PERCEIVING THE TREND: HOW TASK CONSTRUAL SHAPES PERFORMANCE PERCEPTIONS, EFFORT, AND PERFORMANCE

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ABSTRACT

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People rarely have only a single opportunity to perform, but instead repeat tasks and develop a history of performance across time – and this trajectory likely contains both cumulative patterns and unique fluctuations at each instance. How, then, do people respond when they consider these different aspects of their past performance that may tell different stories? In this study, I consider how performance perceptions influence subsequent effort and performance. Three-hundred and ninety-five undergraduates participated in a lab study where they completed several trials on a task and then received bogus feedback regarding their performance; and they subsequently responded to self-reports of self-efficacy and discrepancy and then completed another performance trial. I hypothesized that task construal would influence how participants viewed their performance feedback and thus change the aforementioned outcomes. Other hypotheses concerned relationships between self-efficacy, discrepancy, effort, and performance. Results do not support my predictions and are discussed with respect to possible conclusions.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

It's not what you look at that matters, it's what you see - Henry David Thoreau

Although repeated performance has always been a fact of work life, the ability to monitor personal performance trajectories – to view the raw data – is a modern phenomenon (Neff & Nafus, 2016). Mass data collection and performance monitoring efforts in today's organizations (e.g., Tonidandel, King, & Cortina, 2015), paired with an increasing prevalence of customer feedback systems, allow employees to easily view their performance history. These changes have even reached the personal lives of employees as communication information, sleep characteristics, and step and calorie counts can now be logged and tracked over time with cheap apps and monitoring devices.

Alongside an employee's greater ability to view their own performance data, many tasks require repeated performance that produce trajectories over time. For example, software engineers use sequential staging to develop their products where they receive performance feedback many times in the development life cycle. Academics receive repeated feedback while writing their papers – and possibly from many different sources. Finally, website designers monitor clicks-on-site as they adjust the images, fonts, colors, and layout of their pages.

These performance histories fluctuate dynamically but also maintain an overall trend when considered as a whole. When an employee then asks herself, "How am I doing?" her answer may depend on which part – the trend or an individual blip – of her performance data she is focused on. Subsequently, her ideas about how much effort is required of her may differ with respect to which aspect she attends to. In this project, I explore (1) how perceptions of past performance guide effort allocation and (2) the situational characteristics that shape those perceptions.

Literature Review

Two performance perceptions that dominate our current thinking in this area include self-efficacy and discrepancy, and they are described, respectively, in social-cognitive and control theory. Control theory posits that a disparity between performance and one's desired goal influences subsequent effort, goal striving, and performance (Powers, 1973; Carver & Scheier, 1998; Lord & Levy, 1994). Social cognitive theory describes how perceptions surrounding performance (e.g., personal accomplishments, observing others' accomplishments, or being persuaded of your own accomplishments by others) engender oscillating convictions of mastery (Bandura, 1977). Performance perceptions therefore indicate effort investments needed to change one's performance standing.

These variables are applied extensively in the motivation (e.g., Donovan & Williams, 2003; Campion & Lord, 1982; Schmidt & DeShon, 2010; Vancouver & Kendall, 2006; Yeo & Neal, 2006) and general work literature (e.g., Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991; Hannah, Schaubroeck, & Peng, 2015; Parker, Williams, & Turner, 2006; Tsai, Chen, & Liu, 2007; Nease, Mudgett, & Quiñones, 1999; Parker, 1998; Kirkpatrick & Locke, 1996; Dragoni, Park, Soltis, & Forte-Trammell, 2014; Saks, 1995; Bauer, Bodner, Erdogan, Truxillo, & Tucker, 2007) and both explanations depend on how employees perceive past performance. Yet, the current literature contains several unacknowledged aspects related to this dependence that, if incorporated, would be of value.

First, extant studies that examine the influence of prior performance do not measure perceptions, making them inconsistent with original theorizing. Authors in control (Lord & Levy, 1994) and social cognitive (Bandura, 1991) domains state that perceptions of past performance are important for effort. Studies that include prior performance, however, use prior trials as a non-subjective covariate (Vancouver & Kendall, 2006; Campion & Lord, 1982; Mano,

1990; Donovan & Williams, 2004; Schmidt & DeShon, 2010; Zimmerman, Bandura, & Martinez-Pons, 1992; Prussia & Kinicki, 1996; Kane, Marks, Zaccaro, & Blair, 1996), which misses the key theoretical claim. The current study, by examining perceptions, addresses this limitation and tests the full statement made by original theorists.

Second, studies incorporating perceptions need to account for the possibility of diverse performance trajectory perspectives because performance is embedded in a subjective personal history. Discrepancies and self-efficacy change when individuals focus on different feedback sources (Bandura, 1991; Lord & Levy, 1994; Tolli & Schmidt, 2008; Hollenbeck, 1989). Moreover, current perceptions and predictions about behavior change if longer time horizons are considered (Trope & Liberman, 2000). Explanations stemming from control and social cognitive literatures concerning self-efficacy and discrepancy perceptions, and the behaviors they motivate, are therefore incorrect if alluding to the wrong performance timespan. How much time an individual considers largely depends on task features that evoke psychological distance (e.g., Henderson, Fujita, Trope, & Liberman, 2006; Matthews & Matlock, 2011). The current investigation therefore explores how task characteristics influence the length of history considered (i.e., construal level; Trope & Liberman, 2010), thereby changing perceptions of self-efficacy and discrepancy.

Third, studies that do not incorporate past performance implicitly assume that only the last performance instance matters. Such a framework is unbalanced (similar to the unbalanced framework of only addressing negative feedback rather than both negative and positive feedback; Tolli & Schmidt, 2008) and excludes relevant information for understanding effort decisions. I acknowledge both immediate and cumulative past performance here.

I also respond to a variety of new developments about the within or between nature of the effects of self-efficacy. Studies highlighting the negative relationship between self-efficacy and

performance have typically been conducted within-person (e.g., Schmidt & DeShon, 2010; Vancouver & Kendall, 2006; Vancouver, Thompson, Tischner, & Putka, 2002). One recent study, however, exposed this effect between-person (Vancouver, Gullekson, Morse, & Warren, 2014). The current study also examines this effect at the between-person level and therefore serves as a partial replication of this new finding. Moreover, prominent motivation authors have called for the joint examination of motivation and task characteristics (Kanfer & Kanfer, 1990), an "integration of multiple theoretical perspectives" (Diefendorff & Seaton, 2015; p. 685), and more efforts to link psychological distance "to organizationally important and tangible outcomes," (Wiesenfeld, Reyt, Brockner, & Trope, 2017; p. 27). This study integrates three theoretical lines of research in a novel way to guide its predictions and does so while manipulating task characteristics, thereby satisfying calls for further refinements in our understanding of workplace motivation.

What follows is a brief overview of self-regulation and motivation to provide the reader with a general understanding of the effort allocation literature. Although construal theory is the organizing framework to the current study, control and social cognitive theory will be described first to help elucidate limitations in how they are currently considered. Moreover, these sections will contain broad hypotheses that are not particularly novel (hypotheses 1-4) to create general representations of relationships between performance and performance perceptions (self-efficacy and discrepancy) that can be unpacked after integrating construal theory. In other words, I establish a heuristic for thinking about effort allocation and performance to push against once the details of construal are described.

Motivation

Understanding effort investment is an important endeavor for organizational scholars because effort is one of the necessary (though not sufficient) conditions for performance. This

line of inquiry is typically studied under the label of motivation, which describes the forces that determine the direction, intensity, and persistence of behavior across time and circumstances (Diefendorf & Seaton, 2015). Work settings lend themselves to motivational research because of the variety of features at play, such as altering sources of feedback and an array of task characteristics (Kanfer & Kanfer, 1991).

Diverse opinions exist on the number and structure of categories that define motivation research (see Karoly, 1993 and Diefendorf & Seaton, 2015), but three components are useful for framing the literature as a whole: goals, individual differences, and self-regulation. Although I will describe, briefly, research that is specific to each domain, these research streams do not have to be examined independently and many authors find it useful to examine multiple or all of the components described next.

Goals are future states agents strive to reach. Research in this domain addresses questions concerning the level of effort and performance achieved based on characteristics of goals, such as their difficulty, specificity, direction, and importance (Lock & Latham 1990; Locke, Shaw, Saari, & Latham, 1981; Tubbs, 1986; Diefendorf & Seaton, 2015), or their association with behavior (e.g., I want to become friendly) or an outcome (e.g., I want friends; Kanfer & Kanfer, 1991).

The individual difference literature identifies personal features that influence performance. Considerations in this domain include working memory capacity, metacognition, or genetic constraints (Barrett, Tugade, & Engle, 2004; Karoley, 1993; Bandura, 1991; Kanfer & Kanfer, 1991; Healey, Crutchley, & Kahana, 2014) and while some authors treat individual differences as stable (e.g., Moser, Schroder, Heeter, Moran, & Lee, 2011), others note that certain characteristics are mutable (Elliot & Dweck, 1988). I also include goal-orientations in this domain (e.g., Bell & Kozlowski, 2002; Towler & Dipboye, 2001; VandeWalle, 1997;

Button, Mathieu, & Zajac, 1996; Lee, Sheldon, & Turban, 2003; Franken & Brown, 1995). Although this literature is conceptually inconsistent, many of the studies outlined by DeShon and Gillespie's (2005) goal-orientation review describe goal-orientation as a disposition, trait, mental framework, or belief regarding one's own abilities and how they approach performance circumstances.

The final pillar, self-regulation, is succinctly described by Karoley (1993) as "voluntary action management" (p. 24) that encompasses all of the self-prescribed processes that influence motivation, such as self-monitoring, judgments, and evaluations (Kanfer, Chen, & Pritchard, 2012; Diefendorf & Seaton, 2015; Bandura, 1991). Research in this domain (e.g., Bandura, 1977; Carver & Scheier, 2001; Kanfer, 1970; Naylor, Pritchard, & Ilgen, 1980; Weiner, 1985) spurred after empirical evidence demonstrated that self-control, delay of gratification, and vicarious learning occur following social observation (Kanfer & Phillips, 1970; Mischel, 1958; Bandura, 1976). This domain also includes feedback loops, which may not be considered voluntary, but do help explain action management. Feedback loops will be fully unpacked in the section on control theory (Powers, 1973; Carver & Scheier, 2001; Lord & Levy, 1994).

The current project falls into the third research stream – I focus on situational factors rather than dispositions or goal characteristics. Although goals will be constant in the current investigation, goal setting work is one of the largest domains in organizational psychology with robust findings that high, specific goals (that people accept and are committed to) are necessary to determine the direction and magnitude of effort (Lock & Latham, 2002; 2006; Latham & Lock, 1991). Goals used in the current investigation will therefore mirror that research body.

Two performance perceptions that fall into the third pillar, self-regulation, dominate current thinking on what drives task effort and performance and will therefore receive full attention here. These include discrepancies between current performance and goal performance

(Carver & Scheier, 1982) and self-efficacy (Bandura, 1977). The claims of the current paper are the following: 1) performance perceptions (self-efficacy and discrepancy) are different among people focused on cumulative performance compared to people focused on local, recent performance, 2) task characteristics serve as one source of these differences, and 3) they will ultimately lead to divergent levels of effort and performance among the groups. Each perception will be unpacked by discussing its respective theory.

Social Cognitive Theory and Self-Efficacy

Social cognitive theory emerged as a cognitive pushback to the stimulus-response research that dominated the early 20th century. Researchers became interested in forethought and individual capacities to plan courses of action. Bandura (1991) argued that human behavior is purposive and therefore motivation research ought to account for what future state is under pursuit. He recognized, however, that future states/outcomes cannot be the causal agent in present action. Rather, "causal agency resides in forethought" (Bandura 1991; p. 249) because it directs self-regulation. Many researchers, among a variety of fields (e.g., Dawkins, 2016), have also given the capacity to simulate future states and consider possible outcomes a lofty perch in the determinants-of-behavior hierarchy. Social cognitive theory describes three sub-functions of forethought that guide self-regulation: self-monitoring, judgment, and affective self-reactions (Bandura, 1991).

The first, self-monitoring, refers to how much attention is given to the antecedents, effects, and details of a given behavior. The key property that attention provides is information about reoccurring behavioral and environmental patterns (Kanfer & Kanfer, 1991). Given this information, individuals are then motivated to improve, set realistic goals, and evaluate their progress (Bandura, 1991).

After an action is taken and outcomes are identified, they can then be evaluated as positive or negative. Bandura (1991) acknowledges a variety of sources that influence this valence judgment. These include standards, or comparisons to group norms or previous behavior, how significant others react to the action, the significance attached to the behavior, and whether the individual attributes the outcome of the action to internal or external sources. If the outcome is attributed to interior sources (i.e., effort and abilities), superior to group norms and prior behavior, positively evaluated by significant others, or stems from a behavior of significance to the individual, that outcome will be judged favorably. To be clear, these effects do not have to occur in concert, but a larger number of criteria evaluated as favorable engender more positive judgments. This judgment, in turn, drives the third sub-function, affective self-reactions.

Bandura's description of affective self-reactions is simple, "people behave in ways that result in positive self-reactions and refrain from behaving in ways that result in self censure" (1991; p.256). Anticipation is crucial here. That is, the *anticipated* self-satisfaction following achieving certain accomplishments (and the anticipated dissatisfaction stemming from failures) motivates behavior (Bandura, 1977).

