A LONGITUDINAL INVESTIGATION OF RESOURCE GAIN AND LOSS IN AN ADAPTATION CONTEXT

By

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ABSTRACT

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The present study integrated conservation of resources (COR) theory (Hobfoll, 1989) with dual process theory, self-regulation, and adaptation research to highlight similarities and fill in gaps in motivational theory. Subsequently, COR theory was tested by examining the between-subjects effects of a dual process resource intervention and changes in finite resource pools on adaptation and resource investment. In addition, the present study investigated within-subject resource investment trajectories over time by experimentally manipulating finite resource pools in order to provide evidence for or against Hobfoll's (1989) gain/loss spirals (e.g., repeated gains/losses over time). A marginally significant interaction between resource intervention and finite resource manipulation on adaptation was found, as well as a significant interaction between resource intervention and finite resource manipulation on resource investment. Overall, there was partial support for key tenets of COR theory, dependent on the information processing target of the resource intervention (i.e., System 1 or System 2).

This dissertation is dedicated to my mother, for when it was just the three of us.

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INTRODUCTION

Globalization, evolving technology, and changing work roles are becoming commonplace in today's workforce. There is a need to find talent who can adapt to changing task demands and job requirements in order for organizations to remain competitive. Conversations about the importance of adaptation can be found in popular press articles and various studies of psychological research, including industrial-organizational, educational, and experimental psychology. To foster growth in this area of research, there is a need to use an interdisciplinary approach to streamline the language, terminology, and theory used to describe effortful human processes that contribute to adaptation and identify key leverage points to facilitate adaptation in the workplace.

Adaptation is well-defined in the literature thanks to Baard, Rench, and Kozlowski's (2014) performance adaptation taxonomy. The taxonomy positions the research on performance adaptation as encompassing two perspectives: domain general and domain specific. The domain general perspective classifies adaptation as an individual difference or performance construct. Classifications that are described as domain general define adaptation as a stable, enduring construct that can be generalized across people, settings, and tasks. Conversely, the domain specific perspective defines adaptation as either a change in performance or as a process. In the domain specific view, the construct is malleable where individual differences and situational characteristics can influence adaptation. While the domain general perspective views adaptation as stable and enduring, the domain specific perspective views adaptation as able to be learned. The present study will use the domain specific perspective, particularly the learning process performance change approach to define adaptation (Baard et al., 2014). The present study uses a behavioral definition, as opposed to an outcome-based definition. Specifically, adaptation is defined as an event-based change in cognition, affect, or behavior following changes in task demands. Operationally, those who adapt behavior to align with new task demands are expected to have more superior behavioral performance relative to those who do not align their behavior to the task environment.

Despite the clarity around the definition of adaptation, the process that leads to adaptation is not as well understood. Many variables contribute to variance in adaptation constructs (e.g., self-efficacy, metacognitive skill, job experience and knowledge, cognitive ability, goal orientation, negative affect, and personality constructs), but how these variables all work together to impact adaptation is not well-defined. Many of the aforementioned variables require resource deployment to occur and, in turn, use up resources over time. For example, in order for individuals to adapt, they need to deploy cognitive resources (i.e., engage executive-level capabilities). Therefore, resources are important to have in order for an individual to adapt effectively. In organizational psychology, resources are often defined narrowly, focusing mostly on cognitive resources, such as cognitive ability, attention, and knowledge repertoires (Matton, Paubel, Cegarra, & Raufaste, 2016); however, the definition of valuable resources for adaptation can be expanded by using an interdisciplinary approach. For instance, dual process approaches from experimental psychology note that information processing modes have different resource needs and sensitivities. In experimental psychology, the dual process framework can be used to classify, clarify, and guide adaptation research in organizational psychology and highlight how expanding the definition of resources can inform adaptation.

