximal. These include time (now versus later), space (here versus there), social distance (me versus other), and hypotheticality (likely versus unlikely). Thus, high-level construal is a functional psychological response to the challenges presented by distant events in that it allows people to think about content that extends beyond one’s immediate sensory and perceptual capacities (Ledgerwood, Trope, & Liberman, 2010; Liberman & Trope, 2008; Trope & Liberman, 2010). Low-level construal, by contrast, allows people to immerse themselves into the details of the here and now, allowing them to respond to the unique and idiosyncratic contingencies of the present.
To demonstrate the tendency to process near and far events at low and high-level construal respectively, consider the example of thinking about how one will spend his day tomorrow versus 10 years from tomorrow. In the absence of specific information about the distant future, an individual must engage in high-level construal, considering only the most abstract, essential elements of how he typically spends his day: eating meals, going to work, caring for his children, and interacting with family, friends, and colleagues. When this same individual considers how he will spend his day tomorrow, on the other hand, he can engage in low-level construal, incorporating secondary, peripheral details to form unique representations of a singular event. He may imagine that tomorrow will entail an egg-white omelet breakfast, an 11:00am department meeting, and a 2:00pm parent-teacher conference at his daughter’s elementary school. This association between proximal/low-level construal and distal/high-level construal becomes so over-learned that individuals generally process in this manner even when the amount and type of details are held constant across psychological distance (i.e., even in the case where one has enormously detailed knowledge about a distal event).

The term construal can refer both to the process of representing stimuli (i.e., construal as a verb) as well as the output of this process (i.e., construal as a noun). CLT assumes that differences in representational process result in different representational outputs. Previous construal level research has tended to assess construal level output via low and high-level construal descriptions of the same behavior, a measure derived from Vallacher & Wegner’s behavioral identification form (BIF; Vallacher & Wegner, 1987, 1989). For example, a participant would see the behavior “painting a room” and is asked
whether “applying brush strokes” (low-level construal descriptor) or “making the room look fresh” (high-level construal descriptor) better describes that behavior. While this method of assessing construal is experimentally pragmatic, it is conceptually problematic because no two people can be expected to have the same high or low-level construal representation of the same behavior, despite using similar cognitive processes to arrive at those representations. Thus, one person who uses high-level construal to think about painting a room may think of it as “making the room look fresh” while a second person thinks of it as “showing their creative side.” The first person would therefore have an easier time selecting a descriptor on a BIF than the second. Despite the fact that two people may arrive at two different high-level construal outputs of the same object, those different outputs should share common high-level construal features, such as invariance and essentialism, as a result of the similar cognitive processes that produced them. A second issue with measuring the output of construal rather than the underlying processes is that two people may end up at the same place on a continuum, but moved from different starting points to arrive there. For example, one person may have started out by thinking of painting the room as “pressing paint onto a wall” and ended up thinking of the same activity as “applying brush strokes” whereas a second person began by thinking of the activity as “decorating” and ended up at “applying brush strokes.” The first person arrived at an output after an abstraction process whereas the second arrived at the same point after a concretization process. Thus, the direction of movement along the continuum (i.e., the process) and the ending point (i.e., the representational output) are distinct.
**Construal level and decision-making.** That people engage in high-level construal (vs. low-level construal) to represent distant (vs. proximal) events has important consequences for decision-making and behavior. For example, when people consider temporally distant situations, they categorize objects into fewer, broader categories and tend to infer that singular behaviors are indicative of broad, dispositional traits on the part of the actor (Trope & Liberman, 2010). This focus on broad categories of events facilitates sensitivity to the broader implications of singular behaviors. Thus, people are more likely to behave in a manner consistent with their own broad values when engaged in high-level construal (Torelli & Kaikati, 2009; Eyal, Sagristano, Liberman, & Trope, 2009).

Some might assume that because high-level construal has the beneficial effect of promoting value-consistent behavior it is somehow more beneficial than low-level construal in general. This, however, is not the case. Instead, low and high-level construal are each functional for different tasks. Low-level construal facilitates self-regulatory challenges that require tailoring responses to idiosyncratic task demands (e.g., putting a golf ball; Liberman & Trope, 2014; Schmeichel, Vohs, & Duke, 2010) whereas high-level construal allows us to consider remote content and plan for the future (Trope & Liberman, 1998). Importantly, research has also demonstrated that high-level construal promotes self-control.

**Construal Level and Self-Control**

The scenario of a dieter choosing between an unhealthy donut and a healthy apple as a snack demonstrates the role of construal level in self-control contexts. If the dieter
uses low-level construal to consider this choice, that cognitive process highlights the idiosyncratic features of the choice that are most associated with immediate gratification, such as the taste of the foods. Thinking of the choice in this way leads the dieter to see the decision as a one-time choice between this tasty donut and this less tasty apple in this moment, which promotes self-control failure, to the extent that the dieter prefers the taste of the donut to the taste of the apple. If, on the other hand, the dieter uses high-level construal to consider this choice, that cognitive process highlights the invariant features of the decision that are most relevant to long-term goals, such as the healthiness of the foods. Thinking about the conflict in this way pushes the dieter to see the decision not as a one-time choice between this donut and this apple, but as a decision similar to others that are relevant to weight-loss (i.e., other healthy vs. unhealthy food choices). Situating the choice in this broader goal-relevant context pushes the dieter to see it as a choice between hedonism and weight-loss, a thought process that promotes self-control success, to the extent that the dieter values weight-loss over hedonism.

A construal level approach to self-control proposes that the time-sensitivity of self-control decisions results from changes in how people subjectively construe or understand events as a function of distance from direct experience (from low to high-level construal). People use high-level construal to think about the distant future, which highlights the broader, goal-relevant implications of their choices, which in turn promotes self-control. People use low-level construal, by contrast, to think about the near future, which highlights the salient secondary, incidental features of their choices, which in turn may promote self-control failure. CLT suggests that promoting self-control requires
adopting the perspective that one would have if the decision was in the more distant future, i.e., high-level construal.

Empirical support for this proposition has experimentally manipulated construal and observed its effect on self-control. As psychological distance can be confounded with other variables (e.g., diminished personal relevance, reduced emotional impact), the most critical tests manipulate construal directly as procedural mindsets: inducing differences in construal level in one context tends to impact construal of subsequent unrelated contexts (e.g., Freitas, Gollwitzer, & Trope, 2004; Fujita, Trope, Liberman, & Levin-Sagi, 2006). For example, generating superordinate categories (“animal”) versus subordinate exemplars (“poodle”) for a series of 40 everyday objects (“dog”) reliably induces high-level versus low-level construal of unrelated events, a procedure called the “category/exemplar task” (Fujita et al., 2006). Similarly, researchers ask participants to consider why (“to live a long life”) versus how (“eat more vegetables”) they engage in a target behavior (“maintain good physical health”), a procedure referred to as the “why/how task”. The generation of superordinate ends (why) versus subordinate means (how) in this manner reliably influences construal level of subsequent unrelated contexts (Freitas et al., 2004; Fujita et al., 2006).

Supporting Evidence

Temporal discounting. Initial evidence that high-level construal promotes self-control comes from work examining temporal discounting – the tendency to value rewards less as they become more distant in time (e.g., Ainslie, 1975). Temporal discounting tasks involve a choice between a smaller monetary amount available in the
near future (e.g. $30 tomorrow) versus a larger monetary amount available in the more distant future (e.g. $40 in three months). The larger the amount an individual would require in order to choose the larger, later amount over the smaller, sooner amount, the steeper his or her discounting rate. Steeper discount rates are associated with poorer self-control, as they lead people to prefer smaller-immediate over larger-delayed rewards.

High-level construal has been shown to reduce discounting rates. In one experiment, Fujita and colleagues (2006) induced differences in construal level, using the why/how manipulation described earlier. Participants then indicated how much more they would pay to receive various consumer goods now rather than later as a measure of discounting. High-level construal reduced discount rates, suggesting greater self-control. Other studies have found similar results using similar methods. For example, Malkoc, Zauberma, and Bettman (2010) found that participants in a high-level construal condition were willing to wait longer to receive a consumer good (i.e. a camera) in order to save money on its purchasing price. Participants in the low-level construal condition, on the other hand, were willing to pay a premium to receive the camera immediately. This experiment too suggests that greater abstraction led to reduced temporal discounting. Other studies have examined the effects of psychological distance on temporal discounting. For example, Maglio, Trope, and Liberman (2013) offered participants a choice between a smaller, immediate payout vs. a larger, delayed payout and found that participants preferred the larger, delayed reward if they believed that the bank that would process the payment was spatially distant rather than spatially near. Similarly, participants were more likely to choose a larger, delayed monetary reward if they made
the decision on behalf of their future self or on behalf of someone else rather than on behalf of their current self (Pronin, Olivola, & Kennedy, 2008).

**Choice and behavior.** Research suggests that high-level construal also improves self-control by producing choices and behaviors that are consistent with global goals. In one experiment, for example, Fujita & Han (2009) recruited female undergraduate students, a population that is typically concerned with weight-loss. Participants completed the category/exemplar construal level priming procedure described earlier, and then indicated whether they would prefer to eat an apple versus a candy bar. High-level, relative to low-level, construal led to a fifty percent increase in preferences for the apple, suggesting heightened self-control.

Additional work has examined manipulating construal level as the basis of interventions to increase various health behaviors. Sweeney & Freitas (2014), for example, developed an intervention based on the “why/how task” previously described to increase physical exercise. Participants with behavioral intentions to exercise more did indeed engage in more physical activity over a one-week period following the high-level relative to low-level construal intervention. Chiou, Wu, & Chang (2013) report that a smoking cessation intervention similarly based on “why/how task” significantly reduced smoking behavior. Thus, high-level relative to low-level construal appears to promote self-control across a variety of behaviors.

**Ego depletion.** Additional evidence on the role of high-level construal in self-control comes from research examining ego depletion – an apparent diminished capacity to exert self-control following a previous self-control behavior (Muraven & Baumeister,
Though ego depletion effects are robust in the literature, research also shows that high-level construal can mitigate such ego depletion effects. For example, when a construal-level manipulation comes between two self-control tasks, those induced to low-level construal show the typical ego depletion effect while those induced to high-level construal do not (Agrawal & Wan, 2009; Schmeichel & Vohs, 2009; see also Bruyneel & Dewitte, 2012).

**Change in meaning.** A construal level approach suggests that shifting construals influences self-control by shifting the meaning of the reward structure. For example, a dieter may construe the same donut as either a tasty and delicious treat or as a sinful diet-buster. The former evaluation may lead the dieter to self-control failure while the latter evaluation is more likely to lead to self-control success. In this way, such changes in meaning may change evaluations of the proximal and distal goal in ways that favor pursuit of the latter, through a shift in construal. The construal approach offers an important alternative to the effortful inhibition approach because such shifts in meaning need not involve effort or deliberation. Self-control can be “easy” rather than effortful when relying on shifts in construal rather than effortful overriding of pre-potent responses.