These three sub-functions, Bandura argues, direct self-behavior once they are properly mobilized. He also discusses the importance of goal characteristics, such as their hierarchical structure, and individual characteristics, such as depression, in self-regulatory processes. It is unclear, however, how these interact with his sub-functions. For example, Bandura (1991) argues that, despite the importance of long-term, superordinate goals, small attainments are rewarding and facilitate the development of proficiency. But this explanation is never tied to his main sub-functions, making it unclear if small goal attainments mobilize the functions, change their output, or act independently. Another individual characteristic that has become one of the most heavily studied variables in organizational research (Karoley, 1991; Sitzmann and Yeo, 2013) and is

often discussed in motivation reviews (Kanfer & Kanfer, 1991; Karoley, 1990; Diefendorf & Seaton, 2015) is self-efficacy (Bandura, 1977; Bandura, Adams, & Beyer, 1977).

Bandura's introduction of self-efficacy was consistent with the cognitive pushback described earlier. Citing evidence that *beliefs* regarding reinforcement, rather than reinforcement itself, can produce changes in behavior (e.g., Baron, Kaufman, & Stauber, 1969; Estes, 1972) he argued that two expectations occur; one represents the expectation that a given behavior will produce outcomes (i.e., outcome expectations) and the other represents a belief about the ability to successfully execute the necessary behavior (i.e., efficacy expectations). He also noted that a majority of cognitive research at the time measured outcome desirability. Bandura, on the other hand, was interested in personal feelings of mastery; self-efficacy satisfied that need. Self-efficacy, therefore, is a conviction about one's abilities to conduct the necessary behaviors on a given task or situation (Bandura, 1977; 1991) such that individuals with high self-efficacy perceive their abilities as sufficient for the given demands and, therefore, find utility in investing their time and effort (Bandura, 1986).

Beliefs about mastery arise from four sources (Bandura 1977), including personal accomplishments, observing others, persuasion, and emotional arousal. Self-efficacy increases following performance success and decreases after (repeated) failure. Bandura does note that failure can increase self-efficacy if it leads the individual to expend more effort toward accomplishing the task and eventual success. Observing others (which Bandura calls vicarious experience) can increase self-efficacy (in person "A") to the extent that the observed individual (person "B") handles performance situations with success. Self-efficacy can also increase if someone is led to believe (person "A"), through persuasion by another (person "B"), that they can handle the requirements of the situation. Observing others and persuasion should produce weaker effects on self-efficacy, however, than personal accomplishments because they do not

entail an objective instance of success for the individual (i.e., person "A"). Finally, heightened arousal and anxiety can thwart performance and therefore reduce efficacy.

Early empirical work on self-efficacy focused on reducing anxiety and "performance" was operationalized as the ability to conduct a behavior (e.g., holding a snake) that previously hindered day-to-day activities. Bandura (1977) found that participant modeling, or watching another individual perform the behavior before attempting the behavior, compared to the control condition, lead to larger increases in self-efficacy and ability to conduct the behavior. He therefore recognized that self-efficacy follows the same pattern as performance, which was consistent with later work on managerial self-efficacy (Wood & Bandura, 1989; Bandura & Wood, 1989). These results lead Bandura to the lofty claim that self-efficacy determines coping behavior initiation, effort expenditure, and effort sustainment in the face of obstacles, which, ultimately, fueled an extensive amount of research in organizational literature.

Research on some of the major processes organizational scholars seek to understand, such as newcomer socialization, training, feedback, or building coworker and/or leader relationships found that self-efficacy serves a consequential role in those areas (e.g., Tannenbaum et al., 1991; Hannah et al., 2015; Parker et al., 2006; Tsai et al., 2007; Nease et al., 1999; Parker, 1998; Kirkpatrick & Locke, 1996; Dragoni et al., 2014; Saks, 1995; Bauer et al., 2007).

Motivation research found that self-efficacy is related to task persistence, performance (Stajkovic & Luthans, 1998) and personal goal levels (Lock & Latham, 1990), which are thought to facilitate the development of more difficult goals once success is accomplished (Bandura, 1997) and internally attributed (Tolli & Schmidt, 2008).

A variety of studies by Vancouver and colleagues, however, noted that the relationship between self-efficacy and performance is negative when analyzed within-person (Vancouver &

Kendall, 2006; Vancouver et al., 2002; Vancouver, More, & Yoder, 2008; Vancouver, Thompson, & Williams, 2001; Yeo & Neal, 2006). Moreover, Sitzmann and Yeo (2013) found that self-efficacy had a stronger relationship with past performance than future performance at the within-person level. These findings suggest a complex relationship between self-efficacy, effort, and performance, which, as others have noted, merits further examination (Diefendorff & Seaton, 2015).

To explain the divergent findings regarding the relationship between self-efficacy, effort, and performance, researchers have manipulated the performance environment. Schmidt and DeShon (2010) found that high self-efficacy resulted in lower performance and low self-efficacy led to higher performance (consistent with Vancouver and colleagues) under high ambiguity situations. That is, participants did not know how many solutions were possible on their anagram task. In low ambiguity environments, on the other hand, high self-efficacy led to high performance. This suggests that task characteristics serve as boundary conditions on how self-efficacy motivates behavior.

Recent work has now demonstrated that the negative relationship between self-efficacy and performance can occur between subjects (Vancouver et al., 2014). This study was able to explicate self-efficacy's causal role more clearly because of its use of manipulation (Shadish, Cook, & Campbell, 2002). Feedback was manipulated such that, in the high self-efficacy condition, participants were told that they performed above average for each round of an anagram task while those in the low self-efficacy condition were told that they performed below average after each round. Across rounds, participants in the low self-efficacy condition spent more time, produced more attempts, and performed at higher levels than those in the high self-efficacy condition. To be clear, this effect emerged in the same high ambiguity (unknown amount of solutions for each anagram) environment discussed above. One final point to

emphasize about Vancouver et al. (2014) is that they equate a feedback manipulation with a self-efficacy manipulation. Some may disagree with this practice, but it is consistent throughout Vancouver's work.

The now robust finding that self-efficacy negatively relates to effort in an extended performance context (i.e., more than one trial), is believed to occur because of compensation (Vancouver et al., 2014; Sitzmann & Yeo, 2013; Vancouver & Kendall, 2006; Vancouver et al., 2002; Vancouver et al., 2008; Vancouver et al., 2001; Yeo & Neal, 2006). When efficacy beliefs are low, people exert effort in the hopes of thwarting poor performance.

In summary, while differences in levels of self-efficacy between individuals may be important for job attitudes after socialization (Saks, 1995) or to identify who could benefit the most from training (e.g., Tannenbaum et al., 1991), a majority of motivation studies concur that low self-efficacy facilitates higher effort and performance when we take performance histories into account. I therefore hypothesize the following:

H1: Performance will be negatively associated with self-efficacy

H2: Effort will be negatively associated with self-efficacy

These first two hypotheses represent part of the broad relationship I unpack in this study. Although a curvilinear relationship between self-efficacy and the stated outcomes emerges in some contexts (Vancouver, More, & Yoder, 2008; Beck & Schmidt, 2012; 2015), the general direction remains consistent. These hypotheses are therefore not meant to be novel, but to help establish a way of thinking about effort allocation to integrate with construal.

Control Theory and Discrepancies

Psychological research on control theory (Powers, 1973; Carver & Scheier, 1998; Lord & Levy, 1994) centers on the concept of negative feedback loops, which contain input, comparator, reference value, output, behavior, and disturbance functions. These loops are meant to control a

system at some standard level and respond when discrepancies between that reference value (e.g., a goal) and the system arise. For example, plants photosynthesize at slower rates when carbon dioxide decreases in their environment, and the human body regulates its temperature to maintain homeostasis. The input function is the current condition (e.g., the current body temperature). The comparator compares the current condition to the standard (e.g., the desired body temperature). If there is a discrepancy between the input and the standard, the comparator triggers the output function (e.g., sweating or shivering). This output changes the environment (e.g., the temperature of the body) and alters the subsequent input, creating a "closed loop." Disturbances that arise from outside the system can also change the nature of the loop by adjusting the discrepancy. For example, a sudden fire would adjust the discrepancy between body temperature and homeostasis.

Although a considerable amount of research uses control theory and discrepancies to understand workplace behavior, Vancouver and Day (2005) point out that discrepancies are conceptualized in different ways. For example, Brett and Atwater (2001) describe discrepancies as the difference between two sources of feedback (e.g., self and supervisor) while Hollenbeck (1989) analyzed how employees perceived current workplace characteristics in relation to how things "should be." The current study remains consistent with motivation literature (e.g., Schmidt & DeShon, 2007; Schmidt, Dolis, & Tolli, 2009; Ballard, Yeo, Loft, Vancouver, & Neal, 2016) and refers to "the discrepancy between a goal level and the current level of the variable to which the goal refers" (Vancouver & Day, 2005; p. 166).

The motivation-focused control theory literature can be partitioned into two foci: magnitude and velocity. Magnitude, or proportional control, refers to the size of the discrepancy. Early work found that large negative discrepancies capture attention and are associated with increases in effort and performance (Lord & Hanges, 1987; Matsui, Okada, & Inoshita, 1983;

Kernan & Lord, 1988) so long as they are not overwhelming as to produce goal changes (Donovan & Williams, 2003; Campion & Lord, 1982). More recent research in multiple goal settings (e.g., Schmidt & DeShon, 2007; Schmidt et al., 2009; Ballard et al., 2016) focuses on the environmental characteristics – such as time pressure or unexpected task changes – that lead individuals to act on discrepancies with different magnitudes (i.e., large or small). Velocity research, on the other hand, focuses on the rate at which discrepancies decrease (Chang, Johnson, & Lord, 2009; Johnson, Howe, & Chang, 2013). Both research streams provide valuable insights into work motivation. A pervasive form of control in engineering, but absent in psychological discussions, however, is the notion of integral control (Astrom 2002; Tehrani & Mpanda, 2002).

Integral control refers to corrective effort in relation to previous errors, rather than simply the present error (VanDoren, 2000). Lord and Levy (1994) stated that past performance could be an important source for effort and goal standards. Indeed, Campion and Lord (1982) found that college student GPA correlated with initial goals for an upcoming test and Mano (1990) found that practice trial performance served as an anchor for performance aspirations on subsequent rounds. Donovan and Williams (2003) similarly found that goal levels for an upcoming season among track athletes were based on prior best performance in their respective events. Notice, however, that perceptual differences in these studies were not examined and past performance was never compared to subsequent effort. Lord and Levy's (1994) discussion focused on memory and perceptions of prior performance, suggesting that, although objective GPA is important, accounting for whether an individual considers one semester or their entire tenure at University may also impact future performance.

Feedback about performance, consistent with the self-efficacy literature, can also drive changes in effort. For example, when Podsakoff and Farh (1989) told participants that their performance was below average (on a task that asked them to list objects that could be described

by a given adjective) during an initial session, those participants had superior performance on a second session than participants who were initially told their performance was above average. Other work has found commensurable results for the relationship between early substandard performance and later improvements in effort and performance (Campion & Lord, 1982; Kernan & Lord, 1988).

In summary, control theory research focuses on discrepancies between performance standards and current performance. When negative discrepancies are large, individuals initiate effort and seek to raise their effort to that of the goal. I therefore hypothesize the following:

H3: Performance will be positively associated with negative discrepancies between goal performance and performance perceptions, such that individuals with a larger negative discrepancy between their goal and their perceptions about their own performance will subsequently have greater performance compared to individuals with small negative discrepancies.

H4: Effort will be positively associated with negative discrepancies between goal performance and performance perceptions, such that individuals with a larger negative discrepancy between their goal and their perceptions about their own performance will subsequently give greater effort compared to individuals with small negative discrepancies.

Again, these hypotheses are broad representations that, when paired with hypotheses one and two, form the general approach to understanding effort allocation and performance.

Across these first four hypotheses (and throughout this project) I expect effort and performance to operate in the same way. I therefore assume that increases in effort result in heightened performance. This assumption does not hold on complex tasks where effort investments are irrelevant when improperly directed, but proximal motivation factors directly

influence performance on simple tasks (Stajkovic & Luthans, 1998; Chen, Casper, & Cortina, 2001; Kanfer & Ackerman, 1989; Beck, Scholer, & Hughes, 2017). To sustain this assumption a simple task will be used (see procedure). Given a simple task:

H5: Performance will be positively related to effort

Limitations in Current Self-Efficacy and Control Theory Research

A majority of motivation studies carry a crucial assumption that, I argue, limits our knowledge of workplace effort. Expectations for upcoming trials and resulting changes in effort/performance are either measured trial-by-trial (e.g., Kernan & Lord, 1989; Schmidt & DeShon, 2010; Phillips, Hollenbeck & Ilgen, 1996) or are averaged across multiple trials (e.g., Vancouver et al., 2014). These studies assume, therefore, that perceptions of current performance are consistent with performance on the immediately prior trial. Stated another way, when an individual compares their performance ("P") with goal performance ("GP"), extant studies view "P" as wherever the individual currently lies on their performance trajectory. Yet, numerous theoretical claims state that discrepancies and self-efficacy are heavily influenced by attention (Lord & Levy, 1994; Bandura, 1991; 1977), which suggests that we need to account for whether an individual considers a specific point on their performance trajectory or the entire trajectory itself when formulating what to do. The current study, therefore, examines how perceiving different timespans of performance motivates subsequent effort/performance.