Kahneman (2011) describes two human information processing systems, which he calls System 1 and System 2. System 1 processes information automatically, spontaneously, and relatively effortlessly, often relying on heuristic decision-making; it is the go-to information processing mode for the human mind. System 2 is volitional and processes information only if there is motivation, attention, and effort to do so. The argument made in the present study will be that adaptation requires motivated System 2 engagement and that the dual process framework helps to explain why adaptation occurs in some cases, but not others. By using the dual process lens, interdisciplinary connections will be made between System 1 and individual dispositions, beliefs, and affect, as well as System 2 and cognitive resources, motivation, and effort. Specifically, the dual process framework will help scholars understand the resource intensity required by the variables that contribute to the adaptation process, how those resources are deployed, and the sensitivity that individuals have to resource losses and gains.

In psychology, a common theory pertaining to resources is the conservation of resources (COR) theory (Hobfoll, 1989). COR theory deals directly with how individuals conserve and protect resources as well as how resource loss and gain affects the conservation of resources. COR theory defines resources as anything valued by an individual that helps facilitate goal attainment (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014). Integrating COR theory into the present argument will shed light on how the System 1 processes of adaptation deal with resource loss and gain, with specific focus on the sensitivity of System 1 to these changes. At the same time, the inclusion of COR theory will also explain how the System 2 processes of adaptation require resources to occur and how resource losses and gains affect motivation when individuals are required to adapt.

By integrating the dual process lens with the adaptation literature, the field is opened up to using COR theory to guide how and when individuals adapt. In doing so, the present study plans to make the following contributions. First, the present study will integrate COR theory with self-regulation and adaptation research to highlight similarities and fill in gaps in motivational theory. Specifically, the present study will argue that the self-regulatory processes that contribute to adaptation are inherently resource-based, using research from organizational and experimental psychology. By making these connections, the tenets of COR theory will be tested by examining the between-subjects effects of resource gains and losses (e.g., gain spirals, loss spirals) on adaptation. Second, the present study will address evidentiary gaps in COR theory by longitudinally studying its key tenets of gain and loss spirals when task demands change. Historically, research on COR theory has implemented cross-sectional designs that do not allow for determination of causal relationships or the chronological order of resource gains (losses) and investments over time. To add to this area of research, the current study will objectively track within-subject resource investment trajectories over time to provide evidence for or against spirals (e.g., repeated gains or losses over time). Finally, the current study will address evidentiary gaps in COR theory by experimentally manipulating finite resource pools through multiple resource gains or losses in order to examine differences between- and within-subjects in resource investment over time, before and after task demands change.

In the section that follows, the connections between the dual process framework and the adaptation literature will be made. From there, COR theory will be integrated to propose how quantity and type of resources affect individual efforts in goal striving, as well as how changes in resource quantity affects individuals' later ability to adapt.

CHAPTER 1: ADAPTATION THROUGH A DUAL PROCESS LENS

Dual process models have a long history of popularity in the cognitive and social sciences (Smith & DeCoster, 1999). The popularity of dual process models in psychology experienced a surge with Daniel Kahneman's (2011) popular press book, *Thinking, Fast and Slow,* where he coined the terms, System 1 and System 2, to describe human information processing modes. These broad terms for human information processing systems are used due to the proliferation of various dual process models that do not use the same language, terms, and labels to describe the processing modes. Nevertheless, there is agreement across dual process models that there are two information processing systems that exist within the human mind. A summary of notable dual process models is shown in Table 1.

Table 1 shows the main differences between the two information processing modes: System 1 processes information quickly, efficiently, and automatically, while System 2 processes information slowly, effortfully, and analytically. System 1 relies on simple decision rules and heuristics to generate judgments, evaluations, and responses. On the other hand, System 2 requires more cognitive resources and analytic reasoning than System 1 because motivation, capacity, and opportunity are required to produce accurate and reliable responses. System 2 operates deliberately and consciously; it needs resources to effortfully process information and situations. System 1 generally operates automatically or unconsciously and needs very few cognitive resources to produce responses. As a result, individuals tend to operate in the more effortless System 1 over time; the need to engage in the effortful processing of System 2 only occurs when accuracy, reliability, and/or defending personal attitudes are valued, and when there is sufficient time to do so (Smith & DeCoster, 1999; Smith & DeCoster, 2000).