One way to assess shifts in meaning is by measuring shifts in implicit attitudes and evaluations. Attitudes and evaluations are indirect indicators of changes in meaning in that a shift in how an object is evaluated suggests a shift in the meaning of that object. For example, people may evaluate a flu shot positively (as an inoculation against illness) or negatively (as a painful and unpleasant needle prick). Shifts in these evaluations (i.e.,
from negative to positive) may indicate that the attitude object itself has changed (i.e.,
from needle prick to inoculation). Research supports this notion that construal level
influences attitudes and evaluations of temptations and goals. Experiments using implicit
measures of evaluative associations—people’s readiness to associate goals and
temptations with positivity and negativity—suggest that high-level, as compared to low-
level construal promotes shifts in meaning that can be helpful for self-control success.
For example, Fujita and Han (2009) induced participants to high versus low-level
construal using a “category/exemplar” task. After this manipulation, participants
completed an Implicit Association Test (IAT) in which they were asked to sort various
words into categories as rapidly and as accurately as possible by pressing a key on their
computer keyboard. The words varied along two category dimensions: healthy vs.
unhealthy foods (apples vs. candy bars) and positive vs. negative (rainbow vs. murder).
Half of the words belonged to the categories of candy bar versus apple (e.g. Snickers,
Red Delicious) while the other words belonged to the categories of positive versus
negative (e.g. rainbow, murder). Faster responding when two categories are paired (e.g.
apples and positivity) indicates stronger associations between those categories. This task
also presents a self-control conflict for those concerned with healthful eating because
candy bars are generally considered tastier than apples (a short-term reward), while
apples have fewer calories and contribute to health (a long-term reward). Participants
induced to a high-level mindset had stronger associations between temptations and
negativity than those induced to low-level construal. These changes in evaluative
association suggest a fundamental shift in the meaning of stimuli related to self-control
conflicts. The fact that these evaluative associations were assessed using implicit measures (i.e., measures that do not require conscious, effortful introspection) suggests that changes in construal occur without engaging the more deliberative effortful introspection processes that are suggested by effortful inhibition models of self-control.

The evidence that high-level construal promotes self-control is compelling. This relationship between construal and self-control, however, can be problematic because a typical self-control conflict cues low-level, rather than high-level, construal. At the moment of choice, the temptation is in the here-and-now (i.e., part of direct experience) whereas the long-term goal is psychologically removed. Effective self-control requires using high-level construal despite situation cues towards low-level construal. This dynamic makes a key challenge of self-control how to use high-level construal to think about something that is psychologically proximal. My collaborators and I explore environmental variations in low and high-level construal representations as well as cognitive processing variations in low and high-level construal and how these variables affect self-control. Specifically, we examine picture vs. word presentation format as a feature of the environment and individual differences in ability to engage in low and high-level construal as a feature of the individual.

**On How Words Transcend and Pictures Immerse**

Research on differences between pictures and words has largely focused on how pictures are more emotionally evocative than words (e.g., De Houwer & Hermans, 1994; Holmes & Matthews, 2005; Kensinger & Schacter, 2006). This difference in emotionality can have important implications for how people think about and evaluate objects and
events. The tripartite model of attitudes, for example, suggests that attitudes are composed of affective, cognitive, and behavioral components, which need not be consistent (e.g., Breckler, 1984; Ostrom, 1969). When these components are inconsistent, the same object may be evaluated differently depending on which component is highlighted. To return to the example of a flu shot, people may evaluate flu shots positively on a cognitive dimension (e.g., they promote health), but negatively on an affective dimension (e.g., they can be painful). Highlighting the affective rather than cognitive dimension should promote more negative evaluations of flu shots. Thus, to the extent that pictures relative to words promote greater affective processing of stimuli, they should promote more negative evaluations of inoculation (Breckler & Wiggins, 1989).

Pictures and words differ not just in their level of emotionality, but also in their level of construal (Amit, Algom, Trope, & Liberman 2009b). There are many parallels between pictures versus words and low-level versus high-level construal, respectively. Pictures more closely capture the direct experience of objects – they physically resemble the objects that they represent, and highlight many of the specific, idiosyncratic features that distinguish a given stimulus from similar others – a representational process akin to low-level construal. Words, by contrast, do not physically resemble the objects that they represent, and instead highlight the categorical features of a stimulus that are invariant across instances – a representational process akin to high-level construal. Indeed, as CLT predicts, people associate pictures and words with psychological proximity and distance, respectively (e.g., Amit, Algom, & Trope, 2009a; Amit, Waks lak, & Trope, 2013). For example, participants were faster to identify objects in pictorial form when they were
presented in what appeared to be a spatially proximal location and in verbal form when they were presented in what appeared to be a spatially distant location (Amit et. al, 2009a). Research has further shown that pictures facilitate low-level construal whereas words facilitate high-level construal. For example, participants formed fewer yet broader categories when the to-be-sorted objects were presented as words than when they were presented as pictures, suggesting high-level construal (Rim, Amit, Fujita, Trope, Halbeisen, & Algom, 2015). Collectively, this suggests that whereas pictures promote immersion, words promote transcendence. These differences in presentation format may therefore influence self-control by shifting construal level. Specifically, stimuli presented as pictures may activate low-level construal, whereas the same stimuli presented as words may activate high-level construal, promoting self-control failure and success, respectively. Critically, CLT predicts that words and pictures influence self-control even after controlling for emotionality.

**Individual Differences in Ability to Engage in High and Low-Level Construal**

Just as construal level may influence self-control via shifts in the environment (i.e., picture vs. word presentation format of stimuli), so too may construal level influence self-control at the level of individual differences in cognitive processing abilities. A rich literature attempts to identify cognitive deficiencies that contribute to self-control failure, such as executive functioning (Mischel, Ayduk, Berman et al,..., 2011) and working memory capacity (Hinson, Jameson, & Whitney, 2003; Hofmann, Schmeichel, & Baddeley, 2012). Construal level theory suggests that individual differences in cognitive ability to engage in low and high-level construal may also contribute to self-control
outcomes. Previous research demonstrates that low vs. high-level construal promotes self-control success, but these findings do not clarify whether high-level construal promotes self-control, whether low-level construal undermines it, or some combination of these factors. One reason for this lack of clarity is the distinction between construal as a process vs. construal as a representational output. While representation outputs are situated on a continuum from low to high-level, low and high-level construal processing can be understood as two separate cognitive abilities, each on their own continuum. An individual may have low or high ability to engage in low-level construal as well as low or high ability to engage in high-level construal. The present research attempts to disentangle construal process from construal output and separately measure low and high-level construal processing ability.

Little research exists to clarify how these separate abilities may interact to produce self-control effects. While CLT focuses on cognitive processing at the theoretical level, as noted earlier, empirical studies generally assess the representational outputs that those processes are assumed to engender rather than the cognitive processes themselves. One of the goals of the present research is to assess low and high-level construal processing directly, rather than through low and high-level construal outputs. One possibility for how these cognitive processing abilities operate is that those who are most effective in self-control are those who have the greatest ability to engage in low-level construal and in high-level construal. In other words, those with the most flexible set of construal abilities may be in the best position to succeed in self-control, particularly if they are able to recognize which construal mindset will be most helpful for the task at
hand and then effectively deploy that strategy. An alternate hypothesis is that those with the best self-control are those who are adept at engaging in high-level construal but are unable to engage in low-level construal. Such a set of construal abilities may have a protective effect when it comes to self-control conflicts because an inability to engage in low-level construal may make the near-term reward less salient and therefore less tempting.

**The Present Research**

Five studies will explore the role of construal level on self-control decision-making. Three initial studies will assess how features of the situation can serve to impact construals by investigating the role of picture vs. word presentation format on self-control processing. Study 1 will examine whether words lead to more goal-consistent associations among those who value the delayed reward. Studies 2 and 3 will investigate the mechanism for such an effect by examining whether words lead to categorization along a goal-relevant dimension (Study 2) whereas pictures lead to categorization along a temptation-relevant dimension (Study 3). Two additional studies will investigate the role of individual differences in ability to engage in low and high-level construal on self-control outcomes. Study 4 will rely on the same association between picture vs. word presentation format and low and high-level construal as Studies 1-3, but will examine this association as an individual difference in visual vs. verbal processing ability as a measure of low and high-level construal processing ability, respectively. Study 5 will extend this individual difference approach to an additional measure of ability to engage in low and high-level construal processing that does not rely on visual and verbal processing.
Chapter 2: The Effect of Picture vs. Word Presentation Format on Self-Control

In the present studies, my collaborators and I examine the consequences of construal level differences between pictures and words on self-control. Given previous research that high-level construal, compared to low-level construal, promotes self-control (Fujita et al., 2006; Fujita & Carnevale, 2012) and that words, compared to pictures are a more high-level construal representation system (Rim, Amit, Fujita, Trope, Halbeisen, & Algom, 2015), it should be the case that words, compared to pictures, promote self-control success. The goals of these three studies are three-fold. The first goal is to demonstrate the effect of construal level on self-control processes in a way that is more plausible than mindset manipulations. Previous research on construal level and self-control has generally relied on procedural manipulations (e.g., the “why/how” task and the “category/exemplar” task) to shift construal and has assumed that these mindsets carry over to subsequent self-control decisions. While research that uses such mindset manipulations compellingly demonstrates their effect on self-control, we aim to illustrate the effect of construal level on self-control using a manipulation of construal that people are more likely to encounter outside of a laboratory. We therefore selected picture vs. word presentation format because previous research has demonstrated their relationship to low and high-level construal, respectively, and because people encounter visual and
verbal information in their everyday lives in a way that they do not encounter procedural mindset manipulations.

The second goal of this line of research is to use picture vs. word presentation format to demonstrate that shifting construal level changes the fundamental meaning of stimuli in ways that are relevant to goals. Previous research has manipulated construal level and assessed changes in evaluative associations as an indicator of the change in meaning engendered by changes in construal (see Fujita & Han, 2009). The present research goes a step further to seek more direct evidence that changing construal changes stimulus meaning through categorization rather than through evaluative associations.

A third goal of this research is to demonstrate that shifts in construal can impact self-control without engaging differences in emotionality. Experimentally controlling for emotionality differences between picture and word versions of stimuli can test this assertion.

**Study 1**

In Study 1, we examine the influence of picture vs. word presentation format on self-control processes. Specifically, we used the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz., 1998) to assess evaluative associations between goal-undermining vs. goal-consistent objects (presented between-subjects as pictures vs. words) and positivity vs. negativity. We also assessed choices between healthy and unhealthy foods as a function of picture vs. word presentation format.