Prior performance has been statistically controlled as a covariate, both in the social-cognitive and control theory literature (e.g., Schmidt & DeShon, 2010; Zimmerman et al., 1992; Prussia & Kinicki, 1996; Kane et al., 1996; Vancouver & Kendall, 2006), but doing so does not address how *perceptions* of past performance guide self-regulation. Rather, these studies show that only tracking performance does not explain considerable variance in human behavior. Moreover, these techniques do not test claims that individuals use prior performance information

to determine future self-regulation strategies (Podsakoff & Farh, 1989; Lord & Levy, 1994; Bandura, 1991). The current study tests these claims directly.

What determines whether someone considers an immediately prior instance or the performance of multiple episodes from the past? The answer may lie in the construal of the situation.

Construal Theory

Construal level theory is concerned with how people represent objects in their mind. It began as a mediating explanation to account for value changes in time discounting (Mischel, Grusec, & Masters, 1969). Time discounting, valuing a near future reward preferentially as compared to distant rewards of larger value (Ainslie & Haslam, 1992), underwent heavy study in the 1990's, and researchers recognized that the rate (Chapman, 1996; Rachlin & Raineri, 1992) and direction (Elster & Loewenstein, 1992; Lovallo & Kahneman, 2000) of time discounting could change. Several different streams of research then emerged to explain these differences, including an affect vs. cognition stream (Loewenstein, Weber, Hsee, & Welsch, 2001), a valence stream (Shelley, 1994), and a behavioral economic stream focusing on the magnitude of the outcome (Lovallo & Kahneman, 2000). These different streams shared a common desire to explain why the value of an object changes over time. Construal level theory, however, explained changes in the mental representation of objects that occur because of temporal differences that then *lead* to value differences. In other words, mental representations were thought to be the mediating factor between time and the value of an object. The research that followed then applied changes in mental representations to other psychological distances, including space, social, and hypotheticality.

Construal theory states that people perceive and describe objects in their environment consistent with their psychological distance from that object (i.e., any situation, event, or object;

Trope & Liberman, 2003). Although construal level theory began as an examination of temporal distance exclusively, three other dimensions have received empirical support (and there may be more): space, social, and hypothetical (Trope & Liberman, 2010). To be "further" in psychological distance from an object means to be located further away, in a different time, among a different social group, or to be uncertain of the object's existence. Specifically, objects that are further away among a certain dimension are described or perceived as more abstract and decontextualized (i.e., high-level construal) while objects that are close are described or perceived in concrete, contextualized, and complex terms (i.e., low-level construal). For instance, a low-level construal of playing football with friends would be, "I threw a brown leather ball to Tom." A high-level construal of the same event would be, "I was having fun." Construal theory predicts that people are more likely to make the high-level construal if the activity is further away among any of the psychological distance dimensions (Trope & Liberman, 2003), evidence for this has been demonstrated across all four dimensions. In the following paragraphs, I will describe empirical evidence that increasing psychological distance leads to abstract thinking. I will then explain why that occurs and provide an example for clarity.

Time

Liberman and Trope (1998) asked participants to consider engaging in an activity the following day or the following year. Across open and close-ended questions, participants described the distant activity in higher level, abstract terms.

Nussbaum, Liberman, and Trope (2003) then extended this research across four studies. In the first study, participants were more likely to demonstrate the correspondence bias – attributing situationally constrained behavior to a general trait of the person rather than the situational constraint – when they predicted the target's behavior in the distant future. This demonstrates that increasing distance increases the tendency to rely on dispositional, high level

thinking. In study two, participants predicted that a target's behavior would be more consistent if they were making predictions in the distant future compared to the near future. Again, increasing distance facilitated general, less variable, and broad thinking. In study three, participants were given a chance to interview others in an effort to aid their predictions of the individual's future behaviors. If they believed they would be predicting distant future behavior, rather than near future behavior, they asked more dispositional and decontextualized questions. Finally, in study four, participants were given potential outcomes for a variety of actions (e.g., "You will go on a date and it will go badly") and asked to imagine those outcomes happening to themselves. If they imagined the outcomes occurring further away in time (high construal) they rated the outcomes in more global terms. That is, they believed the outcomes influenced many aspects of their lives.

Liberman, Sagristano and Trope (2002) asked participants to classify objects for an upcoming camping trip into categories. Some participants were told that the camping trip would occur the following weekend, while others were told that it would take place in several months (temporal distance). Participants in the high-construal group (distant temporal distance), who were told that the camping trip would occur several months later, placed the objects into fewer but more distinct categories.

Across all of these studies, therefore, temporal distance facilitated broad, abstract thinking.

Space

Abstract thinking can also emerge from spatial distance. Fujita et al. (2006) conducted two studies in which participants were asked to watch a video clip (study 2) or imagine helping a friend move into an apartment (study 1). In both cases, participants in the spatially distant condition imagined the event very far away (e.g., Italy), while participants in the spatially near condition imagined the event in a local location (e.g., the city where the experiment was

conducted). In study one, participants were more likely to rate action statements in terms of "why" when the event was imagined in a spatially distant location (i.e., putting a key in a lock selected for the purpose of "securing the house" rather than "locking the door"). In study two, participants used abstract language (coded by independent researchers) to describe the video they saw when they believed the video took place in a distant location.

Similarly, Henderson et al. (2006) conducted several studies in which participants were asked to consider either a situation occurring at a local University (spatially close) or at a distant University. In the spatially distant conditions, participants were more likely to make general predictions about student behavior (study 3), rely on general trends to make future predictions (study 4), and make decontextualized, attitudinal (as opposed to situational) inferences about an essay writer even when the writer was forced to write about a given topic (study 2). In study one, Henderson et al. (2006) asked participants to press a key anytime a meaningful action took place in a cartoon film. If the participants were told that the cartoon took place 3000 miles from their current location (spatial distance), they pressed the key fewer times than those who believed the cartoon took place only a few miles away and thus classified the film in fewer, but larger behavior chunks. The authors argued that participants were classifying the cartoon's behavior in general purpose, abstract terms.

These findings suggest that spatial distance engenders general, abstract construals.

Social

More recent empirical work extended mental representations to social differences, or feelings of similarity between the self and others. Matthews and Matlock (2011) asked participants to think about walking through a park to deliver a package. During their walk, they were told that they would pass by friends (low social distance) or strangers (high social distance). Participants were then given a map with marks representing a "start," "finish," and figures

representing friends (low construal) or strangers (high construal). Participants were asked to draw a route from start to finish and estimate the time it would take to deliver the package. Participants in the low distance group (i.e., friends) drew shorter lines, drew the lines closer to the figures, and estimated the entire trip taking a shorter amount of time. Similar results emerged when participants imagined driving a car or riding in a taxi (Matthews & Matlock, 2011).

Liviatan, Trope, and Liberman (2008) manipulated interpersonal similarity between a participant and an unknown target to study social distance. Participants, prior to the actual study (and unaware that it was related to the study), provided information about their class schedule and hobby preferences for the researchers to create similar or dissimilar target descriptions. In study one, participants who read about a similar target (i.e., same class schedule and hobbies) were more likely to believe their target individual carried out contextualized, low level behaviors (i.e., behaviors described as a "means" as opposed to an "ends"). In study two, participants who read about a similar target (low construal) had increased interest in secondary material about that target, relative to those that read about the dissimilar other (in which they were only interested in general, primary material; high construal). In study three, participants were more likely to believe their target individual would focus on how feasible, rather than how desirable, attending an event would be if the target was similar to them. Other empirical work has demonstrated that concrete, low-construal representations of events are typically tied to feasibility (e.g., time and monetary constraints) while high construal representations are typically tied to how desirable the event is (Liberman & Trope, 2008). In study four (Liviatan et al., 2008), participants were asked to evaluate the quality of a short story by a similar or dissimilar other. When the target was believed to be similar, participants were more influenced by secondary aspects in their judgments (i.e., the target's physics ability; an unrelated, low construal aspect) relative to the participants evaluating a dissimilar target.

These studies suggest that people think in high construal terms when considering socially distant others and focus on contextualized, dispersed information (low construal) when considering socially close individuals.

Hypothetical

The final dimension, hypothetical, refers to whether people believe the event will actually occur. Wakslak et al (2006; study two) told participants they would be classifying products into particularly categories. They were then told that it was likely (low construal) or unlikely (high construal) that they would receive vouchers for the products they were rating. Subsequently, participants who believed they would not receive vouchers (high construal) were more inclusive of atypical items in their categories. In study three, participants who believed it was unlikely (high construal) they would receive a research assistant position described the job in a more abstract way. In study four, participants who believed it was unlikely (high construal) the experiment would contain a second task coded a movie with fewer segments. In study five, participants who believed it was unlikely that they would be asked to perform a second experimental task (high construal) subsequently performed better on the task, which, importantly, required abstract thinking. In study six, conversely, participants who believed it was unlikely (high construal) they would be asked to perform a task requiring more concrete thinking subsequently performed worse on the task. In study seven, participants primed with words relating to low probability (e.g., "unlikely," high construal) then had a higher preference for general, action statements about "ends" rather than "means" (e.g., "securing a house" rather than "locking a door"). Finally, participants were asked to imagine different scenarios (e.g., having a yard sale) and then group items in meaningful ways to be used in those scenarios (e.g., yard sale; items: chairs, rollerblades, sweaters, crib, candy dish, etc.) in Wakslak et al.'s (2006) first study.

If the participants believed the scenarios were unlikely to occur (high construal), they grouped the items into fewer and broader categories.

Amor and Sackett (2006, study 3) also examined how a hypothetical task influenced mental representations, although it was not the main focus of their research. Participants were asked to evaluate questions for new GRE tests and were told (low level) or not told (high level) that they would be taking the test themselves later on. Those who did not expect to take the test (high construal) rated the test as more meaningful (i.e., more important as representing their true ability, etc.) and recalled significantly fewer details from the test. They were thinking, therefore, in abstract, high level, broad terms.

Other Possibilities

Although research currently identifies four major psychological distances, other characteristics are also believed to produce general, decontextualized thinking. Trope and Liberman (2010) discuss how some emotions, such as pride, lend themselves to a long-term lens and therefore may be more likely to produce high construal thinking. That being said, the same emotion may be construed as high or low depending on the characteristics of the object considered. Novelty has also been tied to construal because of its close relation to hypotheticality. Forster, Liberman, and Shapira (2009) examined how novelty influences construal across six studies. In several experiments (1a, 2, & 3a), participants were told that the task they would complete was new (i.e., novel). Compared to when participants believed the tasks were old or were not told anything, participants in the novel conditions were significantly faster to identify global configurations of letters (1a), select more global matches of a target image (2), and scored higher on a gestalt completion task (GCT: where abstract thinking leads to higher performance; 3a). Similar results emerged for participants who were told to imagine future activities as novel rather than old (experiments 1b, 3b, 4a, & 5). The authors, therefore,

argued that novelty influences processing style and can lead to abstract, high-level construals. Finally, certain senses may be construed more readily in high- or low-level terms. Trope and Liberman (2010) suggest that taste is more likely construed in lower level terms than vision because of its inherent physical closeness. Yet, taste is also heavily tied to smell, which, because its association with memory (Klein & Thorne, 2006) would suggest a relation to high construal. These claims, therefore, are speculative and have yet to be tested.

The research above supports predictions that increasing psychological distance creates abstract construals. A good theory, however, needs explanation, not just prediction (Deutsch, 2011). High-level construals become abstract because of the hierarchies people use to categorize information (Medin & Smith, 1984) in an effort to reduce cognitive effort (Rosch & Loyd, 1978). When something is concrete, it can be placed into any one of several high-level, abstract representations (Rosch & Loyd, 1978). For example, two (or more) classifications are possible for a baseball bat: a piece of sports equipment or a weapon. Choosing an abstraction then directs attention to certain features of the object while diminishing others (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 2004). The bat, if abstracted as a weapon, retains features such as hard and long but loses any association with baseball. As abstract representations trim non-essential features, they become general and prototypical (Goldstein, 2014). Although hierarchical categorization of mental representations is discussed in many areas of psychology, including learning (Rosch, 1973), mental models (Rouse & Morris, 1986), cognitive ability (Murphy & Medin, 1985), actions (Vallacher & Wegner 1987), and self-regulation (Lord, Diefendorff, Schmidt, & Hall, 2010), construal level theory uniquely claims that psychological distance is fundamentally related to mental representations. Because they are connected, increasing distance changes the level of abstraction (Trope & Liberman, 2003). The current explanation for the connection between distance and abstraction is association (Trope & Liberman, 2003). Concrete,

low level information is unavailable for any object that is distant and therefore cannot become associated with it. Over time, people automatically make high-level representations when distance seems relevant. Another reason abstraction and construals become associated with psychological distance is for perceptual stability and consistency (Trope & Liberman, 2010). For example,

"Identifying an object in near and distant locations as being the same requires forming an abstract concept (e.g., a chair) that omits incidental features (e.g., perspective-specific appearances and contextualized variations, such as the way the chair's shade falls upon the floor) and retains essential, relatively invariant features (e.g., its overall shape and proportions). The use of high level, abstract construals to represent psychologically distant objects are thus indispensable for effective functioning in many domains" (Trope & Liberman, 2010, p. 4).

In summary, when a situation entails psychologically distant characteristics, people will construe the situation in a general, long-term, and abstract way. As discussed next, these considerations have major ramifications for the length of performance history under consideration.