Table 1. Summarized review of notable dual process models.

Dual Process Model	**Description of System 1**	**Description of System 2**	**How the Two Systems Interact**
Heuristic-systematic model: Chaiken (1980); Chen & Chaiken (1999)	Heuristic processing requires little effort and processes information along simple decision rules, schema, scripts, or cognitive heuristics.	Systematic processing requires cognitive effort and is generally performed when accuracy and reliability are valued in decision making.	Both processing modes can co-occur via three hypotheses: (1) the additivity hypothesis (i.e., heuristic and systematic processing exert independent and additive effects on cognition), (2) the bias hypothesis (i.e., heuristic processing biases the results of systematic processing), and (3) the attenuation hypothesis (i.e., results of systematic processing attenuate responses by the heuristic processor).
The MODE model: Fazio (1990), Fazio & Towles-Schwen (1999)	Spontaneous processing is characterized by instinctive reactions to situations following perception.	Deliberative processing is characterized by effortful, conscious processing regarding decision alternatives.	Spontaneous, automatic processing can be overridden if there is sufficient motivation and available opportunity to override the results of processing (e.g., attitudes).
Elaboration likelihood model: Petty & Cacioppo (1986), Petty & Wegener (1999)	Persuasion occurs through a peripheral route when the information of a persuasive message is not considered with scrutiny, which occurs when individuals are unmotivated to process. The individual considers positive or negative cues of the message not the content.	Persuasion occurs through a central route when the individual has the motivation and ability to process the content of the message.	The two routes are pursued based on the amount of motivation the individual has to elaborate on the central information contained in the message. A series of decisions (i.e., quick, almost undetectable decisions) are made along the elaboration continuum to determine the individual's attitude toward the message.
Connectionist model: Smith & DeCoster (1999), Smith & DeCoster (2000)	Slow-learning memory forms stable, general representations of the world over time. Associative processing pulls from the slow-learning memory system and operates based on pattern recognition and past experiences.	Fast-learning memory creates new representations of the world in real time. Rule-based processing pulls from both the slow-learning and fast-learning memory systems to create rules about stimuli and responses over time.	After repeated exposure and accessibility, rules are transferred into slow-learning memory. A key process, called consolidation, is responsible for binding representations from fast-learning memory into slow-learning memory. Consolidation is a lengthy process and can take anywhere from weeks to years to complete.
Dual attitudes: Wilson, Lindsey, & Schooler (2000)	Implicit attitudes are attitudes that are activated automatically and with little to no awareness, often due to frequent exposure, which increases the accessibility of the attitude. These implicit attitudes are generally stable.	Explicit attitudes are conscious attitudes that require motivation and effort to retrieve. Explicit attitudes are more sensitive to change.	Dual attitudes exist in multiple forms. Motivated overriding exists when individuals are aware of their implicit attitude, but are motivated to override it with the explicit attitude (e.g., sexist implicit attitudes). Automatic overriding occurs when the explicit attitude is retrieved from memory and overrides the implicit attitude. Motivated overriding is triggered from dissatisfaction with the implicit attitude; automatic overriding occurs effortlessly.

In complex situations that call for goal choice, goal striving, and adaptation, it is likely that both System 1 and System 2 will be operating either independently or interdependently to process and act on information. System 1 is the primary and preferred mode of processing for individuals because of its processing fluency (i.e., the subjective experience of ease when processing information; Alter & Oppenheimer, 2009), efficiency, and oftentimes correct intuitions. System 1 processing allows individuals to conserve cognitive and attentional resources and generally produces correct solutions, which allows individuals to balance available cognitive resources with accuracy. Despite its sophistication, however, its results are often subject to human biases, such as overconfidence, availability bias, hindsight bias, and halo effect (Kahneman, 2011). During goal striving, where accuracy is valued, System 2 will often engage in order to check if a System 1 result (i.e., a solution to a problem) is correct, or to employ decision-making strategies that will increase the likelihood of a coming up with a correct solution.