The IAT requires participants to sort target stimuli rapidly into one of four categories (on two category dimensions). Two categories are mapped onto each response
key. Typically, one category dimension assesses evaluative attributes while the other category dimension assesses the target category of interest. The logic of the IAT is that faster responding results when associated concepts are mapped onto the same response key. For example, faster responding when “women” and “unpleasant” are mapped onto the same keyboard key (versus when “women” and “pleasant” share the same response key) indicates greater ease in associating women with negativity (Greenwald, Nosek, & Banaji, 2003). We also assessed preferences between healthy and unhealthy foods as a function of picture vs. word presentation format. We predicted that among dieters, words relative to pictures would promote ease of associating healthy vs. unhealthy foods with good vs. bad, respectively. In addition, we predicted that picture vs. word presentation format would lead dieters to choose healthy over unhealthy foods and that this relationship would be mediated by the strength of associations between healthy foods/positivity and unhealthy foods/negativity.

**Overview**

Participants completed a vegetable-dessert IAT. Participants completed either a word or picture version of the IAT (manipulated between subjects), with target stimuli (i.e., vegetables and desserts) presented as words or pictures, respectively. Participants also indicated their preference for vegetables or desserts as a snack. We hypothesized that pictures and words should lead to different associations with these diet-consistent versus diet-undermining objects, respectively. Specifically, those in the word condition, as compared to the picture condition, should show goal-consistent associations (i.e., associations between vegetables/good and desserts/bad). Critically, we only expected
this pattern of associations for those for whom dieting presents a self-control conflict -- dieters. We expected this effect to be less apparent among non-dieters, because unhealthy foods are less multiply-categorizable for those who do not value the distal rewards of weight-loss. We also expected that words would increase the preference for healthy vegetables (vs. unhealthy desserts) as a snack among dieters, to the extent that dieters show goal-consistent associations (associations between vegetables/good and desserts/bad).

Method

Participants. One hundred fifty-four Ohio State University undergraduates completed this study in a laboratory for partial course credit and were randomly assigned to condition. We excluded data from 11 participants because of computer malfunctions, leaving a sample of 143 (60 male, 83 female).

Stimuli selection. Because it was crucial to keep level of emotionality constant across the picture and word conditions, emotionally-impoverished pictures of food stimuli (vegetables and desserts) were obtained from Microsoft ClipArt in order to minimize the likelihood that the pictures would be more emotionally evocative than the words (see Figure 1). We conducted a pilot study to provide evidence for this assertion. Participants (N = 82) recruited using Mechanical Turk (Burhmeister, Kwan, & Gosling, 2011) rated the emotionality of various vegetable (BROCCOLI, CARROT, PEAS, SPINACH) and dessert (BROWNIE, CAKE, COOKIE, MILKSHAKE) stimuli using a 5-point scale (i.e., “How strong of an emotional response do you have to what you see below?” with 1 = very weak, 5 = very strong). Participants rated picture and word stimuli
in counterbalanced order, with no participants rating both versions of the same stimulus. Participants also reported their dieting status (“Are you now watching what you eat in order to lose weight?”). We identified 44 dieters and 38 non-dieters. Emotionality ratings were analyzed using a 2 (food type: vegetable versus dessert) X 2 (presentation format: picture versus word) X 2 (dieting status: dieters versus non-dieters) repeated measures ANOVA with food type and presentation format as within-subjects factors and dieting status as a between-subjects factor. Desserts ($M = 3.27, SD = .98$) were generally rated as more emotional than vegetables ($M = 2.58, SD = .86$), $F (1, 78) = 27.90, p < .001, r = .95$ (see Figure 2). Unexpectedly, words ($M = 3.00, SD = .81$) were generally rated as marginally more emotional than pictures ($M = 2.87, SD = .76$), $F (1, 78) = 3.27, p = .08, r = .35$. Critically, presentation format did not appear to differentially impact emotional responses to the two types of stimuli, $F (1, 78) = .66, p = .42, r = .07$, nor did this effect vary by dieting status, three-way $F (1, 78) = .06, p = .82, r < .01$. These results suggest that the picture versions of the stimuli were no more emotionally evocative than the word versions – perhaps because of the emotionally impoverished nature of the pictures that we selected. Thus, any apparent differences between picture vs. word conditions is unlikely to be due to differences in emotionality.
Figure 1: Stimuli used in picture version of implicit association test (IAT)

Figure 2. Food type by presentation format by dieting status interaction on ratings of strength of emotional response from 1 (very weak) to 5 (very strong)
**Materials and procedure.** All participants completed a vegetable-dessert IAT. Each IAT consisted of seven blocks. Block 1 required categorizing stimuli as vegetables or desserts. Block 2 required participants to categorize valenced words (e.g., cancer, rainbow) as good or bad. Blocks 3 and 4 constituted a combined critical block in which vegetables were paired with negativity and desserts with positivity (or vice versa, counterbalanced). Block 5 was another practice, with key pairings reversed from Block 1. Blocks 6 and 7 were also critical trials, reversing key pairings of Blocks 3 and 4. Error feedback was provided for incorrect responses. Participants were randomly assigned to the picture or word condition.

After completing the IAT, participants indicated their dieting status (“Are you now watching what you eat in order to lose weight?”). We identified 51 dieters and 92 non-dieters. Finally, participants were asked to report their snack preferences as a dichotomous choice (“Right now, if you had to choose between a vegetable versus a dessert, which would you choose?”). Participants were then debriefed, thanked and dismissed.

**Results**

We analyzed IAT responses using the $D$-score algorithm with a 600 ms penalty for incorrect responses that is commonly used in the IAT literature (Greenwald et al., 2003). This algorithm includes the following procedures: (1) delete individual trials greater than 10,000 ms, (2) delete subjects for whom more than 10% of trials have less than 300 ms latencies, (3) compute standard deviation for all trials in blocks 3 and 6 and likewise for blocks 4 and 7, (4) compute mean latencies for responses for each block.
through 7, (5) compute two mean differences first for block 6 minus block 3 and likewise for block 7 minus block 4, (6) divide each difference score by its associated standard deviation, (7) \( D \) = the average of the two resulting ratios. Higher \( D \)-scores indicate evaluative associations that promote self-control – namely, greater ease of categorizing stimuli when vegetable/good and dessert/bad response categories were paired (vs. vegetable/bad and dessert/good). Overall, \( D \)-scores were negative – dessert/good and vegetable/bad response pairings facilitated response times (\( M = -.29, SD = .52 \)), \( t(143) = 6.58, p < .001, r = .48 \). To test the impact of dieting status and IAT format on moderating this effect, we analyzed \( D \)-scores using a 2 (dieting status: dieters versus non-dieters) X 2 (IAT format: picture versus word) ANOVA. As predicted, there was a significant dieting status by IAT format interaction, \( F(1, 142) = 7.22, p < .01, r = .52 \) (see Figure 3). Specific comparisons revealed that among dieters, completing the word (\( M = -.17, SD = .57 \)) relative to the picture (\( M = -.48, SD = .49 \)) version of the IAT facilitated performance when dessert/bad (and vegetable/good) were paired, \( F(1,139) = 4.63, p = .02, r = .37 \). Among non-dieters, word (\( M = -.35, SD = .37 \)) and picture versions of the IAT (\( M = -.18, SD = .61 \)), if anything, produced the opposite pattern of results, with words impeding performance when dessert/bad and vegetable/good categories were paired, \( F(1,139) = 2.59, p = .07, r = .21 \).
Recall that after completing the IAT, participants indicated whether they would prefer to eat a vegetable or dessert. This allowed us not only to examine the effect of presentation format and dieting status on the strength of evaluative associations between vegetables/desserts and positivity/negativity, but also whether these changes in evaluative associations then impacted subsequent choice preferences. We first tested the direct effect of the condition by dieting status interaction on preferences. This effect was not
significant, $b = 1.17, SE = .74, p = .11$, however the results were in the expected pattern. Non-dieters did not differ in how likely they were to choose vegetables as a snack in the picture (33%) and word (30% conditions), $\chi^2 (n = 92) = .05, p = .82$. Dieters were marginally more likely to prefer vegetables in the word (58%) than picture (32%) condition, $\chi^2 (n = 51) = 3.40, p = .07$ (see Figure 4). The lack of a direct effect may be due to lack of statistical power. The sample consisted of 51 dieters which may be insufficient to detect an effect on a dichotomous variable. It is also possible that the lack of a direct effect is due a simultaneous suppressing effect of an unmeasured mechanism, though it is not immediately clear what this suppressor variable might be.

Despite the lack of a direct effect, we tested the indirect effect of the interaction between presentation format and dieting status on choice through $D$-scores. Dieting status and IAT type were effects-coded (-1 = non-dieter, 1 = dieter; -1 = picture, 1 = word) and food preference was dummy coded (0 = dessert, 1 = vegetable). We used bias-corrected bootstrapping procedures ($N = 10,000$) and found that not only did the interaction between presentation format and dieting status predict $D$-scores, but that these $D$-scores in turn predicted choice preferences ($b = .69, SE = .36, p < .05$). This indirect effect was statistically significant, 95% CI = [0.0066 - .2178] (see Figure 6). This analysis indicates that the words led people to evaluate temptations less positively, which in turn led to more dieting-consistent choices.
Discussion

These results suggest that dieters are responding differentially to the same stimuli based on their presentation format. Specifically, words lead dieters to more goal consistent associations (i.e., associations between distal goal stimuli and positivity) whereas pictures lead dieters to less goal consistent associations (i.e., associations between proximal goal stimuli and positivity) and that these associations in turn promote diet-consistent food preferences (preference for healthy vegetables vs. unhealthy desserts).
Study 1 demonstrates that pictures and words lead to different evaluative associations and preferences towards self-control relevant stimuli and suggests shifts in construal as the mechanism for this effect. Because stimuli were selected to hold emotionality constant across picture vs. word presentation formats, differing levels of emotional evocativeness are unlikely to be responsible for the effect of presentation format on associations. This does not definitively indicate, however, that construal is responsible. A better test for a construal mechanism is to examine whether changing the presentation format of a stimulus changes the meaning and interpretation of that stimulus in ways that are relevant to proximal and distal goals. Therefore, the goal of Studies 2 and 3 is to test the proposition the words versus pictures change the meaning of stimuli by sensitizing people to different category dimensions of stimuli.