Integration and Model Development

Previous work demonstrated two mechanisms in the development of effort and performance toward a task. First, discrepancies between performance and goal performance increase effort until the desired level of performance is reached. Second, low self-efficacy leads to more effort to compensate for a perception of low mastery. A simple heuristic for understanding these relationships, therefore, is to consider a feedback loop between behavior perceptions and behavior itself (figure 1). Discrepancies and self-efficacy are perceptions that both guide and then are modified by behavior. In this model, the perception of behavior (e.g.,

effort or performance) is compared to a goal, which can then influence the behavior-perception relationship.

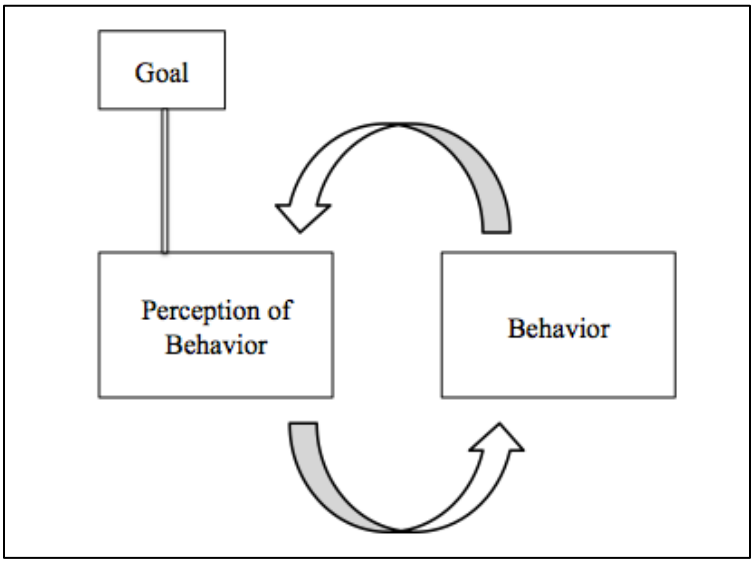


Figure 1. Feedback loop between behavior, the perception of the behavior, and a goal.

These cycles are then iterative. That is, perception-behavior cycles continue as an individual marches across time. This perspective is shown in figure 2.

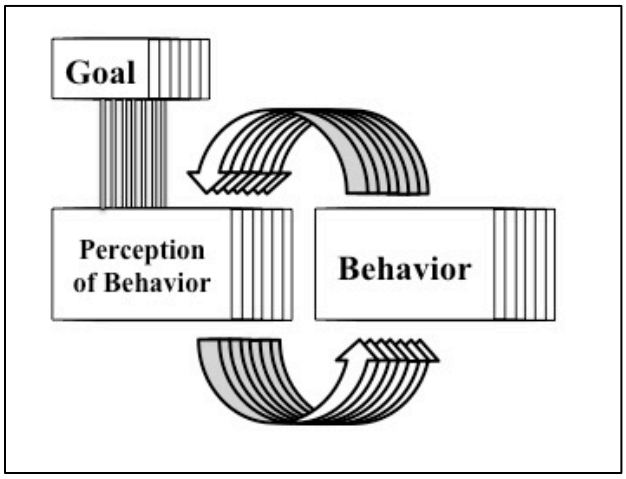


Figure 2. Continual behavior-perception cycles.

A performance perception, however, could represent the immediate trial (as is the case for past studies) or all previous trials. Imagine an individual who performs well on a majority of past trials but poorly on the immediately prior trial. If all trials are considered, and assuming that

goal performance entails "doing well," then the discrepancy between performance and goal performance is small (they performed well on a majority of trials). If only the last trial is considered, however, then there is a large discrepancy. The discrepancy between this individual's performance and goal performance therefore changes depending on the timespan of history considered, and the same could be said for self-efficacy.

One of the mechanisms behind how much history is considered, I argue, is construal. As discussed, a variety of psychological distances foster general, long-term mental representations. If distance is apparent in the performance environment, therefore, a certain construal arises. For example, because high construal focuses attention on general, long-term behavioral trends (Henderson et al., 2006), a task that facilitates high construal representations should draw attention to a long time span of performance history.

To account for the construal of the environment an additional component needs to be added to the feedback loop. Figure 3 shows the same perception-behavior cycles, but with an added construal component to represent how construal constrains the timespan of behaviors considered.

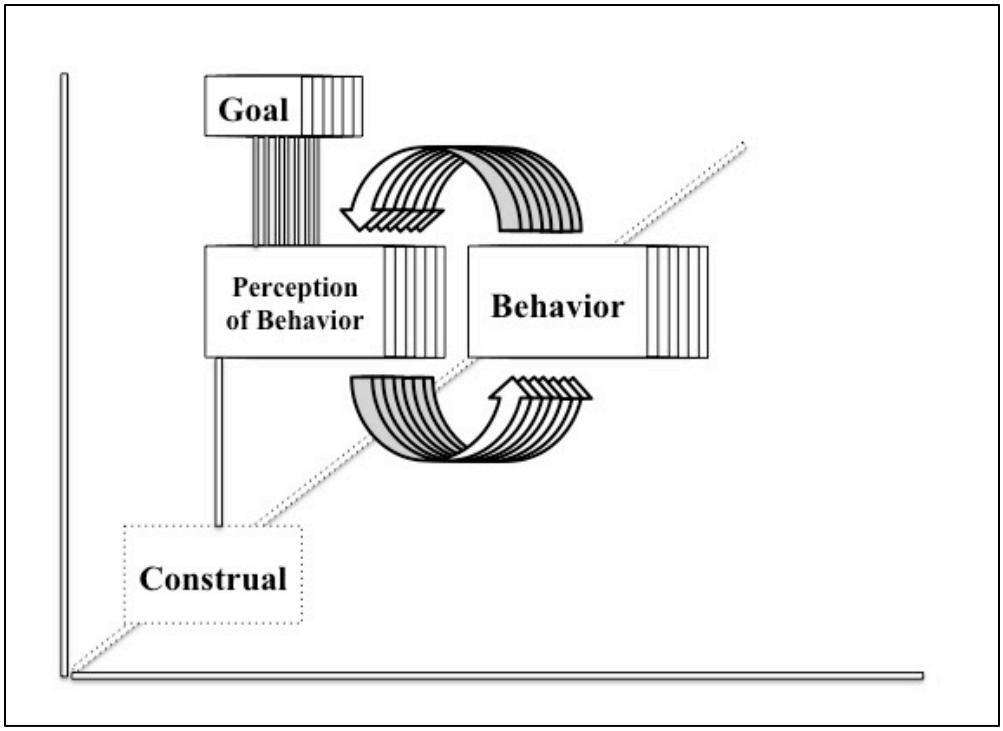


Figure 3. Continual behavior-perception cycles with an added construal dimension that determines how many episodes are considered.

Again, the claim of the current project is that these constraints change discrepancy and self-efficacy perceptions, which then drive differences in behavior. I will now present the study hypotheses, but it is first important to acknowledge that the performance trajectory every participant will see in this study is of one form: successful (above average) cumulative performance and unsuccessful (below average) recent performance. The method section fully unpacks how they will receive feedback and view their performance, but recognize that every hypothesis described below is with respect to a trajectory characterized by successful cumulative performance and unsuccessful recent performance. That is, **every hypothesis should be couched with "…given successful cumulative but unsuccessful recent performance."**

High construal is hypothesized to lead individuals to focus on general behavior trends and therefore produce greater self-efficacy:

H6: Self-efficacy will be greater among high construal participants than low construal participants.

The same long-term perceptions should guide notions of discrepancy. To reiterate, discrepancy perceptions are small when performance meets goal performance.

H7: Discrepancy will be lower among high construal participants than low construal participants.

Recent performance is irrelevant for both self-efficacy and discrepancy given high construal processing, and that claim represents a major disjoint from current social-cognitive and control thinking. Low construal, conversely, is hypothesized to guide attention toward more immediate information (i.e., the prior trial) and levels of self-efficacy and discrepancy will therefore be consistent with recent performance.

These effects are then expected to carry over into effort and performance. Given high construal, general patterns of performance will determine the amount of effort

H8: Effort will be lower among participants in the high construal group compared to the low construal group

and performance put toward a task.

H11: Performance will be lower among participants in the high construal group compared to the low construal group.

When majority performance is successful and recent poor performance episodes are ignored then there is no drive to change effort allocation. Recent poor performance matters, however, when attention is focused on more immediate trends. Therefore, low construal should reverse the effects of performance perceptions on effort and performance.

Methods

Participants

Data were collected from 414 undergraduate students at a large Midwestern University. Nineteen were removed due to failed attention checks that resulted in a final sample of 395. Females comprised 76.5% of the sample, and the race/ethnicity dispersion was 65.6% Caucasian, 12.4% African American, 12.3% Asian or Pacific Islander, 4.8% Hispanic, 2.3% Asian Indian, 2.3% Other, and 0.05% Native American.

Task

Participants played a radar-tracking game called TANDEM (Weaver, Bowers, Salas, & Cannon-Bowers, 1995; Bell & Kozlowski, 2008; Ford, Smith, Weissbein, Gully, & Salas, 1998) that requires the player to monitor targets and subsequently make "shoot" or "clear" decisions. Each target contains information that allows players to come to an action decision, and participants can query this information by selecting targets on their screen. For example, the bin "Class" reveals three query options once a target is selected, including "Intelligence," "Direction of Origin," and "Maneuvering Pattern." Clicking on any of these options reveals one unique piece of information about the target (e.g., "Private" after selecting "Intelligence"). There are three bins that contain three possible query items, creating a total of nine possible pieces of information about each target. Based on this information, participants then classify targets (e.g., submarine or surface) before making action decisions. To summarize, participants must look up information (e.g., "Intelligence" is "Private") to classify a target (e.g., submarine) and then make action decisions based on target classifications (e.g., "shoot" because the target is a hostile, military, submarine).

To minimize the influence of learning I made the scope of the task simple, which allows persistence and motivation to determine performance rather than abilities (Beck et al., 2017).

Participants were told to "shoot" the target if classified as submarine, military, and hostile. Moreover, classification decisions (e.g., submarine) were based on one piece of information (prior studies used multiple). Finally, participants were reminded of the classification criteria before every trial. The information needed to reach those classifications, however, changed across trials. I made strategic adjustments to this information to bolster believability of false feedback, which is described next.

Manipulations

Performance Feedback

Performance trajectories were manipulated by providing false feedback, which ensured that every participant perceived the same pattern of performance. One trajectory was used across all conditions that is shown in Figure 4. As displayed, the performance trajectory for every participant represented successful cumulative but unsuccessful recent performance. "Recent" performance refers to the seventh trial, and "cumulative" performance refers to a majority of the trials. Participants viewed their (false) performance trajectory just before completing their last (eighth) trial. The first trial was neutral to minimize primacy effects.

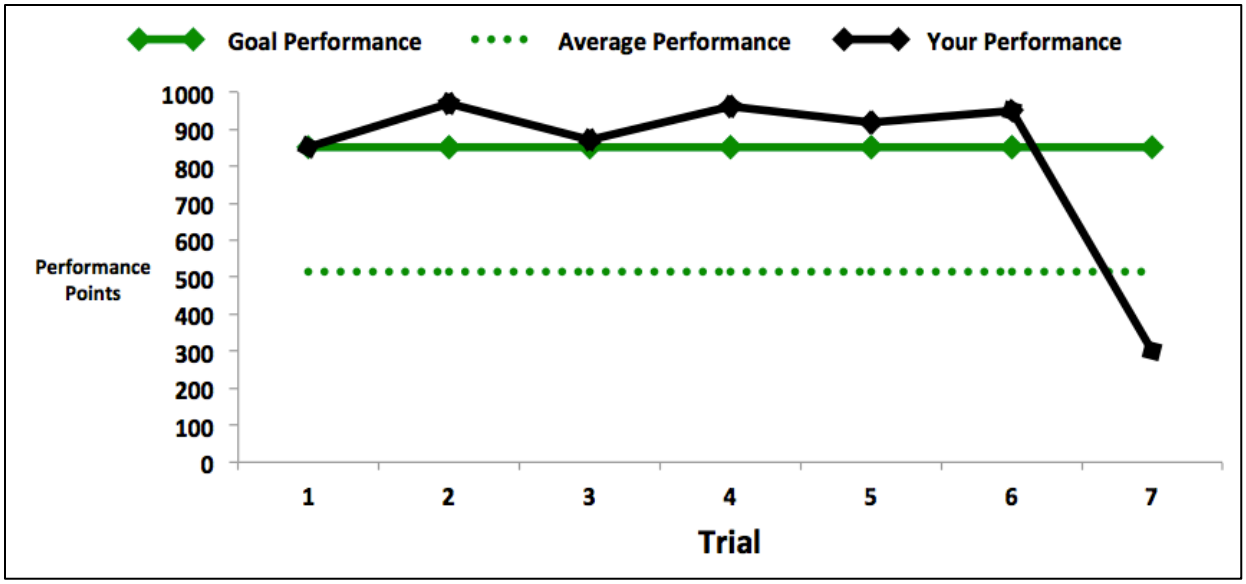


Figure 4. Successful cumulative and recent performance feedback image.