Complex problems can overwhelm individuals with information and require additional cognitive resources to process that information. The extent of one's domain knowledge, as well as past experiences with similar or familiar problems, will affect the attention given to the task, the selection of decision-making strategies, and the effectiveness of those strategies (Payne, Bettman, & Johnson, 1993). A decision-making strategy is "a sequence of mental and effector (actions on the environment) operations used to transform an initial state of knowledge into a final goal state of knowledge where the decision maker views the particular decision problem as solved" (Payne et al., 1993; p. 9). When faced with much information and the choice of many different strategy alternatives to approach the complex problem, individuals use System 1 processing as an efficient response in order to process the information with limited cognitive resources (Payne et al., 1993). Heuristic decision-making strategies are not costly to cognitive effort, but will vary in their accuracy, especially if the individual does not have a large repertoire of decision-making strategies available to them. The use of heuristic decision-making strategies is adaptive because it helps to achieve accuracy in decision-making while expending few cognitive resources (Payne et al., 1993), but as mentioned previously, the utility of this response can be hindered by the biases that are inherent in using the System 1 processing mode. In addition, individuals' decision-making strategies may be ineffective due to: lack of domain knowledge, a limited repertoire of decision-making strategies, inaccuracies in determining required effort, inability to determine the expectancy of decision strategies, a lack of understanding the necessary tradeoffs between effort and accuracy, inability to execute the strategy, or overgeneralization of strategies to inappropriate problem situations (Payne et al., 1993).

In many cases, these reasons can be boiled down into failures to use executive-level capabilities, such as strategic knowledge (i.e., how and when to use declarative and procedural knowledge) (Gagne, 1984) and metacognitive skills (i.e., self-monitoring and control of one's cognitive strategies) (Smith, Ford, & Kozlowski, 1997). In order to correct for the inefficacy of System 1, System 2 should intervene. System 2 allows individuals to override the often incorrect, intuitive results provided by System 1 (Alter, Oppenheimer, Epley, & Eyre, 2007). Although System 2 requires more cognitive resources than the principle of least effort would prefer, the addition of those resources helps to solve problems and make decisions, particularly for those individuals who possess domain knowledge and are not operating under time constraints (Chen & Chaiken, 1999).

Adaptation requires individuals to select decision-making strategies and deploy them in order to meet changing task demands. As mentioned previously, Baard et al. (2014) proposed a taxonomy that divided adaptation into two perspectives: domain general and domain specific. The domain general perspective classifies adaptation as an individual difference or performance construct. These classifications are coined as "domain general" because of their stability over time across people, settings, and tasks. The domain specific perspective, on the other hand, defines adaptation by performance change or process, and sees individual differences and situations as having influence on adaptation. While the domain general perspective deems adaptation to be stable and enduring, the domain specific perspective assumes adaptation to be malleable and able to be learned. The present study requires learning of a new task and aims to investigate how cognition and behavior change over time; thus, the present study defines adaptation according to the domain specific perspective, specifically the learning process performance change approach where a multi-trial learning phase is followed by a single-trial adaptation phase (Baard et al., 2014). According to this approach, individuals adapt if they change behavior to appropriately align to changes in the task environment (i.e., changes in behavior from routine to novel task demands). Therefore, individuals who adapt to align their behavior with novel task demands should yield more superior performance relative to those who do not adapt to align with the task environment. Task demands are defined as cognitive, behavioral, or affective aspects of the task that require sustained physical or mental effort, and are associated with physiological or psychological costs (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). These changes are generally novel, unexpected, and complex (Chen, Thomas, & Wallace, 2005; LePine, Colquitt, & Erez, 2000) and exist in the work requirements of the task (Joung, Hesketh, & Neal, 2006). Thus, adaptation occurs when an individual changes cognition, affect, or behavior as a reaction to new and different task demands. In addition, Baard et al. (2014) contend that adaptation is a response to changed task demands that require generalization of knowledge and skills. As such, adaptation is associated with both learning (i.e., attending to novel and complex changes in the environment) and performance (i.e., achieving a certain level of performance despite changes in the task) (LePine et al., 2000; Mumford, Baughman, Threlfall, Uhlman, & Costanza, 1993; Niessen, Swarowsky, & Leiz, 2010). These changes are event-based in that the performance required for adaptive tasks qualitatively shifts from the performance required for routine tasks. This qualitative shift from routine to adaptive aligns with Wood's (1986) taxonomy of task complexity.