Presentation format, picture vs. word, should shift the construal level, which in turn will change the salient category dimension. This change should reduce the ambiguity of the self-control conflict by shifting categorization towards one category over another. Highlighting one category dimension over another has a critical impact on evaluative associations because the proximal vs. distal rewards available in self-control conflicts generally point in different evaluative connotation directions (i.e. a donut is good now because it tastes good, but bad for later because it is fattening). Specifically, pictures should promote low-level construal, facilitating evaluative associations that undermine self-control, whereas words should promote high-level construal, facilitating evaluative associations that promote self-control.
Participants completed a categorization task with stimuli relevant to the self-control conflict of dieting (vegetables and desserts), which were presented as words versus pictures. We predicted that among the dieters, words relative to pictures would enhance sensitivity to the goal-consistent weight-loss dimension of these stimuli (Study 2), and pictures relative to words would enhance sensitivity to the goal-undermining taste dimension (Study 3).

Studies 2 and 3

Overview

Studies 2-3 examine change in meaning directly via categorization, rather than assessing the evaluative associations that result from such shifts in meaning. Self-control relevant stimuli are multiply-categorizable along dimensions that highlight short-term and long-term rewards (i.e., tastiness and healthiness in the case of foods; Young & Fazio, 2013). Therefore, we expected individuals would be more sensitive to the distal goal-relevant dimensions of stimuli when those stimuli are presented as words rather than pictures, but would be sensitive to the temptation-relevant dimension of stimuli when they are presented as pictures rather than words. To test this hypothesis, we presented participants with single-category Implicit Association Tests (SC-IAT) in Studies 2-3. The SC-IAT assesses the degree to which pairing a single other category with another category dimension facilitates categorization of stimuli (Karpinski & Steinman, 2006). The versions that we implemented assessed to what degree words vs. pictures of vegetables and desserts facilitated categorizing stimuli on the dimension of weight-loss (Study 2) and tastiness (Study 3). We predicted that presenting stimuli as words rather
than pictures to dieters would enhance sensitivity to the weight-loss dimension of the stimuli, thereby facilitating performance when vegetables were paired with weight-loss, whereas presenting stimuli as pictures should enhance sensitivity to the tastiness dimension, thereby facilitating performance when desserts were paired with tastiness. We expected this effect to be less apparent among non-dieters, because healthy and unhealthy foods are less multiply-categorizable for those who do not have a distal weight-loss goal.

**Method**

**Participants.** Students at the Ohio State University participated in both studies in exchange for partial course credit. They were randomly assigned to condition. Two-hundred three participated in Study 2. We excluded data from 2 participants because of computer malfunctions and from 3 participants who they indicated that they did not understand the directions for the SC-IAT, leaving a sample of 198 (111 male; 87 female). One-hundred seventy-eight students participated in Study 3 (61 male, 117 female).

**Materials and procedure.** We followed procedural recommendations described by Karpinski and Steinman (2006) in implementing the SC-IAT. We presented participants with the same vegetable and dessert stimuli that used in our stimuli selection pilot study, displaying them as words in one condition and as pictures in the other. At the same time, participants sorted weight-loss related words (CALORIES, DIET, FITNESS, LEAN, SKINNY, THIN, SLIM) into the single category of “weight-loss” in Study 2 and taste related words (SWEET, YUMMY, DELICIOUS, DECADENT, MOUTHWATERING, COMFORTING, DELISH) into the single category of “tasty” for Study 3. The SC-IAT consisted of two stages, which all participants completed in the
same order. Each stage consisted of 24 practice trials followed by 72 critical trials. In Stage 1, participants responded to vegetable and weight-loss using the ‘A’ key on the left side of the keyboard and to dessert using the ‘5’ key on the right side of the keyboard (on the number pad). To prevent response bias, vegetables, weight-loss related words, and desserts were presented in a 7:7:10 ratio so that 58% of correct responses used the ‘A’ key and 42% of correct responses used the ‘5’ key. Stage 2 of the SC-IAT was identical to the first, but with key pairings reversed. After completing the SC-IAT, participants indicated their dieting status (“Are you now watching what you eat in order to lose weight?”). We identified 85 dieters in Study 2 and 69 dieters in Study 3. Participants were then debriefed, thanked, and dismissed.

Results

We analyzed SC-IAT responses using the $D$-score algorithm with 400 ms incorrect response penalties as recommended by Karpinski and Steinman (2006). In Study 2, we identified blocks in which vegetable/weight-loss were assigned the same response key as compatible (dessert/weight-loss blocks = incompatible). In Study 3, we identified blocks in which dessert/tasty were assigned to the same response key as compatible (vegetable/tasty = incompatible). Higher $D$-scores indicate greater facility in categorizing stimuli during compatible relative to incompatible blocks. $D$-scores were analyzed using a 2 (dieting status: dieters vs. non-dieters) X 2 (IAT format: picture vs. word) ANOVA. There was no main effect of IAT format or dieting status in either study. Analyses of both studies, however, revealed the predicted (albeit marginally significant)
interaction between dieting status and IAT format – Study 2: $F(1, 194) = 2.80, p = .10, r = .20$; Study 3: $F(1, 174) = 2.66, p = .10, r = .20$.

In Study 2, the word ($M = .14, SD = .39$) relative to picture ($M = -.04, SD = .44$) version of the SC-IAT enhanced dieters’ performance on weight-loss/vegetable (vs. weight-loss/dessert) pairings, $F(1, 194) = 3.92, p = .03, r = .27$ (see Figure 5). In Study 3, as predicted, the picture ($M = .22, SD = .37$) vs. word ($M = .07, SD = .41$) version of the SC-IAT enhanced dieters’ performance on taste/dessert (vs. taste/vegetable) pairings, $F(1, 174) = 2.93, p = .05, r = .22$ (see Figure 6). There were no significant differences among non-dieters between the picture and word versions of the task in either study – Study 2: $F(1,194) = .07, p = .79, r < .01$; Study 3: $F(1, 174) = .22, p = .76, r = .02$. 
Figure 5. Study 2 - Implicit association test (IAT) performance as a function of dieting status and IAT type when vegetable/weight-loss are paired.
Figure 6. Study 3 - Implicit association test (IAT) performance as a function of dieting status and IAT type when dessert/tasty are paired

**Discussion**

Collectively, the findings from Studies 2-3 are consistent with the proposition that words and pictures change how people construe stimuli in the IAT. As predicted, dieters became more sensitive to the diet-consistent properties of stimuli, as indicated by greater ease categorizing stimuli when vegetables were paired with weight-loss, when those stimuli were presented as words rather than pictures. Also as predicted, dieters became more sensitive to the tempting hedonic properties of stimuli, as indicated by greater ease
categorizing stimuli when desserts were paired with tasty, when those stimuli were presented as pictures rather than words, consistent with the suggestion that words promote high-level construal whereas pictures promote low-level construal. Furthermore, these findings provide evidence that shifting construal (via picture vs. word presentation format) shifts the meaning that people apply to the same stimuli. Thus, the same object, such as a piece of chocolate cake, is subjectively understood within the context of its relationship to dieting when it is presented as a word, and subjective understood within the context of its relationship to tastiness when it is presented as a picture. These shifts in categorization capture the shift in meaning from diet-buster to tasty snack as a function of high and low-level construal.

Taken as a whole, Studies 1-3 examined how pictures and words impact evaluative associations in the context of self-control and suggest construal level as a mechanism. Study 1 revealed that words relative to pictures reduced the ease of associating desserts (relative to vegetables) with positivity among the dieters in our sample. Studies 2-3 provided evidence that words relative to pictures changed the meaning of food stimuli for dieters. Words were more likely than pictures to enhance dieters’ sensitivity to the diet-relevant dimension of food stimuli whereas pictures were more likely than words to enhance dieters’ sensitivity to the hedonic-relevant dimension of the same stimuli. These studies are consistent with our proposition that words vs. pictures promote high-level vs. low-level construal, respectively. This, in turn, can impact how people evaluate objects and events, particularly when stimuli are relevant to self-control conflicts, a domain in which evaluative associations are construal-dependent.
Whereas words promote evaluative associations that should promote distal goals by enhancing sensitivity to those features, pictures promote evaluative associations that should promote more proximal, goal-undermining temptations by enhancing sensitivity to hedonism-relevant stimulus features. These findings have a number of important theoretical and methodological implications.

This set of studies sought to demonstrate three key theoretical contributions: to assess whether picture vs. word presentation format impacts self-control, to demonstrate construal level as the mechanism for these effects, and to control for the alternative explanation of emotionality.

The first goal of this research was to examine whether picture vs. word presentation format can impact self-control. These findings demonstrate that this is indeed the case and suggest that picture vs. word presentation format is a promising route through which to harness the effects of construal to “nudge” people towards more adaptive decisions and self-control success (Thaler & Sunstein, 2008). For example, public health officials may want to change the presentation format of their health advocacy campaigns, transmitting information about healthy behaviors in words rather than pictures, particularly if those healthy behaviors involve a long-term goal at the expense of short-term unpleasantness. For example, public health advocates may be able to increase healthy eating choices by presenting food temptations as words rather than pictures on menus. We might observe that policies adopted by the United States Food and Drug Administration to control cigarette smoking embrace the opposite strategy, imposing graphic warning labels on cigarette packaging (U.S. Food and Drug
Administration, 2013). Pictures, especially graphic ones, solicit more attention than words, but the present research suggests that words may be more effective in anti-tobacco campaigns when controlling for attention. With this in mind, we encourage future research adopting a construal level perspective to examine what impact words and pictures may have on evaluative processes beyond evaluative associations, and with what practical consequences for attitude formation and change. A key goal of future research into this question should be to determine what balance of pictures and words is best to maximize attentional salience and message processing with a focus on long-term goal pursuit.

Relatedly, picture vs. word presentation format has implications for others who are interested in shifting attitudes. For example, marketers may want to market vice products that appeal to our momentary desires (e.g. chocolate) visually as pictures, yet market virtuous products that require delayed gratification (e.g. savings accounts) verbally as words.

The second conceptual goal of this research was to use picture vs. word presentation format to demonstrate that shifts in construal change stimulus meaning and interpretation in ways that are goal-relevant. Previous research manipulated construal and assessed change in meaning via evaluative associations (i.e., Fujita & Han, 2009). These studies sought to go beyond previous research by gathering more direct evidence that shifts in construal shifts the meaning of stimuli. Fujita and Han showed that shifting construal (via a mindset manipulation) led to evaluative associations of self-control relevant stimuli in line with goals. Specifically, high-level construal led to associations
between vegetables and positivity and between desserts and negativity. Shifts in the meaning of these stimuli were assumed to account for these effects (i.e., desserts are bad to the extent that they are categorized as sinful diet-busters rather than tasty indulgences). Study 1 replicated this finding using picture vs. word presentation format as the manipulation of construal. Studies 2 and 3 went a step further by revealing more directly that shifting construal does in fact shift categorization. Words led dieters to categorize vegetables as related to weight-loss while pictures led dieters to categorize desserts as tasty treats.