I made a number of calibrations to ensure TANDEM performance feedback was believable. My goal was to increase performance ambiguity and the plausibility of making mistakes across trials (e.g., Chang, Johnson, & Lord, 2009) while also minimizing the amount of learning needed to succeed on the task (e.g., Bell & Kozlowski, 2008). First, the physical characteristics of each trial, including the number, speed, location, and movement direction of the targets and the amount of time given were adjusted to make comparisons across trials difficult. These changes were not in place to change task complexity; the task remained relatively simple throughout. Rather, these changes created trial diversity to impede participants from making subjective performance comparisons in the absence of initial feedback. Second, the classification criteria needed to make "shoot" decisions changed across trials and participants were only allowed to study this information before the trial (see procedure). Although participants were always told to "shoot" a target when classified as a submarine, military, and hostile, the queried information to reach these classifications (e.g., information revealed when "Intelligence" is selected) changed. Third, these changing classification criteria sounded similar across trials. For example, one trial specified hostile if "Countermeasures" reveal "Jutting," while a subsequent trial specified hostile

if “Countermeasures” reveal “Jamming.” All information was paired in this way to develop a sense of doubt in the participants about remembering the correct classification criteria. Overloading memory demand would favor participants high in cognitive ability, therefore these classification changes were kept to simple, one-word adjustments and only one piece of information was needed to make a classification; three classifications were then needed to reach an action decision. Finally, I used a fake point system to increase performance ambiguity.

The point system described next was presented to participants as if it were true, but it was *not* used to calculate actual performance. A fixed, circular perimeter appears on the screen and participants attempted to make decisions before the targets entered the perimeter. If a correct decision was made on time the participant gained points. They lost points, however, when (1) targets crossed the perimeter before a decision was made, (2) an incorrect decision occurred (i.e., selecting “shoot” when a target was friendly), (3) participants selected irrelevant information, or (4) no information about a target was queried. The last point deduction ensured participant engagement during the task. Participants were told that 1000 points were possible on each trial and their goal was to reach at least 850 (Bandura, 2006). Participants were unaware of their (false) point totals until they view their performance trajectories before the last trial.

Construal

Two methods were used to manipulate construal level: an abstract/concrete task and altering task distance. Although within trials participants click on targets to read action-decision information, before every trial they also read general information about where the targets came from. This style of construal manipulation is consistent with literature on psychological distance (e.g., Henderson et al., 2006; Fujita et al., 2006). In the high construal condition participants were told, “the targets were manufactured at a building located on ____ street in Indonesia” (the street names used were Indonesian cities). In the low construal condition participants were told,

"the targets were manufactured at a building located on ____ street at Michigan State University" (the street name used were actual streets on campus).

Participants also completed a Navon letters task between each trial where they were asked to select either a global or local letter; the figure below illustrates an example. In the high construal condition participants were asked to select the global letter. In the low construal condition participants were asked to select the local letter. Twenty images were presented after trials one through six to create a total of 120 letter selections, which is consistent with other construal literature (e.g., Liberman & Forster, 2009).

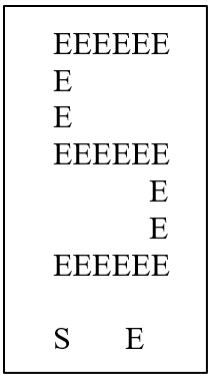


Figure 5. An example Navon letter where focus could be drawn to the local "E" or global "S."

These manipulations were not crossed. For example, participants in the high construal condition were presented with Indonesian street names and asked to select the global letter on the Navon task. The focus of the study was not related to the efficacy of different construal manipulations; they were simply in place to create strong manipulations.

Measures

The two behavioral outcomes, effort and performance, were assessed on the final task trial.

Effort

Two independent indicators of effort were assessed (Ford et al., 1998; Dalal & Hulin, 2008), including time spent querying correct information and the number of targets engaged (i.e., the number of ships they clicked on).

Performance

Performance was operationalized as the number of correct shoot decisions. A binary score was applied (zero for incorrect, one for correct) for every decision on the last trial. These decisions were then summed into one performance score for every participant.

Psychological construct measures were taken after participants viewed their (false) performance feedback; which was also before their final task trial.

Self-Efficacy (Appendix B)

Participants were asked to select a value between 0 ("Cannot do at all") and 100 ("Highly certain can do") to indicate their confidence in performing at ten levels across the point score range (100 – 1000) to assess self-efficacy (Bandura, 2006), $\alpha = 0.93$.

Discrepancy (Appendix C)

Perceptions of discrepancy between performance and goal performance were assessed with a five-item questionnaire. An example item is, "I am ____ from reaching the goal of 850 points"). Response options ranged from 1 = Very far to 5 = Very close; $\alpha = 0.96$.

Intended Effort (Appendix D)

Effort intention was assessed with one item: "On a scale of 0 to 100, 100 being maximum effort, how much effort do you intend to give on the next trial?"

Other measures were included between each trial to reduce participant suspicion of the key construct measures that occur before the last trial.

Depletion (Appendix E)

Participants reported their depletion in between each trial (Lin & Johnson, 2015). Participants were asked the extent to which they agree with items such as, "I feel drained" on a 5-point likert scale ranging from "Strongly Disagree" to "Strongly Agree." Test-retest correlations among depletion scores across time were between 0.56 for time points greater than 5 intervals apart and 0.98 for trial to trial correlations.

Visual Congruency Task (Construal Manipulation -- Navon Letters; Appendix F)

As described above, a Navon letters task was completed between each trial to manipulate construal. The task was presented as a "visual congruency task important for radar command that we are piloting for a future study." Participants were instructed to circle one of two letter options that correspond to the global (high construal) or local letters (low construal) in the image.

Several measures were taken at the end of the study to serve as control variables.

Demographics (Appendix G)

Participants were asked to report their gender, race, major, and year.

Cognitive Ability

Cognitive ability was assessed by asking participants to report their SAT and/or ACT scores (Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008).

Construal Level Manipulation Check (Appendix H)

Vallacher and Wegner's (1989) action identification measure served as a construal manipulation check. Participants viewed 25 behaviors with two alternative identifications and will be instructed to "choose the identification, *a* or *b*, that best describes the behavior for you." An example item is, "Reading" with response options, "Following lines of print" or "Gaining knowledge."

Goal Commitment (Appendix I)

Goal commitment was assessed using Klein, Wesson, Hollenbeck, Wright, and DeShon's (2001) meta-analytically derived five-item survey because performance feedback is irrelevant to individuals who do not accept goals (Chang, Johnson, & Lord, 2009; Erez & Kanfer, 1983). Items (e.g., "I was strongly committed to pursuing the goal") are anchored on five-point Likert scales (strongly agree to strongly disagree), $\alpha = 0.78$.

Procedure

Appendix "A" depicts the study procedure. Upon entering the lab, participants were greeted by an experimenter who explained that their performance was going to be assessed on a Radar Simulation. Consent forms and a task introduction were presented online. Again, this study aimed to minimize learning effects and therefore the introductory material was thorough. Target selection, classification information, "shoot" criteria, and trial steps were explained with images to ensure participants were aware of their task.

After completing the introductory material participants completed two practice trials to familiarize with the computer controls.

The experimental phase then consisted of eight Radar Simulation (TANDEM) trials. Participants were told that their performance was going to be evaluated and they would receive feedback after the seventh trial.

Before each trial participants viewed a "shoot" criterion slide for one minute (Appendix J). The "shoot" criteria were held constant while the classification criteria differed across trials. Next, participants were told that the target ships were manufactured in Indonesia (high construal) or at MSU (low construal) before completing a trial of TANDEM. After each trial participants completed the depletion measure and the Navon letters task. At the beginning of the study

participants were told that the Navon letters task was being piloted as a "visual congruency task important for radar simulations."

These steps were repeated until participants completed their seventh trial. After answering the depletion measure and completing Navon letters participants were shown their (false) performance feedback graphically for 20 seconds. They then responded to the self-efficacy, discrepancy, and intended effort surveys before completing their last trial.

The study concluded with the end of study measures and a debrief.

Control Groups

Several control groups were also included where all procedures were the same as above, but participants were not put through any construal manipulations. These participants, instead, were either told to focus on their cumulative performance across the trials (the 'look global' group) or only on their most recent trial (the 'look local' group) during their performance feedback image. Moreover, the feedback images used for these groups contained red, square brackets that indicated where they were supposed to look. A final control group was simply shown their performance feedback without being told anything. Measures of self-efficacy, discrepancy, effort, and performance were then the same.

Results

Descriptive Statistics

I used visual plots and various normality tests to assess variable distributions, and this did not suggest any large discrepancies from normality among self-efficacy, both behavioral effort indicators, and performance (independently). Intended effort, conversely, demonstrated a negative skew while discrepancy perceptions demonstrated a positive skew. Residual patterns in the regressions reported below do not suggest any cause for concern for predictive modeling but nonparametric tests will be used to assess group differences on these two variables moving forward. Means, standard deviations, and correlations between the study variables are presented in table one.

Beginning with the means across the sample, discrepancy perceptions were fairly low (max value possible on survey = 25) whereas self-efficacy and intended effort were high (max value possible on surveys, respectively = 110 and 100). Recall that behavioral effort was measured with two indicators, including the amount of time (seconds) spent viewing appropriate information (Effort 1) and the number of ships engaged (i.e., the number of ships a participant clicked on; Effort 2), and performance was the number of correct shoot decisions, or the number of ships they correctly classified as 'shoot' or 'clear.' As indicated by the means, participants on average correctly classified one fewer ship than the total number of ships they engaged (3.5 versus 4.6).

Moving to the correlations, discrepancy demonstrated significant negative correlations with all other variables, such that low discrepancy was associated with higher self-efficacy, intended effort, behavioral effort, and performance. Self-efficacy was positively related with intended effort, behavioral effort, and performance. Intended effort was positively related with behavioral effort and performance. The first indicator of behavioral effort was not related to

performance, but the second indicator, the number of targets engaged, was highly correlated with performance.

Measures were also included to observe any differences in depletion or goal commitment across the sample. A one-way ANOVA suggested that there were no differences in goal commitment across the study conditions $F(4, 390) = 2.01$, $MSE = 13.69$, $p = 0.09$, $\eta_p^2 = 0.034$. Similarly, there were no significant differences in depletion on the last trial $F(4, 390) = 1.90$, $MSE = 29.67$, $p = 0.11$, $\eta_p^2 = 0.019$.

Finally, I also ran a construal manipulation check to contrast the high and low construal groups. The mean for the high construal group was 17.12 ($SD = 10.3$), whereas the mean for the low construal group was 20.52 ($SD = 8.8$). These groups did not differ significantly $t(9.9) = 1.0$, $p = 0.34$, $d = 0.35$. A greater discussion about the failure of this manipulation occurs in the discussion.

Table 1. Means and correlations among the study variables.

	M (*SD*)	1	2	3	4	5	6	7	8
1 Discrepancy	11.11 (5.4)	---							
2 Self-Efficacy	80.19 (20.0)	-0.55*	---						
3 Intended Effort	87.41 (17.7)	-0.15*	0.22*	---					
4 Effort 1	13.74 (5.5)	-0.11*	0.15*	0.18*	---				
5 Effort 2	4.62 (2.4)	-0.26*	0.30*	0.18*	0.04	---			
6 Performance	3.49 (2.4)	-0.21*	0.24*	0.20*	0.02	0.82*	---		
7 Goal Commitment	17.40 (3.8)	-0.18*	0.23*	0.43*	0.11	0.29*	-.07	---	
8 Cognitive Ability	25.74 (3.8)	-0.11	0.09	0.06	-0.11	0.15	0.16	-0.11	---

Note * = $p < 0.05$

Hypothesis Testing – Performance Perceptions

The effects of performance perceptions (self-efficacy and discrepancy) on effort and performance were modeled using regression, with cognitive ability (i.e., ACT scores) as a covariate in every analysis presented below. Five regression models were used to assess the hypotheses related to these relationships and the direct relationship between effort and performance. The first three, respectively, regressed the three indicators of effort on self-efficacy and discrepancy (and the cognitive ability covariate) while the fourth regressed performance on self-efficacy, discrepancy, and the first indicator of effort (and the cognitive ability covariate). The final regression model of performance was the same as the fourth but replaced the first effort indicator predictor with the second effort indicator. Results are summarized in tables two (effort) and three (performance).

Hypothesis one predicted that self-efficacy would be negatively related to effort, and this hypothesis was not supported. Instead, self-efficacy was positively related to all three indicators, although only the relationship with the second behavioral effort indicator was significant (table two).

Hypothesis two predicted that self-efficacy would be negatively related to performance, and this hypothesis was also not supported. In both performance models, self-efficacy positively related to performance, but this relationship was only significant among the model using the first, rather than the second, effort indicator as a predictor (table three).

Hypothesis three predicted that discrepancy would be positively related to effort, and this hypothesis was not supported. Discrepancy was negatively related to all three of the effort indicators but, as was the case with self-efficacy, the relationship was only significant predicting the second effort indicator.

Hypothesis four predicted that discrepancy would be positively related to performance. Contrary to my prediction, discrepancy did not significantly relate to performance in either model.

Hypothesis five predicted that effort would be positively related to performance. This hypothesis held using the second effort indicator (table three), or the number of engaged targets. Both the first effort indicator and intended effort failed to predict performance.

In summary, relationships between effort and performance perceptions (self-efficacy and discrepancy) were opposite to those predicted. Moreover, self-efficacy and discrepancy did not predict the first indicator of effort or effort intentions after partialling cognitive ability. Removing cognitive ability from the models makes all of the self-efficacy and discrepancy effects significant, but it does not change their sign. Moving to performance, the second indicator of effort (i.e., the number of targets engaged) had the strongest effect as a predictor with an unstandardized beta coefficient of 0.82, and it removed the significance of all the other predictors in the model. In models that do not include effort, self-efficacy and discrepancy significantly relate to performance but, again, they do so in ways opposite to those predicted.