Wood (1986) identified three dimensions of task complexity including component, coordinative, and dynamic complexity. Component complexity is defined as the number of cues in a task. Examples of increasing component complexity include increasing the number of cues in the task; this is often described as an increase in difficulty. Coordinative complexity is defined by relationships between cues. Examples of increasing coordinative complexity include changing the interactions between timing, frequency, intensity, and/or location requirements. Dynamic complexity is characterized by the combination of both component and coordinative complexity. As such, dynamic complexity is the most appropriate demonstration of task complexity for adaptation tasks. Dynamic complexity requires individuals or teams to adapt to cue changes as well as changes in the interactions between those cues in the task.

The process by which individuals adapt involves self-regulation. According to research characterized by the domain specific definition of adaptation, self-regulation plays a key role in determining whether individuals adapt to dynamic changes in task complexity and which decision-making strategies they select (cf. Table 2). In studies employing the performance change perspective, the bulk of the variables related to adaptation deal with self-regulation, or a three-part executive-level process designated by self-monitoring, self-evaluation, and self-reactions (Bandura, 1991). Self-monitoring is characterized by analyzing the task environment, extracting information from the environment, and interpreting it in order to set goals and strive towards them. Self-evaluation is the process of comparing the current state of performance to the desired goal state of performance. Self-reactions encompass affective responses to goal progress. Altogether, self-regulation is an executive-level function in that it requires the individual to monitor and evaluate their cognitions, behavior, and affect, and react to that information to make progress toward goal attainment.

Table 2. Summarized review of constructs related to adaptation.