The third conceptual goal of this research was to demonstrate the role of construal level on self-control while controlling for emotionality differences between pictures and words. Our stimuli selection pilot data support the supposition that pictures and words differ in ways other than emotionality. These data found that the pictures used in our three experiments were no more emotionally evocative than the words. Instead, Studies 2-3 demonstrated that words and pictures changed dieters’ sensitivity to the diet and taste-relevant (i.e., goal and temptation-relevant) dimensions of target stimuli. Together, this suggests that words and pictures can change the construal of objects without necessarily changing the level of emotionality. To our knowledge, these are the first studies to experimentally control for level of emotionality, thereby excluding emotionality as an alternate explanation for picture vs. word presentation format effects on judgments and decisions. We hasten to add, however, that with most stimuli, emotionality and construal level are likely confounded. We are not attempting to repudiate past work on the emotional differences between words and pictures; rather, we
highlight an additional dimension (i.e., construal level) that may produce effects that are independent of emotionality.

While these findings indicate that pictures and words vary on construal level above and beyond level of emotionality, the relationship between construal and emotion merits further exploration. One possible response is that low-level construal is more emotional than high-level construal. CLT, however, suggests that the emotional experiences people have depend on the high-level and low-level features of the event. Some emotions may represent acute responses to the unique, idiosyncratic features of the here-and-now, whereas other emotions may result from understanding the event in a broader context (see also Libby & Eibach, 2011). Whereas low-level construal is associated with the concrete feeling of lust, for example, high-level construal is associated with the more abstract feeling of love (e.g., Epstude & Förster, 2011). Similarly, whereas low level-construal is associated with primary emotions such as happiness, high-level construal is associated with secondary self-reflective emotions such as pride (e.g., Eyal & Fishbach, 2010). The critical point is that low-level and high-level construal may not differ on degree of emotionality; rather, they may differ on the type of emotions experienced. One might even suggest a distinction between “low-level” and “high-level” emotions that may be induced via pictures and words, respectively, although this speculation awaits empirical support.

This line of research has implications for methodology as well. Methodologically, the present work suggests that the decision whether to use word or picture stimuli to assess evaluations may influence participants’ responses. To the extent that any
evaluation of interest is construal-dependent, the use of word vs. picture stimuli may impact participants’ apparent evaluations, and thus the conclusions researchers draw from such data. The present work suggests that these decisions require nuanced consideration.

Future research should examine whether these findings are specific to the IAT. Although the IAT is a popularly used measure of evaluative associations, it is also unique in that it requires participants to make explicit categorical judgments. Other measures, such as evaluative priming (e.g., Fazio, Jackson, Dunton, & Williams, 1995) and the affective misattribution procedure (e.g., Payne, Cheng, Govorun, & Stewart, 2005), do not require such categorization. Future research might test whether picture vs. word stimuli promote similar effects when using an alternative assessment of evaluative associations.

The findings from Studies 1-3 add to the literature suggesting that high-level construal promotes self-control. As in previous research, this study relies on an experimental manipulation of construal level (via picture vs. word presentation format). These studies show the impact of exposing people to pictures vs. words in their environment. We assume that exposure to visual information leads people to process information visually whereas exposure to verbal information leads people to process information verbally and further assume that visual and verbal processing represent low-level and high-level construal processing, respectively. We do not, however, assess this relationship directly in Studies 1-3. The next set of studies will investigate the role of low and high-level processing on self-control outcomes more directly.
Studies 4-5 will examine this question by assessing individual differences in ability to engage in low and high-level construal and the impact of those abilities on self-control outcomes. Study 4 will bridge the gap between presentation format and individual differences by examining visual and verbal processing style as a person-level variable. Specifically, Study 4 will examine fluency at visual vs. verbal processing and the impact of those abilities on self-control. Those who are more fluent at processing information verbally should be more adept at high-level construal processing and therefore better at self-control. Study 5 will assess the influence of low and high-level construal ability through an alternate measure that does not rely on visual and verbal fluency.
Chapter 3: The Effect of Individual Differences in Ability to Engage in Low and High-Level Construal on Self-Control Outcomes

Study 4

This line of research has two key goals. The first is to investigate whether low and high-level construal processes can be distinguished from low and high-level construal representational outputs. The second goal is to examine whether differences in ability to engage in low and high-level construal processing can be used to predict self-control outcomes.

Overview

In Study 4, we assess ability to engage in visual and verbal processing as an indicator of ability to engage in low and high-level construal processing, respectively. We measure visual and verbal processing by assessing accuracy on a similarity judgment task that requires visual and verbal processing and use these accuracy scores to predict self-control outcomes. This study is the first that we are aware of that attempts to experimentally disentangle construal as output vs. construal as a process. We assess visual and verbal processing fluency independently, because we believe that low and high-level construal processing abilities are conceptually distinct. Previous research that
has examined construal output as an indicator of construal processing has not been
designed to separate these abilities. We aim to assess whether these abilities are indeed
distinct, and if so, with what consequences for self-control.

Self-control is assessed in two key ways: via self-report and via counteractive
evaluations. We use two self-report measures of domain general self-control success that
have been widely used in the literature: the Self-Control Schedule, developed by Michael
Rosenbaum (1980; see Appendix A) and the Self-Control Scale, developed by June
Tangney, Roy Baumeister, and Angie Luzio Boone (2004; see Appendix B).
Counteractive evaluations of stimuli that are relevant to short and long-term goals
provide a measure of self-control processing. This measure is derived from counteractive
control theory that proposes that people respond to goal threats by enacting various
cognitive, affective, and motivational processes to counteract the influence of short-term
temptations, thereby securing long-term rewards (Trope & Fishbach, 2000). One such
strategy involves evaluations of short-term and long-term rewards that protect the long-
term goal by devaluing short-term temptations while bolstering the value of the long-term
reward. Such a set of evaluations makes the short-term temptation less attractive while
making the goal-related stimulus more attractive. Previous research has shown that such
counteractive evaluations are a precursor to self-control behavior and are a marker of
good self-control (Myrseth, Fishbach, & Trope, 2009). Such strategies, however, are only
effective to the extent that one’s commitment to attaining the long-term goal is high.
Method

Participants. The study included two-hundred students (109 males, 89 females, 2 participants who did not provide a response) enrolled in an introductory psychology course at The Ohio State University. Students participated in exchange for partial course credit.

Materials and procedure. Participants were tested in the laboratory in groups of one to ten. Participants were greeted by a research assistant who gave verbal instructions and directed each participant to a computer. Participants read instructions on a computer screen and completed the study individually. All instructions and materials were presented via MediaLab and DirectRT.

Measure of visual and verbal processing ability. To assess visual and verbal processing ability, we used a word-based and picture-based feature matching task that has been used previously in the cognitive literature to assess visual and verbal skills (Kraemer, Rosenberg, & Thompson-Schill, 2009). This task has also been used by CLT researchers to assess the impact of construals on moral judgments (Amit & Greene, 2012). During the feature-matching task, participants were informed that during this task they would see a slide with one figure followed by a second slide with two figures and that the figures would be made up of different shapes, colors, and patterns. They were informed that their task was to indicate which of the two figures on the second slide is more similar to the figure on the previous slide via a button press (i.e., press a button on the right if the figure on the right is more similar and a button on the left if the figure on the left is more similar). Participants were told that some of the figures would be
presented verbally while others would be presented visually, were shown an example of
each trial type, and were told that the task was the same regardless of whether they saw a
visual or verbal representation of the figure. One of the comparison figures resembled the
target figure on two out of three dimensions and was coded as the correct response while
the other comparison figure resembled the target figure on only one of three dimensions.
The location of the more similar probe (left vs. right) was counterbalanced across trials
and randomized. There was no time limit for responding. A fixation cross appeared for
1,000 ms before each trial. Each target figure was displayed for 1,000 ms before the
comparison figures were displayed. Participants completed six practice trials and were
given feedback on whether their response was correct or incorrect.

There were 30 different visual target figures which varied on three dimensions:
color, shape, and pattern. Each visual target figure had a corresponding verbal target
figure. For example, one visual target was a solid green circle and the corresponding
verbal target was made up of the words “solid,” “green,” and “circle” arranged vertically
(See Figure 7 for example). Each dimension could hold five possible values (e.g., five
colors: red, blue, green, yellow, and orange). Participants completed 60 total trials (30
visual targets and their corresponding verbal targets). The proportion of responses in
which participants accurately identified the more similar comparison figure (i.e., the
figure that shared 2 out of 3 dimensions with the target figure) was used as an indicator of
greater accuracy for each trial type. Greater accuracy on the visual trials indicates greater
ability to engage in low-level construal and greater accuracy on the verbal trials indicates
greater ability to engage in high-level construal.
**Self-reported self-control.** Participants completed the short-version of the Self-Control Scale (Tangney et al., 2004), a domain-general assessment of self-reported self-control success. Participants indicated their agreement with 13 items, such as “I am able to work effectively toward long-term goals,” and “I am good at resisting temptation” on a five-point scale from 1 (not at all) to 5 (very much). Participants also completed the Rosenbaum Self-Control Schedule (Rosenbaum, 1980), a domain-general assessment of self-reported self-control success. Participants read a total of 36 statements and indicated how characteristic or descriptive each statement was of them on a scale of +3 (very characteristic, extremely descriptive) to -3 (very uncharacteristic, extremely undescriptive). Example statements include “When I plan to work, I remove all the things
that are not relevant to my work” and “When an unpleasant thought is bothering me, I try to think about something pleasant.”

*Measure of counteractive evaluations.* Participants next provided evaluations of various stimuli related to the self-control domain of academics. Sixteen stimuli were related to studying and academics, 16 stimuli were related to leisure, and 15 were unrelated to academics. Participants provided ratings of their positivity and negativity towards each object. Specifically, they were asked, “How positively do you feel towards the following object?” and “How negatively do you feel towards the following object?” Responses were provided on a seven point scale anchored by 1 (“Not at all Positive/Not at all Negative”) and 7 (“Extremely Positive/Extremely Negative”). All objects were presented as words.

*Measure of academic motivation.* After providing counteractive evaluations, participants completed five items designed to assess their motivation to do well academically. These included the statements: “To what extent is performing well academically an important goal for you?”, “How concerned are you about getting good grades?”, “To what extent do you make an effort to attend class and prepare for exams?”, “To what extent do you avoid distractions from your schoolwork?” and “How valuable would it be for you to do well in school?” Participants responded to a 7-point scale anchored at 1 (not at all) and 7 (extremely). These items were averaged to create a composite measure of academic motivation (α = .83). Participants provided demographic information and were then debriefed, thanked, and dismissed.
Results

Because our measure of verbal processing ability requires facility with the English language, 22 non-native English speakers and 3 participants who did not provide a response were excluded from all analyses, leaving a sample of 175. Responses on the Self-Control Schedule and Self-Control Scale were averaged such that higher scores indicated better self-control. Counteractive evaluation scores were significantly positively correlated with Self-Control Schedule scores \( r = .18, p = .02 \) and Self-Control Scale scores \( r = .39, p < .001 \). Scores on the Self-Control Scale and Self-Control Schedule were also significantly positively correlated \( r = .52, p < .001 \).