Table 2. Model results for effort.
Model: DV ~ Cog Ability + Self-Efficacy + Discrepancy

		DV	
Predictor	**Effort 1**	**Effort 2**	**Intended Effort**
Cognitive Ability	-0.17*	0.076*	0.16
Self-Efficacy	0.016	0.021*	0.12
Discrepancy	-0.070	-0.059*	-0.22

Note: unstandardized values reported. * = $p < 0.05$.
Effort 1 = time spent querying correct info.
Effort 2 = number of engaged targets.

Table 3. Model results for performance.
Performance Model A: DV ~ Cog Ability + Self-Efficacy + Discrepancy + Effort 1
Performance Model B: DV ~ Cog Ability + Self-Efficacy + Discrepancy + Effort 2

Predictor	**Performance (Model A)**	**Performance (Model B)**
Cognitive Ability	0.082*	0.018
Self-Efficacy	0.021*	0.0040
Discrepancy	-0.047	0.018
Effort 1	-0.0073	
Effort 2		0.82*

Note: unstandardized values reported. * = $p < 0.05$.
Effort 1 = time spent querying correct info.
Effort 2 = number of engaged targets.

Hypothesis Testing – Task Characteristics

The other study hypotheses concern task manipulations (construal and "look global") and their effects on outcomes. Recall that there were five groups: high construal, low construal, look global, look local, and a control group (although the look global and look local groups could also be thought of as controls). I predicted that participants in the high construal group, compared to the low construal group, would report greater self-efficacy, lower discrepancy, provide less effort, and subsequently perform worse. Moreover, I expected matching contrasts among the 'looking' groups, such that participants in the 'look global' group, compared to the 'look local' group, would report greater self-efficacy, lower discrepancy, provide less effort, and subsequently perform worse. Between person effects were tested using a one-way ANOVA and its accomplice the Kruskal Wallis test for non-normally distributed variables (discrepancy and intended effort).

Results showed no group differences in self-efficacy $F(4, 390) = 1.96$, $MSE = 397.1$, $p = 0.1$, $\eta_p^2 = 0.02$, but significant differences on discrepancy perceptions $H(4) = 22.96$, $p < 0.05$, $\eta_p^2 = 0.053$. Follow up contrasts were conducted as follows. First, I assessed the difference between

participants in the low construal versus high construal groups, I then contrasted those in the 'look global' versus 'look local' conditions. Results showed no differences between the high versus low construal groups on discrepancy $F(1, 392) = 0.12$, $MSE = 3.53$, $p = 0.7$, $\eta_p^2 = 0.01$ or between the 'look global' versus 'look local' conditions $F(1, 392) = 1.13$, $MSE = 32.71$, $p = 0.3$, $\eta_p^2 = 0.021$.

Finally, results also did not demonstrate significant group differences on performance $F(4, 390) = 1.32$, $MSE = 5.94$, $p = 0.26$, $\eta_p^2 = 0.013$, the behavioral effort indicators $F(4, 390) = 0.98$, $MSE = 29.72$, $p = 0.42$, $\eta_p^2 = 0.015$, for indicator 1, $F(4, 390) = 1.4$, $MSE = 5.89$, $p = 0.23$, $\eta_p^2 = 0.022$ for indicator 2, or intended effort $H(4) = 8.91$, $p = 0.06$, $\eta_p^2 = 0.21$.

Post Hoc Analyses

I also conducted exploratory analyses on the data given the limited findings above. None of the following results will be framed as arguments for or against any particular view – these are simply extra pieces of information given the scope of this project.

The means and standard deviations of the study variables across the groups are presented in table four. As revealed in the results presented above, there were minimal group differences on all study variables except discrepancy. Although the differences were not significant, participants in the high construal condition reported lower discrepancy than participants in the low construal condition and participants in the 'look global' condition reported lower discrepancy than participants in the 'look local' condition. The pattern in the means also suggests that the 'looking groups' had higher discrepancy scores than the 'construal groups,' and this contrast was significant $F(1, 392) = 9.40$, $MSE = 261.20$, $p < 0.05$, $\eta_p^2 = 0.034$. The 'looking groups' also had significantly higher discrepancy ratings than control group participants $F(1, 392) = 9.2$, $MSE = 261.20$, $p < 0.05$, $\eta_p^2 = 0.11$. In summary, participants as a whole within both the 'look global' and 'look local' groups had higher discrepancy perceptions than control group

participants or participants as a whole within the construal conditions. The implications of this finding will be discussed in the discussion section.

I also examined gender differences. Females reported higher discrepancy perceptions (M = 11.44, SD = 5.52) compared to males (M = 10.04, SD = 4.79) and lower self-efficacy (M = 78.23, SD = 20.54) compared to males (M = 86.57, SD = 16.83); both of these effects were significant ($H(1) = 4.59$, $p < 0.05$, $\eta_p^2 = 0.045$ for discrepancy ; $F(4, 390) = 14.55$, $MSE = 54.9$, $p < 0.05$, $\eta_p^2 = 0.033$ for self-efficacy. There were no gender differences on other variables and there were no interactions between gender and the study conditions.

Table 4. Condition means.

Variable	**Condition**				
	High Construal	*Low Construal*	*Look Global*	*Look Local*	*Control*
Discrepancy	9.84 (5.2)[a]	10.24 (5.4)[a]	11.88 (5.3)[b]	13.21 (5.2)[b]	10.27 (5.0)[a]
Self-Efficacy	85.56 (18.7)	79.90 (20.0)	77.76 (19.8)	77.85 (21.5)	80.71 (19.6)
Intended Effort	92.47 (12.2)	85.90 (18.4)	84.62 (20.1)	88.71 (15.9)	86.53 (17.6)
Effort 1	13.45 (4.8)	13.27 (5.4)	14.36 (6.4)	14.36 (4.4)	13.11 (5.7)
Effort 2	5.11 (2.2)	4.74 (2.3)	4.29 (2.6)	4.67 (2.5)	4.38 (2.5)
Performance	4.05 (2.5)	3.44 (2.2)	3.44 (2.6)	3.22 (2.4)	3.3 (2.5)

Note: Mean (SD). Superscript indicates significant contrast.

I also explored the data with structural equations modeling. Again, this was post-hoc and not part of my original plan. I do not report every result because I spent a lot of time simply exploring different options. I ran a variety of measurement models and checked residual correlations, created different latent constructs and checked model fit, ran models with different

causal path directions, and observed results after employing different variables in the models. What I report below is a combination of the "best" outcomes of these efforts and my own opinions about what is appropriate given some of the findings above. Specifically, I estimate the structural model shown in figure 6.

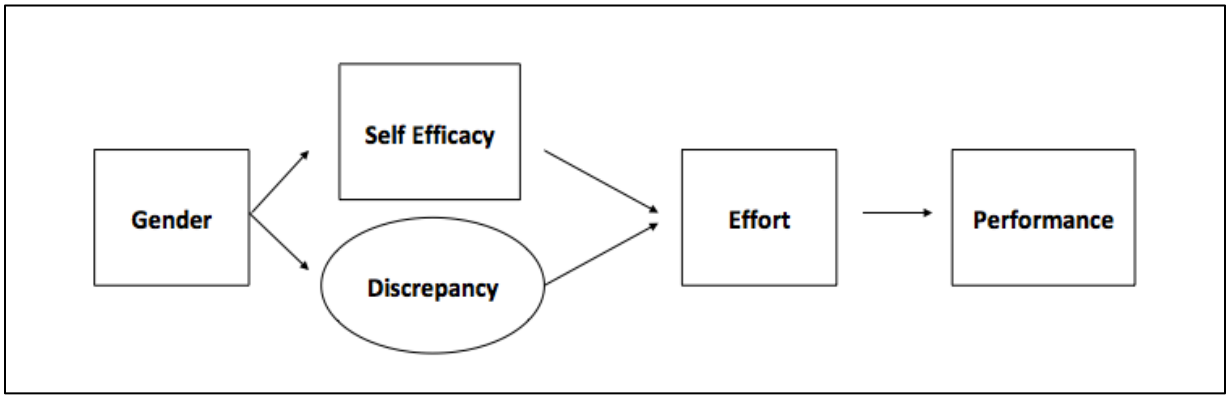


Figure 6. The estimated structural model.

I use the structure in Figure 6 for several reasons. I chose gender as an exogenous variable to predict self-efficacy and discrepancy because the post hoc analysis above suggested gender effects on performance perceptions. I created a latent discrepancy variable using the five items that constituted that scale because measurement models suggested appropriate factor loadings of these items on a common factor, whereas residual correlations from self-efficacy suggested that it should not be represented as a latent variable. Rather, I took the mean of all items on the SE scale as an observed variable – this is also consistent with how Bandura discusses his own use of this variable. These performance perceptions then predict a single observed effort indicator: the number of engaged targets. The regression models suggested that this effort indicator "worked" with performance perceptions and performance, so I discarded the other two effort measures – results from creating a latent variable from all three indicators also suggested that these three indicators do not load onto a common factor. In the last part of the model, effort predicts performance. Finally, I ran a multiple groups analysis where I allowed the

mean estimates of the path coefficients to vary across conditions. I did so because these conditions were the main focus of this study – so any findings here would be worthwhile to explore.

Fit statistics for the model in figure 6 were: χ^2 (26) = 271.04, $p < 0.05$; CFI = 0.92; RMSEA = 0.16; SRMR = 0.17. These indices are less than adequate, but remember that discrepancy was not normally distributed. Removing it from the model changed the fit indices to almost unrealistic levels: χ^2 (6) = 0.734, $p = 0.87$; CFI = 1.00; RMSEA = 0.00; SRMR = 0.015 – which suggests that the reason fit for the model in figure 6 is inadequate is because of discrepancy's distribution. These two models are not properly nested and therefore cannot be directly compared. I will continue with the model that includes discrepancy because this is, again, an exploratory section and I have an idea for why fit is (relatively) poor.

The path coefficient estimates were consistent with the effects presented above. Gender significantly predicted self-efficacy ($b = 8.29$, $SE = 2.35$, $p < 0.05$) and discrepancy (b = -0.27, SE = 0.13, $p < 0.05$) and these effects were in the same direction as reported above. Self-efficacy positively, whereas discrepancy negatively, predicted effort (b = 0.027, SE = 0.006, $p < 0.05$; b = -0.33, SE = 0.11, $p < 0.05$; respectively). Finally, effort positively related to performance (b = 0.83, SE = 0.029, $p < 0.05$).

In the multiple-groups analysis, the structural model was the same but the mean path coefficients across conditions were allowed to vary. The unstandardized path coefficients across conditions are reported in table five. The largest trend to notice is that effort positively predicted performance across all conditions. It is also interesting to note that the relationship between discrepancy and effort was negative in the high construal group but positive in the low construal group. Finally, gender had large effects on self-efficacy for the look global and control groups. I will unpack the implications in the discussion section.

Table 5. Multiple groups SEM.

Relationship	**Condition**				
	High Construal	*Low Construal*	*Look Global*	*Look Local*	*Control*
Gender => SE	3.44	5.5	12.2*	5.95	15.2*
Gender => Disc	0.06	-0.34	-0.43	-0.24	-0.42
SE => Effort	0.02	0.05*	0.037*	-0.003	0.016
Disc => Effort	-0.78*	0.47*	-0.40	-1.05*	0.17
Effort => Perf	0.89*	0.74*	0.86*	0.79*	0.84*

Note: Unstandardized betas reported. * = $p < 0.05$

The last post-hoc analysis was an "abstract" contrast. My study contained one-factor: condition (high construal, low construal, look global, look local, control), but conceptually a few of these conditions can be combined. To do so, I artificially created two conditions: direction (global versus local), and style (explicit versus implicit). That is, I took the global and local conditions and combined them into an "explicit" condition, and combined the construal groups into an "implicit" condition – this created the factor "style." I created the second factor, "direction," by combining high construal and look global, and low construal and look local. Again, this was not a true 2x2 study but due to the conceptual similarity of the conditions and the exploratory nature of this section I am making this post-hoc contrast.

First with respect to discrepancy. Style had a significant main effect, $F(1,318) = 16.25$, $MSE = 28.3$, $p < 0.05$, $\eta_p^2 = 0.052$, but direction did not, $F(1,318) = 2.2$, $MSE = 28.3$, $p = 0.14$, $\eta_p^2 = 0.0069$, and there was no interaction, $F(1,318) = 17.2$, $MSE = 28.3$, $p = 0.44$, $\eta_p^2 = 0.0019$.

A similar pattern emerged with self-efficacy. Style had a significant main effect, $F(1,318) = 4.64$, $MSE = 400.5$, $p < 0.05$, $\eta_p^2 = 0.016$, but direction did not, $F = 1.42$, $MSE = 400.5$, $p = 0.23$, $\eta_p^2 = 0.0044$, and there was no interaction, $F(1,318) = 1.63$, $MSE = 400.5$, $p = 0.20$, $\eta_p^2 = 0.005$.