Measure of visual and verbal processing ability. Using the same analysis structure as previous researchers (Kraemer et al., 2009), we computed visual and verbal processing ability scores by calculating each participant’s accuracy for each trial type. Participants were significantly more accurate on the visual trials \( M = .87, SD = .12 \) than the verbal trials \( M = .83, SD = .13 \), \( t(171), p < .001 \), replicating previous research (Kraemer et al., 2009). Verbal and visual processing accuracy were significantly positively correlated such that accuracy on the visual trials was associated with accuracy on the verbal trials, \( r = .65, p < .001 \).

Self-reported self-control. We regressed mean-centered verbal accuracy, mean-centered visual accuracy, and the interaction of these two variables on Self-Control Schedule scores (see Figure 8). There was no effect of verbal accuracy on Self-Control Schedule scores, \( b = .35, SE = .32, p = .28, 95\% \text{ CI} [-.29, .99] \). There was also no effect of visual accuracy on Self-Control Schedule scores, \( b = -.61, SE = .40, p = .13, 95\% \text{ CI} [-.
1.40, .18]. There was, critically, a significant interaction between verbal and visual accuracy on Self-Control Schedule scores, $b = -3.55, SE = 1.72, p = .04, 95\% \text{ CI } [-6.95, - .15]). A simple slope analysis of the verbal accuracy variable revealed that at lower levels of verbal accuracy (-1 SD from mean), visual accuracy had no effect on Self-Control Schedule scores ($b = - .14, SE = .35, p = .68, 95\% \text{ CI } [- .83, .54]). At higher levels of verbal accuracy (+ 1 SD from mean), visual accuracy had a significant effect on Self-Control Schedule scores such that those with lower visual accuracy had higher Self-Control Schedule scores, $b = -1.08, SE = .55, p = .05, 95\% \text{ CI } [-2.16, .01]). A simple slope analysis of the visual accuracy variable revealed that among those with low visual accuracy (-1 SD from mean), verbal accuracy had a significant effect on Self-Control Schedule scores, $b = .78, SE = .36, p = .03, 95\% \text{ CI } [.08, 1.49], such that those with higher verbal accuracy had higher Self-Control Schedule scores. Among those with high visual accuracy (+ 1 SD from mean), verbal accuracy had no effect on Self-Control Schedule scores, $b = -.08, SE = .41, p = .85, 95\% \text{ CI } [-.90, .74].
We next regressed mean-centered verbal accuracy, mean-centered visual accuracy, and the interaction of these two variables on Self-Control Scale scores (see Figure 9). There was no effect of verbal accuracy on Self-Control Scale scores, $b = .19, SE = .48, p = .70, 95\% \text{ CI } [-.77, 1.14]$ nor was there an effect of visual accuracy on Self-Control Scale scores, $b = -.64, SE = .60, p = .28, 95\% \text{ CI } [-1.81, .54]$. There was no interaction between verbal and visual accuracy on Self-Control Scale scores, $b = -3.56, SE = 2.56, p = .17, 95\% \text{ CI } [-8.61, 1.49]$). Simple slope analyses of both verbal and visual accuracy revealed a similar pattern to results as the Self-Control Schedule but no statistically significant differences.

Figure 8. Study 4 – Self-Control Schedule scores as a function of verbal accuracy and visual accuracy
Counteractive evaluation scores. We computed counteractive evaluation scores by first averaging responses across objects to create mean positivity and negativity ratings towards academic and leisure words. We then reverse scored negativity ratings to create overall positivity ratings towards academics and leisure. Finally, we subtracted the leisure ratings from the academic ratings to create a total counteractive evaluation score such that higher numbers indicate more positive ratings of academics than leisure and therefore greater use of counteractive evaluations (i.e., better self-control). We then assessed the effect of verbal and visual processing ability by regressing verbal accuracy, visual accuracy, academic motivation, and the interaction of these variables on counteractive evaluation scores. There was a marginal effect of verbal accuracy on counteractive evaluation scores, such that higher verbal accuracy predicted lower...
counteractive evaluation scores, $b = -3.10$, $SE = 1.63$, $p = .06$, 95% CI [-6.32, 5.43].

There was no effect of visual accuracy on counteractive evaluation scores, $b = 1.45$, $SE = 2.02$, $p = .47$, 95% CI [-2.53, 5.43]. There was a significant effect of academic motivation on counteractive evaluation scores, such that those with higher academic motivation had higher counteractive evaluations scores $b = 43$, $SE = .22$, $p = .05$, 95% CI [-.002, .87].

There was not a significant three-way interaction between these variables, $b = 6.24$, $SE = 10.63$, $p = .56$, CI [-14.76, 27.23]. We broke down the three-way interaction by academic motivation. The interaction between verbal and visual accuracy on counteractive evaluation scores was not significant for those low in academic motivation ($b = 5.19$, $SE = 12.01$, $p = .67$, 95% CI [-18.52, 28.91]), or for those low in academic motivation ($b = 15.92$, $SE = 13.35$, $p = .23$, 95% CI [-10.44, 42.27]).

**Discussion**

This study provides some limited and preliminary evidence that verbal processing ability combined with low visual processing ability contributes to self-control success. Using verbal and visual processing accuracy as a measure of low and high-level construal ability, respectively, findings on the Self-Control Schedule suggest that ability to engage in high-level construal combined with *inability* to engage in low-level construal promotes self-control. Although not statistically significant, the general pattern of results for the Self-Control Scale was consistent with the Self-Control Schedule.

There was no evidence to support this pattern for counteractive evaluations of stimuli related to academics. One possible reason for the lack of an effect on counteractive evaluations is that there may be domain differences in the extent to which
visual and verbal processing can stand in for low and high-level construal processing. It may be the case that people find it more natural to think about the domain of academics verbally rather than visually. In other words, the analogue between a verbal and visual representation of studying may not be as clear as the verbal and visual analogues presented in our assessment of verbal and visual processing fluency. It may be the case that other domains are more amenable to verbal and visual processing of the same stimuli. The findings of Studies 1-3 suggest that dieting may be such a domain, perhaps because food in direct experience is more visual than is academics in direct experience.

Given these issues with using verbal and visual processing ability as a proxy for high and low-level construal ability, Study 5 draws on a more direct assessment of construal ability that does not rely on language. In addition, the findings of Study 4 are limited because the counteractive evaluations findings are not consistent with the self-reported assessments of self-control. Study 5 attempts to correct this by examining counteractive evaluations in domain in which we have already succeeded in shifting evaluations in Studies 1-3 (i.e., dieting).

Study 5

Overview

Study 4 suggested that facility at verbal processing combined with a lack of facility with visual processing produced the best self-control according to oneself-reported measure of self-control. This pattern, however, was not replicated with counteractive evaluations of short and long-term rewards. It is also possible that this pattern only holds for visual and verbal accuracy and not for other assessments of low
and high-level construal ability. A more direct measure of low and high-level construal ability that does not rely on facility with language may allow for a more content-free assessment of these abilities. Therefore Study 5 assesses low and high-level construal processing ability with an alternate measure that attempts to tap into these processing abilities more directly rather than through visual and verbal processing (through local vs. global processing). Study 5 also investigates counteractive evaluations in a different self-control domain, specifically dieting rather than academics.

Method

Participants. The study included 161 students (77 males, 84 females) enrolled in an introductory psychology course at The Ohio State University. Students participated in exchange for partial course credit.

Materials and procedure. Participants were tested in the laboratory in groups of one to ten. Participants were greeted by a research assistant who gave verbal instructions and directed each participant to a computer. Participants read instructions on a computer screen and completed the study individually. All instructions and materials were presented via MediaLab and DirectRT.

Measure of low and high-level construal processing ability. We developed a similarity judgment task to measure low and high-level construal ability that was modeled on the measure of visual and verbal processing ability in Study 4. Participants were informed that they would see a figure on the screen followed by a second figure on a second screen and were instructed to make a simple yes/no judgment as to whether or not the first figure resembled the second. They were told to select yes if the figures
resembled each other at either the local level (both figures were made up of the same constituent pieces) or the global level (both figures had the same overall shape). The initial target figures were, diamonds, squares, upward pointing triangles, or downward pointing triangles. The second comparison figures were squares, diamonds, and triangles made up of smaller squares, triangles, or circles (see Figure 10 for example trials). Participants were instructed to press the “S” button on the left side of the keyboard if the figures resembled each other and the “L” button on the right side of the keyboard if the two figures did not resemble each other and were instructed to respond as rapidly as possible. Participants provided 72 yes/no judgments, 48 of which were the critical trials. Among the critical trials, 24 of the figures resembled each other at the global level and 24 of the figures resembled each other at the local level. Faster correct responses on the globally similar trials indicated greater fluency at high-level construal processing and faster correct responses on the locally similar trials indicated greater fluency at low-level construal processing.
Measure of counteractive evaluations. After the measure of low and high-level construal processing ability, participants provided evaluations of various objects as in Study 4. In this study, the self-control domain of interest was dieting rather than academics. Nine objects were healthy foods, nine objects were unhealthy foods, and 30 were unrelated to dieting. Participants provided ratings of their positivity and negativity towards each object. Specifically, they were asked, “How positively do you feel towards the following object?” and “How negatively do you feel towards the following object?” Responses were provided on a seven point scale anchored by 1 (“Not at all Positive/Not at all Negative”) and 7 (“Extremely Positive/Extremely Negative”). All objects were presented as words.

Measure of dieting motivation. Following the counteractive evaluations, participant indicated their dieting status by responding to a dichotomous item: “Are you
now watching what you eat in order to lose weight?” (yes/no). We identified 59 dieters. Finally, participants provided demographic information such as age, gender, and English proficiency. Participants were debriefed, thanked, and dismissed.

Results

Measure of low and high-level construal processing ability. There were no differences in average RTs on the globally similar trials ($M = 1155.75, SD = 347.47$) compared to the locally similar trials ($M = 1203.21, SD = 527.28$), $t(150) = 1.58, p = .12$. Participants were significantly more accurate on the globally similar trials ($M = .83, SD = .17$) than on the locally similar trials ($M = .65, SD = .29$), $t(159) = 6.52, p < .001$. Overall, there was a significant tradeoff between speed and accuracy such that slower reaction times were associated with greater accuracy ($r = .15, p = .05$). To calculate low and high-level construal processing ability, we removed incorrect responses and trimmed responses at three standard deviations of each participant’s mean responses. We then created average log-transformed, mean-centered reaction times for the globally similar trials and the locally similar trials. Faster reaction times indicate greater facility at recognizing local and global similarity and are used as an indicator of low-level and high-level construal ability, respectively.

Counteractive evaluation scores. We computed counteractive evaluation scores by first averaging responses across objects to create mean positivity and negativity ratings towards healthy and unhealthy foods. We then reverse scored negativity ratings to create overall positivity ratings towards healthy and unhealthy foods. Finally we subtracted the unhealthy food ratings from the healthy food ratings to create a total
counteractive evaluation score such that higher numbers indicate more positive ratings of healthy foods than unhealthy foods and therefore greater use of counteractive evaluations (i.e., better self-control). We analyzed a three way interaction between RTs on globally similar trials, RT on locally similar trials, and dieting status on counteractive evaluation scores (see Figure 11). There was a significant three-way interaction between these variables, $b = 6.46, SE = 2.45, p = .02, CI [.83, 12.08]$. We broke down the three-way interaction by dieting status. The interaction between RTs on the globally similar and locally similar trials on counteractive evaluation scores was significant for dieters ($b = -5.15, SE = 2.60, p = .05, 95\% \ CI [-10.29, -.01]$), but not for non-dieters ($b = 1.31, SE = 1.16, p = .26, 95\% \ CI [-.98, 3.60]$). Among dieters with faster RTs (+1 SD from the mean) on the globally similar trials, RTs on the locally similar trials had a marginal effect on counteractive evaluation scores, $b = 2.10, SE = 1.24, p = .09, 95\% \ CI [-.35, 4.55]$, such that those with slower RTs (-1 SD from the mean) on locally similar trials had higher counteractive evaluation scores. Among dieters with slower RTs (-1 SD from the mean) on the globally similar trials, there was no effect of RTs on the locally similar trials on counteractive evaluations, $b = -.76, SE = 1.44, p = .60, 95\% \ CI [-3.60, 2.08]$. Among dieters with faster RTs (+1 SD from the mean) on the locally similar trials, there was no effect of speed on the globally similar trials, $b = .64, SE = 1.39, p = .65, 95\% \ CI [-2.11, 3.89]$. Among dieters with slower RTs (-1 SD from the mean) on the locally similar trials, there was a marginal effect of speed on the globally similar trials such that those who were faster (+1 SD from the mean) on the globally similar trials had higher counteractive evaluation scores, $b = -2.87, SE = 1.64, p = .08, 95\% \ CI [-6.11, .37]$. 

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Figure 11. Study 5 – Counteractive evaluations of healthy and unhealthy foods as a function of dieting status, speed at recognizing globally similar trials, and speed at recognizing locally similar trials

We also analyzed counteractive evaluations as a function of error rates on each trial type, in addition to reaction times. We analyzed a three way interaction between
error rates on globally similar trials, error rates on locally similar trials, and dieting status on counteractive evaluation scores. This three-way interaction was not significant, $b = 5.55$, $SE = 8.60$, $p = .52$, CI [-11.44, 22.53], nor were either of the underlying two way interactions between error rates on global trials and error rates on local trials for either dieters or non-dieters. The fact that reaction times, but not errors, predict counteractive evaluations suggest that this particular construal task was more sensitive to reaction times than to errors, though the reasons for this are not clear.

**Discussion**

In Study 5, ability to engage in high-level construal combined with inability to engage in low-level construal predicted greater use of counteractive evaluations of temptations and goals, but only among those who were motivated by dieting (i.e., dieters). These findings are consistent with the findings of Study 4 in which those with high verbal accuracy but low visual accuracy reported greater self-control on the Self-Control Schedule and further support the hypothesis that ability to engage in high-level construal combined with inability to engage in low-level construal promotes self-control outcomes. Furthermore, Study 5 provides evidence that this pattern is not dependent upon measures that rely on language-laden assessments of high-level construal ability.

While the results of Study 5 supported the hypothesis that high-level construal ability combined with low-level construal *inability* leads people to engage in counteractive evaluations to promote self-control in the domain of dieting, Study 4 found no such support in the domain of academics. One reason for these inconsistent findings may be domain differences. Perhaps people have a greater tendency to process foods
(both goal-promoting and temptations) at both low and high-level construal than they do to process academics (both goal-promoting and temptations) at low and high-level construal. In other words, perhaps people have a tendency to think about academics at only low or high-level construal rather than both.

Another possibility for our inconsistent findings may be the result of our methods. In Study 4, more than half of the words that participants evaluated were related to the self-control conflict (32 out of 47). In Study 5, only 18 out of 66 words were related to the goal conflict and the rest were goal-irrelevant filler words. Previous research has shown that high-level construal facilitates recognition of specific situations as relevant to self-control (Fujita & Sasota, 2011). Thus, the large proportion of goal-relevant words in Study 4 may have led participants to recognize the task as one relevant to self-control conflicts, thereby eliminating one mechanism through which construal level impacts self-control. In other words, perhaps participants engaged in counteractive strategies regardless of their visual and verbal processing ability because the nature of the task led them all to recognize that the task was relevant to self-control. This notion is bolstered by the fact that a much higher proportion of undergraduate research participants see academics as a self-control conflict than those who see dieting as a self-control conflict. While all participants in our research pool are university students, not all of them are trying to lose weight. In Study 5 on the other hand, a smaller proportion of goal-relevant target words may have better masked the purpose of the task, thereby creating greater ambiguity and more opportunity for construal level to have an impact.
Studies 4-5 had two main goals. The first was to examine whether low and high-level construal processes can be distinguished from low and high-level construal representational outputs. The second goal was to investigate whether differences in ability to engage in low and high-level construal processing predict self-control outcomes.

Studies 4-5 provided some supportive evidence that low and high-level construal are separable. One would expect low and high-level construal ability to be negatively correlated if they were on a single continuum. Instead, they are positively correlated, though not perfectly so (Study 4: $r = .65$; Study 5: $r = .72$), suggesting that they are independent and distinct abilities. Taken together, these findings provide evidence that low-level construal and high-level construal processing abilities are experimentally separable. Though further research is needed to replicate and bolster these effects, a measure of construal processing may have important theoretical implications for the field. A reliable assessment of construal processing would eliminate the need to rely on assessments of outputs as proxies for process. Separating low and high-level construal processes from low and high-level construal output, moreover, is an important contribution because it may clarify debates in the literature on when low-level, rather than high-level construal may promote self-control success. For example, some argue that while dieting requires high-level construal to clarify the value of the long-term dieting goal, implementation of this goal requires low-level construal, as when dieters meticulously count calories and track food intake. It is possible that such debates conflate process and output, such that while calories are a concrete feature of foods, it is high-level construal processes that drive dieters to attend to them. Procedures that separate
measures of construal processes from measures of construal output may be able to contribute meaningfully to these debates in ways that advance our understanding of self-control.

Processing patterns that are functional for self-control are not necessarily functional for all judgments and decisions. Inability to engage in low-level construal, while adaptive for self-control, may be maladaptive for other cognitive judgments or forms of self-regulation. For example, someone who is unable to immerse themselves in the here-and-now may struggle to sink a golf putt or hit a dart board, tasks that require a sharp focus on idiosyncratic local demands, but do not feature competing short-term vs. long-term goals. Future research should examine how abilities to engage in low and high-level construal, as well as the ability to shift between levels, influence construal-dependent judgments more broadly, and self-control more specifically. Future research should also determine whether high-level construal ability impedes performance on tasks that require a focus on concrete details. Another question for future research is whether those with the ability to construe stimuli flexibly (at either low or high-level construal) as well as the ability recognize which cognitive mindset will most benefit the task at hand are the best self-regulators more generally. Such individuals would have multiple construal level tools in their self-regulatory toolbox, which, combined with accurate beliefs about which construal level is most useful for which tasks, would allow them to deploy construal level strategically and effectively to solve many self-regulatory challenges. For example, such a person might realize that high-level construal promotes self-control and then use high-level construal to succeed in a self-control conflict and also
realize that low-level construal promotes behaviors like sinking a golf putt or hitting a dart board and then use low-level construal to succeed in those challenges.
Chapter 4: General Discussion

The goal of this research was to examine who, when, and why people fail in their self-control attempts. We investigated the “who” variable by asking what characteristics of individuals predispose them to self-control failure vs. success and investigated the “when” variable by asking what features of the situation nudge people towards self-control success vs. failure. We proposed construal level theory as the psychological mechanism (or “why” variable) that explains the effects of person and situation level variables on self-control processing.

The present research investigated the role of construal in self-control both within the environment (Chapter 2) and within the individual (Chapter 3). The first three studies addressed the question of when people fail in self-control by taking a situation level approach to construal level and assessed how picture vs. word presentation format influences self-control processes. Specifically, these studies proposed that words promote self-control whereas pictures undermine self-control and that construal level differences between these forms of representations are responsible for their effects on self-control processes. The results of these studies indicated that words, compared to pictures, lead to more goal-consistent associations among those who value the long-term goal (Study 1). Furthermore, these studies indicated that pictures and words effect self-control relevant
associations via construal-dependent changes in meaning rather than through emotionality. While words lead to categorization of multiply-categorizable stimuli along a goal-relevant dimension (Study 2), pictures lead to categorization of multiply-categorizable stimuli along a temptation-relevant dimension (Study 3). The stimuli employed across all three studies did not vary in their level of emotionality, thereby suggesting construal, rather than emotionality, as the mechanism by which pictures and words have their effect.

Chapter 3 explored the question of who fails in self-control by examining construal level effects on self-control at the level of individual decision-makers. Specifically, we proposed that whereas representation outputs, such as pictures and words, are situated on one construal continuum (from low-level to high-level), the abilities to engage in low and high-level construal are distinct and separable and each contribute to self-control outcomes. The findings of Studies 4 and 5 provided some preliminary evidence that a pattern of cognitive responding that involves ability to engage in high-level construal combined with an inability to engage in low-level construal promotes self-control success. We found evidence for this pattern when assessing low and high-level construal processing ability via visual and verbal processing ability (Study 4) as well as via local and global processing ability (Study 5). These findings have a number of important implications for research on self-control, and self-regulation, construal level, and language.
Implications for Self-Control

These findings add to a growing body of research demonstrating that high-level construal promotes self-control success. Much of the research in this area has relied on mindset manipulations conducted in a laboratory (e.g., the “why/how” task or “category/exemplar” task) to assess the impact of construal on self-control. The present research makes a novel contribution by examining how construal can be used to nudge behaviors in the real world by using a manipulation of construal level that can be easily adapted to the field – picture vs. word presentation format. While previous research has made use of picture vs. word presentation format to manipulate construal, the current research is the first to do so while examining its effect on self-control. This more externally valid manipulation of construal lends itself to interventions that may push people to succeed in their self-control attempts. Specifically, stakeholders with an interest in helping people achieve long-term goals (e.g., public health officials, those advertising products such as weight-loss programs, gym memberships, and retirement planning) may be more effective if they present their arguments in words rather than pictures. Such a strategy would undoubtedly encounter challenges in implementation. Among these challenges are varying literacy levels among message recipients and the difficulty of attracting attention without eye-grabbing pictures. Despite these challenges, construal level nudges via picture/word presentation format present a promising new direction in helping people achieve their goals. More generally, picture vs. word presentation may be another important decision feature in how to structure environments so that they promote rather than inhibit adaptive decisions and behavior, in the same vein as previous attempts
to nudge people towards self-control success such as removing unhealthy foods away eye level displays and serving food on smaller plates (Wansink, 2004).