Finally, there were no main effects or interactions for intended effort, effort, or performance. Intended effort: (Style: $F(1,318) = 1.92$, $MSE = 306.7$, $p = 0.17$, $\eta_p^2 = 0.0065$; Direction: $F(1,318) = 0.28$, $MSE = 306.7$, $p = 0.60$, $\eta_p^2 = 0.0008$; Interaction: $F(1,318) = 7.21$, $MSE = 306.7$, $p = 0.11$, $\eta_p^2 = 0.021$). Effort 1: (Style: $F(1,318) = 0.097$, $MSE = 29.2$, $p = 0.09$, $\eta_p^2 = 0.0008$; Direction: $F(1,318) = 0.022$, $MSE = 29.2$, $p = 0.88$, $\eta_p^2 = 0.0006$; Interaction: $F(1,318) = 0.024$, $MSE = 29.2$, $p = 0.87$, $\eta_p^2 = 0.0007$). Effort 2: (Style: $F(1,318) = 2.92$, $MSE = 5.86$, $p = 0.22$, $\eta_p^2 = 0.0009$; Direction: $F(1,318) = 0.003$, $MSE = 5.86$, $p = 0.74$, $\eta_p^2 = 0.0007$; Interaction: $F(1,318) = 1.89$, $MSE = 5.86$, $p = 0.39$, $\eta_p^2 = 0.0005$). Performance: (Style: $F(1,318) = 1.97$, $MSE = 5.96$, $p = 0.16$, $\eta_p^2 = 0.0075$; Direction: $F(1,318) = 2.21$, $MSE = 5.96$, $p = 0.14$, $\eta_p^2 = 0.007$; Interaction: $F(1,318) = 0.46$, $MSE = 5.96$, $p = 0.46$, $\eta_p^2 = 0.0017$). In summary, this analysis supports the contrast between the "looking" and "construal" groups reported earlier, but does not add any additional findings.

Discussion

The current study examined two aspects surrounding task performance, including 1) the influence of task characteristics on performance perceptions and 2) whether those perceptions influence subsequent effort and performance. Social research has shown that task characteristics inform construal and the perception of features in an individual's environment, and the self-regulation literature has demonstrated robust effects of feedback on subsequent effort and performance. When combined, these ideas suggest that task features may influence how an individual perceives their own performance feedback and this, in turn, may drive differences in effort and performance.

Perceptions on Effort and Performance

Beginning with the second investigative piece, performance perceptions of feedback (discrepancy and self-efficacy) predicted effort and performance but in directions opposite to my hypotheses. Self-efficacy was positively, rather than negatively, related to both effort and performance. Although different from my predictions, these findings are consistent with studies on the within versus between person effects of self-efficacy. On average, people with greater self-efficacy tend to show higher levels of effort and performance (a between person effect). For a single individual over time, however, spikes in self-efficacy translate to lower subsequent task effort. My study was between persons and was therefore consistent with studies in that area. My hypothesis, however, was consistent with the within person effect even though my design was between persons because participants were shown an image of their performance trajectory and I believed that viewing a performance history would diminish the global between person effect in a similar vein as Vancouver et al. (2014) – but I was incorrect.

Said another way, my predictions about self-efficacy were consistent with within-person literature despite my study being between-persons. I did this because I used trajectories as

performance feedback – which mimic within-person flavors. In a within-person study, measures are taken repeatedly across time. Here, I essentially simulated repeated measures on the front end, located the participants at one point in that trajectory, and then measured one instance of their subsequent behavior. My study, therefore, could be considered as the last point to a within-person study: the between-persons analysis of the last trial. Given this framing, my study was meant to conceptually replicate within person findings.

Relationships between discrepancy and the behavioral outcomes were also inconsistent with my predicted directions. Perceived discrepancy negatively related to performance and effort (although the relationship with effort indicator 1 was not significant). These findings are in sharp contrast to previous work, and there are several possible reasons for this. First, it is possible that participants with a large discrepancy did not view the gap as motivating but instead perceived it as impossible to reduce and therefore provided minimal effort. This explanation would be consistent with some goal setting literature, where the distance between where a person is and where they want to be can reduce motivation if the gap is greater than a threshold (Ordóñez & Wu, 2013). Indeed, the relationship between goal commitment and discrepancy was -0.18, indicating that individuals perceiving large discrepancies were not committed to the goal. Another possibility is that my discrepancy measure tapped a slightly different construct than prior work. Other literature uses distance on the performance measure itself to measure discrepancy (i.e., for a goal of 10 points, 2 points is a larger discrepancy than 8 points). I used a survey with subjective questions such as, "I am ___ from reaching the goal" (very far, far, moderate, close, very close). Perhaps perceptions of discrepancy diverge considerably when measured these various ways.

Finally, I also predicted a positive relationship between effort and performance. I tried to minimize the complexity of the task so that more effort would result in direct performance gains.

The relationship between performance and the number of engaged targets supported this notion (effort indicator 2), while the relationship between performance and the time spent viewing ship information (effort indicator 1) did not. There was a strong positive relationship between the number of engaged targets and the number of correct shoot decisions, and this tells me that participants rarely misclassified targets that they clicked on, while the near zero relationship between the number of correct shoot decisions and the time spent viewing correct information suggests that more or less time spent viewing information was not informative for making better shoot decisions. This second result could have occurred because the information was relatively easy for the participants to keep in mind, making any differences in the time spent viewing information insignificant. A second reason for the result may have been related to the pace of the task. Participants may have felt rushed by the timed nature of the task and therefore tried to maximize target engagements rather than information acquisition – which was the intent of the study design.

Task Characteristics on Perceptions

Moving to features of the task and their relation to performance perceptions, there were no differences in self-efficacy among the conditions. That is, task mastery perceptions for the final trial did not differ among participants who were told to look at various phases of their performance trajectory or among participants under different construal manipulations. This could be due to the manipulations themselves or the nature of the trajectory. Manipulation possibilities will be discussed in the limitations section below. The false performance feedback image revealed performance at or above average during most of the trials except for the most recent one, where performance then plummeted. Although using false performance trajectory images is consistent with other literature, participants in prior research were asked to consider the performance trajectory of another individual rather than their own. It is possible that the

feedback image used here was so strong (or weak) that participants in every condition viewed it in the same way. Another possibility is that self-efficacy perceptions could not differentiate because the task itself was either too difficult or too easy. The means and standard deviations among conditions, however, suggests that this was not the case, as there was plenty of variance in the sample.

Group differences did emerge on discrepancy perceptions, but these were also not in the predicted directions. The high construal group did not differ from the low construal group and the 'look global' group did not differ from the 'look local' group. The differences that did exist stemmed from contrasts between 1) the construal groups and the 'looking' groups and 2) the 'looking groups' and the control group. Construal manipulations resulted in significantly lower discrepancy perceptions than the 'looking groups.' This may have occurred due to some demand characteristic associated with the 'looking groups' or a dimension at play in both construal manipulations that did not exist elsewhere. Construal has been shown to influence a variety of perceptual dimensions (e.g., why/how, feasibility/desirability, now/future, etc.), so construal may have signaled one of those dimensions while the 'looking' groups focused more on the general features of the feedback image itself. Another possibility is that the 'looking' groups took the feedback image as more negative than any other group and thus had larger discrepancy perceptions. This idea is consistent with the final contrast which showed that the 'looking' groups had significantly higher discrepancy than the control group.

Practical Implications

Although many of the study relationships were different from predicted and do not lend themselves to clean interpretations, some practical implications can still be considered. Appropriate handling of task feedback is an important feature in organizational life and some of the results speak to possible 'best practices' in this area. Results suggest that people who focus

heavily on task feedback (the 'looking' groups) have larger discrepancies, and these discrepancies are related to lower effort and performance. Although feedback procedures should be informative and based on true information, employees may need to be sensitive to the drawbacks of focusing too much on the 'points of the system.' In other words, focusing too narrowly on the quantitative feedback itself may lower employee morale because weaknesses can be found even among 'better than average in sum' performance.

The results also speak to possible overstatements in the impact of emerging workplace trends related to increasing distance and thus the construal of the agents involved, such as virtual teams, remote communication, and global connectivity (Zajac, Shuffler, Darling, & Salas, 2013). For example, Jarvenpaa and Leidner (1999) suggest possible reductions in employee outcomes, such as engagement, as companies increasingly extend boundaries and involve individuals across time and space (Mowshowitz, 1997; Krirstof, Brown, Sims, & Smith, 1995). Here, features on spatial dimensions did not influence effort or performance and therefore any construal differences that these new trends carry may be non-issues. Organizations save substantial amounts of money by knowing where complex solutions are not needed and modern, distance-related changes in task features may be such an area.

Limitations and Future Directions

This study was designed to capture the ideas discussed throughout, but there were certainly limitations along the way, and many of these speak to fruitful areas for research moving forward. The largest flaw relates to the construal manipulation. No other studies manipulate construal across multiple trials as I did here. Moreover, I have only come across one paper that used a construal manipulation check, the others assume a construal effect given differences on their dependent variable. Although I chose construal manipulations consistent with prior work, there were no guidelines as to how to handle the aforementioned aspects. In pilot studies, I was

unable to produce differences on a construal manipulation check across different types of manipulations and locations of manipulation among the trials. It is possible, therefore, that my manipulations were not working, working in a different way than I anticipated, or my manipulation check was not sensitive to construal differences.

One question to consider is whether I believe the manipulations, or the manipulation check itself did not work. There are arguments for both positions. First, the manipulation check I used is only discussed in one other study in the literature – which suggests that people are not using it. Now, are they avoiding it because it is a bad instrument or because construal itself does not work? There is no way for me to know, but its absence suggests some hesitation toward its utility as a manipulation check. Turning to the construal manipulations, what evidence do I have that they did or did not work? The manipulations I used are two of the most popular techniques in the literature; and a personal email exchange with a construal researcher suggested that the navon letters were a good choice. These notions (weakly) suggest that the construal manipulations worked. Conversely, in pilot studies I did not find any differences in self-efficacy, discrepancy, effort, or performance when I manipulated construal once and then immediately took these measures. This suggests that construal was producing no differences on the (possibly bad) manipulation check and on other measures – which is evidence that it was not working.

A final point on this issue is why I continued the study given the limited findings in pilots studies. I did so for two reasons. First, my study was not concerned with the efficacy of construal manipulations, so having these "work" was a (granted, large) peripheral step. The larger reason was the deadline. Thesis projects have specific due dates, and I cannot continue my graduate progression without finishing. In other research projects there are technically no deadlines, so if I had come up against manipulation challenges I would go back and consider other methods. I recognize that this argument might sound wrong-minded at first – everything has a deadline and

"giving in" is bad practice – but I think it makes sense given my framing of the thesis. In my view, this is just another project – I would even call it a practice project. This is not the uniting work of my career, so it makes sense to sludge through all aspects (without worrying to much about each piece) and get a sense for where the challenges are – obviously I found one.

Because of the construal challenges, it is hard to know what participants in those conditions were focusing on while viewing their feedback. The manipulation was meant to direct their attention either to the global or local pattern of performance (just like the 'looking' groups). Given the null manipulation findings, however, I do not know where these participants were looking or the dimension they were focused on. A useful next step would be to provide feedback trajectories across different construal manipulations and observe which aspects participants focus on – not by inference through successive task performance but through questions or interviews in the moment.

This study also cannot speak to the belief updating mechanism used among the participants. There is a large literature on causal beliefs and their implications (Gilovich, 1991), and recent work is beginning to unpack how these beliefs change over time (Sharot & Garrett, 2016; Sharot, Korn, & Dolan, 2011). It is certainly possible that task characteristics or various styles of feedback inform update strategies, and this would be useful information to know moving forward.

Conclusion

Drawing from social and motivational literatures, I examined how task features guide perceptions of one's own performance history and the self-regulatory implications that follow. A number of predictions were made regarding both performance perceptions and behavioral tendencies on a radar simulation task, and tests of these relationships produced results contrary to expectations. Although the findings do not lend themselves to explanatory interpretations, the results are discussed as they relate to feedback, perceptions, and possible next steps.

APPENDICES

APPENDIX A

Experimental process description

1. Consent forms and Qualtrics introduction to TANDEM
2. TANDEM Trials

Practice

$Trial_p$		$Trial_p$	
Perform Task	Post Task Material None	Perform Task	Post Task Material None

Experimental

$Trial_1$		$Trial_2$	
Perform Task	Post Task Material • Perceived Workload • Navon Letters	Perform Task	Post Task Material • Perceived Workload • Navon Letters

…continued through trial 6

$Trial_7$		$Trial_8$	
Perform Task	Post Task Material • Perceived Workload • Navon Letters • Performance Feedback Image • Self-Efficacy • Discrepancy • Intended Effort	Perform Task	Post Task Material • Perceived Workload • Navon Letters

3. End of study surveys and debrief
   - Behavior identification survey (construal manipulation check)
   - Demographics

APPENDIX B

Self-efficacy

Please rate how certain you are that you can achieve the given level of performance ON THE NEXT TRIAL. Rate your degree of confidence by recording a number from 0 to 100 using the following scale: 0 (Cannot do at all); 10; 20; 30; 40; 50 (Moderately can do); 60; 70; 80; 90; 100 (Highly certain can do).