This research also demonstrates the benefits of examining self-control from a construal level perspective. While we do not propose that effortful inhibition models are invalid, construal level provides an additional model for self-control that includes additional mechanisms not covered by effortful inhibition. A construal level perspective of self-control is particularly beneficial for strategies that are proactive rather than reactive (i.e., strategies that involve heading off self-control conflicts before they develop, rather than reactive strategies that resolve self-control conflicts only at the point at which they can no longer be avoided; Fujita & Carnevale, 2012). Effortfully overcoming impulses can be effective, provided that people have sufficient motivational and energy resources. Construal level strategies need not require such resource reserves. For example, presenting self-control relevant stimuli as words rather than pictures can promote self-control without requiring effort or awareness on the part of the individual with the self-control conflict. As such, construal related shifts in the meaning of short and long-term rewards represent an additional tool in a decision-maker’s toolbox that can promote effective pursuit of goals.

**Implications for Construal Level Theory**

The present research has a number of implications for construal level theory. Previous research on construal level typically examined the role of construal as an experimental manipulation. The present research is among the first to take an individual differences approach to construal level (see also MacGregor, 2012). Furthermore, the
present research is the first that we are aware of to take an individual differences approach to construal cognitive processes themselves rather than the representations produced by those processes. Adopting an individual differences approach to construal level allows researchers to study the cognitive processes that individuals bring to their decisions and judgments, in the absence of experimental influences. Such an approach may yield information about whether certain people tend to adopt a low vs. high-level construal chronically, as well as whether certain situations push individuals to activate low vs. high-level construal.

A second reason why the present research is important for construal level theory is because it is among the first to demonstrate that shifting construals fundamentally shifts the meaning of the stimulus that is being construed. Previous research has focused on downstream consequences of construal shifts, such as preferences and behaviors. These findings, however, indicate that changing the construal that a person uses to think about a stimulus changes the interpretation of the stimulus in a critical way. These findings lend experimental credence to the theory that a flu shot is not the same object when construed at a low-level vs. a high-level. Consequences of that interpretation, such as attitudes towards flu shots and whether or not one receives the flu shot, stem from that shift in meaning.

**Implications for Language**

The present research has important implications for the role and function of language. First, these findings indicate that presentation format is a critical component of message delivery, influencing interpretations, evaluations, and choices. It also suggests
that the same object presented as a picture vs. a word ceases to be perceived as the same object, with important downstream consequences for decision-makers. Language, by facilitating high-level construal processes, facilitates mental simulations such as traveling through time to the past or the future and imagining other realities, thus enabling creativity. Finally, this research speaks to the idea that language seems to play a special role in allowing people to transcend their immediate desires and pursue the long-term goals that add value to their lives.

**Future Directions**

The present research suggests a number of fruitful directions for future research into construal level and self-control. Chief among these is a need for more direct behavioral evidence of the impact of construal level on self-control. The findings reported here relied on antecedents to self-control behavior such as associations, evaluations, and categorization, but little in the way of behavioral measures. While Study 1 indicated that picture/word presentation influenced hypothetical preferences via evaluative associations, the lack of a direct effect of presentation format on hypothetical preferences makes it difficult to draw conclusions about this relationship. Further research is needed to examine whether the relationship between construal, associations, and behaviors holds up with actual self-control behaviors, such as eating healthy vs. unhealthy foods. Other studies in this package relied on self-reports of domain general self-control. Future research should extend these findings beyond self-report to actual self-control behaviors.
While the present research indicates that people vary in their ability to engage in low and high-level construal processes, the mechanism for these abilities is unclear. An open question is how these abilities relate to general intelligence. It is possible that ability to engage in high-level construal is a key feature that distinguishes intelligence. It is also possible that these separate abilities correlate more strongly with specific intelligences proposed by multiple intelligence theorists like Howard Gardner (Gardner, 2011). While we propose that high-level construal and intelligence are related but conceptually distinct, future research should attempt to further disentangle these constructs.

Another area of future research involves the domain-specificity vs. domain-generality of these effects. It is an open question whether some domains are more resistant to visual vs. verbal processing than others. As previously mentioned, one possibility for the lack of an effect of verbal vs. visual processing ability on counteractive evaluations of stimuli related to studying vs. leisure (Study 4) may be that people tend to think of those stimuli verbally rather than visually. Other domains may lend themselves to greater visual processing while still other domains have greater variability in the way people tend to process them. Such domain variance is purely speculative at this point, but future research should assess differences in spontaneous construal processes across different domains as well as whether such differences are predictive of self-control success in those domains. It is also possible that such domain differences interact with individual differences in chronic tendencies to visualize vs. verbalize. It may be the case that those with a chronic tendency to verbalize have better self-control across domains. Alternately, it may be the case that a matching effect predicts self-control such that
verbalizers achieve the best outcomes in domains that are more highly verbalized but struggle in domains that are more highly visualized. Future research should explore these possibilities.

**Conclusion**

The present studies take a construal level perspective to explore features of the situation and features of the individual that contribute to self-control success. These data demonstrate that environments can be structured to promote self-control through construal level nudges. In addition, these data offer initial steps in exploring individual differences in construal abilities to understand self-control outcomes. The present research suggests that construal level plays an important role in self-control outcomes and that additional inquiry into this area can yield important insights into cognitive processes and behavior. Given the centrality of effective goal pursuit and attainment in people’s lives, creating a deeper understanding of what contributes to successful goal pursuit is incredibly beneficial and important.
References


Amit, E., & Greene, J. D. (2012). You see, the ends don’t justify the means visual imagery and moral judgment. Psychological Science, 23, 861-868.


MacGregor, K. E. (2012). Antecedents, consequences and lay theories of counteractive high-level construal in self-control contexts (Unpublished doctoral dissertation.) The Ohio State University, Columbus, OH.


Appendix A: Self-Control Schedule
Rosenbaum, 1980

Instructions: For the following questions, indicate how characteristic or descriptive each of the following statements is of you by using the scale provided.

-3 Very uncharacteristic of me, extremely undescriptive
-2 Rather uncharacteristic of me, quite undescriptive
-1 Somewhat uncharacteristic of me, slightly undescriptive
+1 Somewhat characteristic of me, slightly descriptive
+2 Rather characteristic of me, quite descriptive
+3 Very characteristic of me, extremely descriptive

1. When I do a boring job, I think about the less boring parts of the job and the reward that I will receive once I am finished.
2. When I have to do something that is anxiety arousing for me, I try to visualize how I will overcome my anxieties while doing it.
3. Often by changing my way of thinking I am able to change my feelings about almost everything.
4. I often find it difficult to overcome my feelings of nervousness and tension without any outside help.
5. When I am feeling depressed I try and think about pleasant events.
6. I cannot avoid thinking about mistakes I have made in the past.
7. When I am faced with a difficult problem, I try to approach its solution in a systematic way.
8. I usually do my duties quicker when somebody is pressuring me.
9. When I am faced with a difficult decision, I prefer to postpone making a decision even if I have all the facts at my disposal.
10. When I find that I have difficulties in concentrating on my reading, I look for ways to increase my concentration.
11. When I plan to work, I remove all the things that are not relevant to my work.
12. When I try to get rid of a bad habit, I first try to find out all the factors that maintain the habit.
13. When an unpleasant thought is bothering me, I try to think about something pleasant.
14. If I would smoke two packages of cigarettes a day, I probably would need outside help to quit smoking.
15. When I am in a low mood, I try to act cheerful so my mood will change.
16. If I had the pills with me, I would take a tranquilizer whenever I feel tense and nervous.
17. When I am depressed, I try to keep myself busy with things that I like.
18. I tend to postpone unpleasant duties even if I could perform them immediately.
19. I need outside help to get rid of some of my bad habits.
20. When I find it difficult to settle down and do a certain job, I look for ways to help settle me down.
21. Although it makes me feel bad, I cannot avoid thinking about all kinds of possible catastrophes in the future.
22. First of all I prefer to finish a job that I have to do and then start doing the things that I really like.
23. When I feel pain in a certain part of my body, I try not to think about it.
24. My self-esteem increases once I am able to overcome a bad habit.
25. In order to overcome bad feelings that accompany failure, I often tell myself that it is not so catastrophic and that I can do something about it.
26. When I feel that I am too impulsive, I tell myself "stop and think before you do anything."
27. Even when I am angry at somebody, I consider my actions very carefully.
28. Facing the need to make a decision, I usually find out all the possible alternatives instead of deciding quickly and spontaneously.
29. Usually I do first the things that I really like to do even if there are more urgent things to do.
30. When I realize that I cannot help but be late for an important meeting, I tell myself to keep calm.
31. When I feel pain in my body, I try to divert my thoughts from it.
32. I usually plan my work when faced with a number of things to do.
33. When I am short of money, I decide to record all my expenses in order to plan more carefully for the future.
34. If I find it difficult to concentrate on a certain job, I divide the job into smaller segments.
35. Quite often I cannot overcome unpleasant thoughts that bother me.
36. Once I am hungry and unable to eat, I try to divert my thoughts away from my stomach or try to imagine that I am satisfied.
Appendix B: Self-Control Scale
Tangney, Baumeister, & Boone, 2004

Instructions: Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

1 Not at all
2
3
4
5 Very much

1. I am good at resisting temptation.
2. I have a hard time breaking bad habits.
3. I am lazy.
4. I say inappropriate things.
5. I do certain things that are bad for me, if they are fun.
6. I refuse things that are bad for me.
7. I wish I had more self-discipline.
8. People would say that I have iron self-discipline.
9. Pleasure and fun sometimes keep me from getting work done.
10. I have trouble concentrating.
11. I am able to work effectively toward long-term goals.
12. Sometimes I can't stop myself from doing something, even if I know it is wrong.
13. I often act without thinking through all the alternatives.