On the next trial, I will be able to achieve a score off…
1. 100 (Please enter a whole number between 0 and 100 to indicate your confidence)
2. 200 (Please enter a whole number between 0 and 100 to indicate your confidence)
3. 300 (Please enter a whole number between 0 and 100 to indicate your confidence)
4. 400 (Please enter a whole number between 0 and 100 to indicate your confidence)
5. 500 (Please enter a whole number between 0 and 100 to indicate your confidence)
6. 600 (Please enter a whole number between 0 and 100 to indicate your confidence)
7. 700 (Please enter a whole number between 0 and 100 to indicate your confidence)
8. 800 (Please enter a whole number between 0 and 100 to indicate your confidence)
9. 900 (Please enter a whole number between 0 and 100 to indicate your confidence)
10. 1000 (Please enter a whole number between 0 and 100 to indicate your confidence)

APPENDIX C

Discrepancy

This set of questions asks you to describe the distance between your performance and the goal.

1. I am _____ from reaching the goal of 850.

Very far	Far	Moderate	Close	Very close

2. When comparing my level of performance to the goal of 850, I am _____ to accomplishing the goal.

Very far	Far	Moderate	Close	Very close

3. The gap between my performance and the goal of 850 is _____

Very large	Large	Moderate	Small	Very small

4. When I consider the goal of 850, I feel that I am at a _____ distance from it.

Very far	Far	Moderate	Close	Very close

5. The goal of 850 seems _____ from my level of performance.

Very far	Far	Moderate	Close	Very close

APPENDIX D

Intended effort

How much effort do you plan to give on the upcoming trial? Please enter a whole number.

0 = No effort
100 = Maximum effort

APPENDIX E

Depletion

Please rate the extent to which you agree with the following items.

1. I feel drained.

Strongly Disagree	Disagree	Neither	Agree	Strongly Agree

2. My mind feels unfocused right now.

Strongly Disagree	Disagree	Neither	Agree	Strongly Agree

3. Right now, it would take a lot of effort for me to concentrate on something.

Strongly Disagree	Disagree	Neither	Agree	Strongly Agree

4. My mental energy is running low.

Strongly Disagree	Disagree	Neither	Agree	Strongly Agree

5. I feel like my willpower is gone.

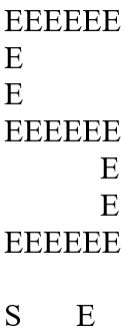
Strongly Disagree	Disagree	Neither	Agree	Strongly Agree

APPENDIX F

Navon letters construal manipulation (visual congruency)
Introductory cover sheet

High Construal

In this task, you will be making basic perceptual judgments. You will see composite letters on the screen. Each composite letter is a large letter made up of small letters, like this:



S E

Your job is to circle the "S" below the image; the large, *global* letter that is formed by the overall shape.

Low Construal

In this task, you will be making basic perceptual judgments. You will see composite letters on the screen. Each composite letter is a large letter made up of small letters, like this:

S E

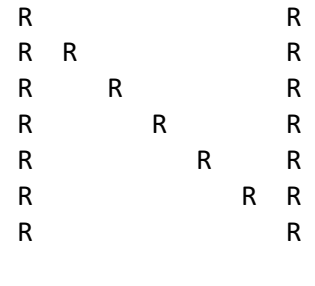
Your job is to circle the "E" below the image; the small, *local* letter that this figure is made up of.

APPENDIX G

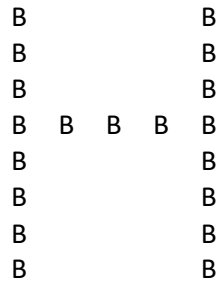
Navon letters construal manipulation (visual congruency)
Example task sheet

High Construal

Please circle the letter that corresponds to the *global* letter represented in the image.



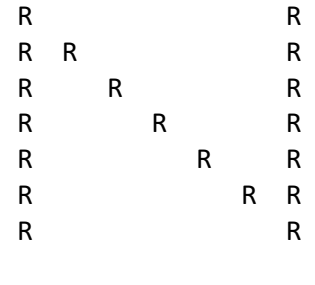
R N



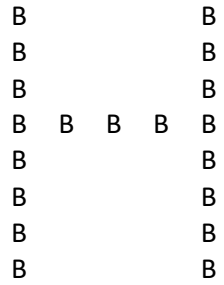
B H

Low Construal

Please circle the letter that corresponds to the *local* letter represented in the image.



R N



B H

*20 letter configurations per round

APPENDIX H

Demographics

Please provide as much of the following information as is applicable. It is important to understand that these scores will be kept confidential and used only for research purposes. If you do not remember your exam scores, please put a zero in that space.

Gender: (M / F) If other please list _____
Age: _____
SAT score: _____
ACT score: _____
Year in College: _____
Major: _____
Race: _____

APPENDIX I

The behavior identification form

1. Making a list
a. Getting organized*
b. Writing things down
2. Reading
a. Following lines of print
b. Gaining knowledge*
3. Joining the army
a. Helping the nation's defense*
b. Signing up
4. Washing clothes
a. Removing odors from clothes*
b. Putting clothes into the machine
5. Picking an apple
a. Getting something to eat*
b. Pulling an apple off a branch
6. Chopping down a tree
a. Wielding an axe
b. Getting firewood*
7. Measuring a room for carpeting
a. Getting ready to remodel*
b. Using a yardstick
8. Cleaning the house
a. Showing one's cleanliness*
b. Vacuuming the floor
9. Painting a room
a. Applying brush strokes
b. Making the room look fresh*
10. Paying the rent
a. Maintaining a place to live*
b. Writing a check
11. Caring for houseplants
a. Watering plants
b. Making the room look nice*
12. Locking a door
a. Putting a key in the lock
b. Securing the house*
13. Voting
a. Influencing the election*
b. Marking a ballot
14. Climbing a tree
a. Getting a good view*
b. Holding on to branches
15. Filling out a personality test
a. Answering questions
b. Revealing what you're like*
16. Tooth brushing
a. Preventing tooth decay*
b. Moving a brush around one's mouth
17. Taking a test
a. Answering questions
b. Showing one's knowledge*
18. Greeting someone
a. Saying hello
b. Showing friendliness*
19. Resisting temptation
a. Saying "no"
b. Showing moral courage*
20. Eating
a. Getting nutrition
b. Chewing and swallowing
21. Growing a garden
a. Planting seeds
b. Getting fresh vegetables*
22. Traveling by car
a. Following a map
b. Seeing countryside*
23. Having a cavity filled
a. Protecting your teeth*
b. Going to the dentist
24. Talking to a child
a. Teaching a child something*
b. Using simple words
25. Pushing a doorbell
a. Moving a finger
b. Seeing if someone is home*

* High level alternative

APPENDIX J

Goal commitment

This set of questions is related to your goal of receiving 850 points on each trial.

1. It was hard to take the goal seriously.
Strongly disagree Disagree Neutral Agree Strongly Agree

2. Quite frankly, I didn't care if I achieve the goal or not.
Strongly disagree Disagree Neutral Agree Strongly Agree

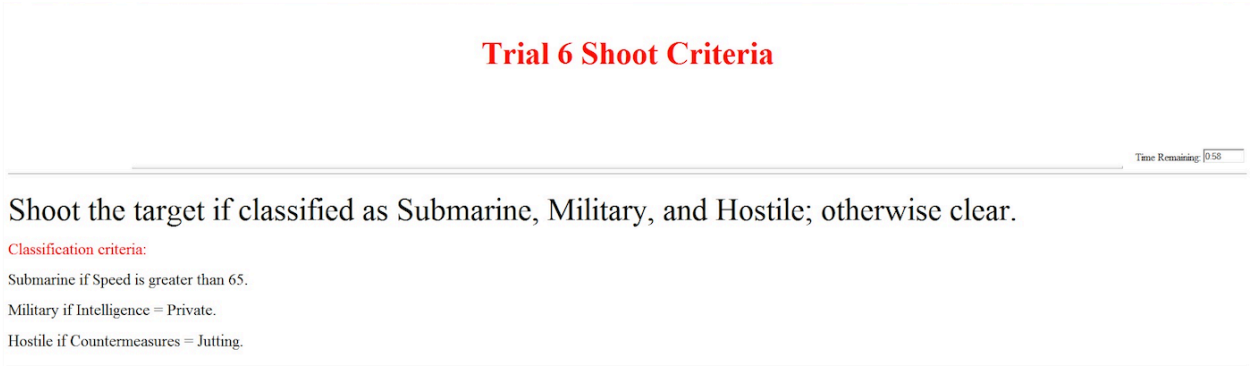
3. I was strongly committed to pursuing the goal.
Strongly disagree Disagree Neutral Agree Strongly Agree

4. It wouldn't take much to make me abandon the goal.
Strongly disagree Disagree Neutral Agree Strongly Agree

5. I think it was a good goal to shoot for.
Strongly disagree Disagree Neutral Agree Strongly Agree

APPENDIX K

Shoot criteria slide example



*Notes

- The “shoot” criteria (submarine, military, hostile) does not change.
- The “classification criteria” changes every trial.
- Participants are given 60 seconds to view this slide.

*Classification criteria if the image is difficult to see:

- Submarine if Speed is greater than 64.
- Military if Intelligence = Private.
- Hostile if Countermeasures = Jutting.

APPENDIX L

Research participant information and consent form

You are being asked to participate in a research study. Researchers are required to provide a consent form to inform you about the research study, to convey that participation is voluntary, to explain risks and benefits of participation, and to empower you to make an informed decision. You should feel free to ask the researchers any questions you may have.

Study Title: Radar Simulation
Researchers: Richard P. DeShon, PhD; Christopher Dishop
Institution: Michigan State University

Organizational Psychology
Psychology Department
Michigan State University
East Lansing, MI 48824

You are being asked to participate in a research study investigating individual performance on a radar simulation. You have been selected as a possible participant in this study because the research applies to all adults regardless of age, gender, occupation, etc. You must be at least 18 years old to participate. If you agree to participate in this study, the researcher will ask you to (1) complete a series radar simulation trials and (2) respond to a variety of questions. Your participation in this study will take about 90 minutes. You will be given 3 research credits as compensation for your time. There are no foreseeable risks associated with participation in this study. The data you provide will remain confidential. The data collected for this research study will be protected on a password-protected computer for a minimum of three years after the close of the project. Only the appointed researchers and the Human Research Protection Program (HRPP) will have access to the research data. Your confidentiality will be protected to the maximum extent allowable by law. All research investigations are required to protect your privacy rights as a participant. Research investigations are meant to be realistic, thus you will be unaware of or misled regarding the nature of the research. You will need to provide identifying information about yourself to be given credit for participation. In addition, the survey website captures IP addresses. However, the investigator will remove all identifying information (including IP addresses) once compensation has been provided. Once this happens, the data will be anonymous and you will be unable to be identified. The course instructors will never have access to your data, beyond knowing that you participated so they can grant credit. Participation is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. Whether you choose to participate or not will have no affect on your grade or evaluation. You have the right to say no. You may choose not to answer specific questions or to stop participating at any time. You will earn 3 research credits for participating in this study. If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 4000 Collins Rd, Suite 136, Lansing, MI 48910.

CONTACT INFORMATION

- If you have any questions or concerns about this study, you may contact the researchers at:

Dr. Richard P. DeShon Psychology Building	Christopher Dishop 348 Psychology Building

Michigan State University East Lansing, MI 48824 deshon@msu.edu	Michigan State University East Lansing, MI 48824 dishopch@msu.edu *preferred contact*

INFORMED CONSENT

- Proceeding to the next screen indicates that I have read and understood the information provided above, and that I willingly agree to participate in this research study.

APPENDIX M

Debrief form

Thank you for your participation in our research study, Radar Simulation. We would like to share more details with you about this study.

As you may know, scientific methods sometimes require that subjects in research studies not be given complete information about the research until after the experiment is completed. Although we cannot always tell you everything before you begin your participation, we do want to tell you everything when the experiment is completed.

Before we tell you about all the goals of this study, however, we want to explain why it is necessary in some kinds of studies to not tell people all about the purpose of the study before they begin. Discovering how people would naturally react is what we are really trying to find out in psychology experiments. We don't always tell people everything at the beginning of a study because we do not want to influence your responses. If we tell people what the purpose of the experiment is and what we predict about how they will react, then their reactions would not be a good indication of how they would react in everyday situations.

Next, we would like to explain exactly what we were trying to study in this investigation. We are interested in how people perceive their performance history. Specifically, we want to know if you paid attention to all of the trials or only the last trial when you were shown your performance feedback. Importantly, the feedback you were given about how well you did on the radar simulation was false. The results from this test mean nothing regarding your actual performance; therefore, please do not give it another thought. We did this to simulate real life conditions of success and failure to get your natural responses to those circumstances.

We ask that you do not talk about this study or the true purpose just revealed to you with anyone else. This is an ongoing investigation and if other people hear about the study and then decide to participate, their reactions would not be spontaneous or realistic. Even if you think the person you are speaking with will not participate in the study, they may tell someone else who does in fact participate. For this reason we ask that you not mention anything more about this study than what was presented to you at the beginning before you knew the true purpose.

Your participation in this research was very important and we thank you for your time. To reiterate, the information regarding your performance on the radar simulation was not true. We also ask that you keep the real purpose of this study to yourself so our future investigations can continue. We realize that finding out that we were not truthful at the beginning of the study can affect your feelings. Again, our purpose for doing so was to keep the situation as real as possible. We apologize for any distress this may have caused you, and we invite you to take advantage of any of the following resources listed below:

MSU Counseling Center
(517) 355-8270
556 East Circle Drive, Room 207
East Lansing, MI 48824
counseling@cc.msu.edu

MSU Human Research Protection Program
(517) 432-4502
irb@msu.edu

If you have additional questions regarding this study you may contact the researchers at dishopch@msu.edu.

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