Adaptation-Related Construct	**Definition of Construct**	**Importance of Construct**	**Scholars Citing Importance of Construct for Adaptation**
Self-efficacy	Belief in one's ability to achieve a certain level of performance, or belief in one's ability to adapt to changes in task demands.	Individuals will not be able to adapt unless they have the motivation and confidence that they *can* adapt.	Allworth & Hesketh, 1999; Bell & Kozlowski, 2008; Bell & Kozlowski, 2010; Chen et al., 2005; Ford, Smith, Weissbein, Gully, & Salas, 1998; Fugate, Kinicki, & Ashforth, 2004; Griffin & Hesketh, 2003; Holladay & Quiñones, 2003; Kozlowski, Gully, Brown, Salas, & Nason, 2001; Kozlowski, Toney et al., 2001; Stokes, Schneider, & Lyons, 2008; Strauss, Griffin, Parker, & Mason, 2015
Metacognitive skill	An executive-level capability that allows individuals to monitor their own cognition in order to plan and strategize the allocation of effort (e.g., affective, cognitive, behavioral resources) to attain a goal.	Individuals with metacognitive skills will be better able to recognize changes in task demands, come up with solutions to problems, monitor their effectiveness, and modify strategies as appropriate.	Bell & Kozlowski, 2008; Bell & Kozlowski, 2010; Caldwell & O'Reilly, 1982; Ford et al., 1998; Heimbeck, Frese, Sonnentag, & Keith, 2003; Ivancic & Hesketh, 2000; Keith & Frese, 2005; Smith et al., 1997; Washburn, Smith, & Taglialatela, 2005
Job experience and knowledge	Experiential learning at one's job.	Greater amounts of job experience and knowledge provide the individual with different problem situations and a broader repertoire of decision-making strategies. Alternatively, long tenure in a specific job role may inhibit unlearning of routines when faced with changing task demands.	Ahearne, Mathieu, & Rapp, 2005; Almahamid, McAdams, & Kalaldeh, 2010; Dokko, Wilk, & Rothbard, 2009; Joung et al., 2006; LePine et al., 2000; Niessen et al., 2010; Tucker, Pleban, & Gunther, 2010
Cognitive ability	The amount of cognitive resources an individual possesses.	Individuals will be better able to handle complex tasks with high task demands than individuals with low cognitive ability because they have more resources to allocate to the task; therefore, these individuals will be better positioned to acquire knowledge and skills.	Allworth & Hesketh, 1999; Kozlowski, Toney, et al., 2001; Lang & Bliese, 2009; LePine et al., 2000; Morgan et al., 2013; Ployhart & Bliese, 2006
Mastery goal orientation	A preference to set development and competence goals in achievement situations.	Mastery goal orientation is an adaptive response pattern because it orients individuals to focus on competence and the development of task mastery.	Bell & Kozlowski, 2002a; Bell & Kozlowski, 2010; Ford et al., 1998; Kozlowski & Bell, 2006; Kozlowski, Gully et al., 2001
Performance avoid goal orientation	A preference to set performance goals that preserve ability perceptions, specifically avoiding poor shows of ability and failure.	Performance avoid goal orientation leads to state anxiety and low self-efficacy, which consume cognitive resources that could be used for adaptation.	Bell & Kozlowski, 2008; Heimbeck et al., 2003; Kozlowski & Bell, 2006

Table 2 (cont'd).

Adaptation-Related Construct	**Definition of Construct**	**Importance of Construct**	**Scholars Citing Importance of Construct for Adaptation**
Negative affect	A tendency to experience negative emotions, including sadness, depression, anxiety, anger, and frustration.	Negative affect (i.e., anxiety, anger, frustration) prompt an individual to allocate resources to the source of the affect in order to reduce it; this takes away cognitive resources from task-related and goal-related cognition and behavior.	Bell & Kozlowski, 2008; Drach-Zahavy & Somech, 1999; Keith & Frese, 2005; Kozlowski, Toney, et al., 2001; Mumford et al., 1993
Openness to experience	A personality trait that describes individuals who are imaginative, seek novel experiences, and have intellectual curiosity.	Open individuals are more likely to seek out new problem-solving and decision-making strategies and approach the challenges that accompany change.	Allworth & Hesketh, 1999; LePine et al., 2000; Mumford et al., 1993; Stewart & Nandkeolyar, 2006
Emotion regulation	A cognitive strategy used to minimize or alter one's emotions.	Emotion regulation minimizes or alters negative and positive affect to ensure cognitive resources are deployed to on-task behavior instead of off-task behavior.	Bell & Kozlowski, 2008; Bell & Kozlowski, 2010; Keith & Frese, 2005
Conscientiousness	A personality trait that encompasses self-discipline, achievement, and competence (achievement facet) as well as dutifulness, deliberation, and orderliness (dependability facet).	The achievement facet of conscientiousness deals with perseverance and excellence which can help individuals detect changing demands and accomplish tasks in spite of them. The dependability facet of conscientiousness deals with orderliness which can hinder the selection of new decision-making strategies to meet new task demands.	Griffin & Hesketh, 2005; LePine et al., 2000; LePine, 2003; Shoss, Witt, & Vera, 2012
Situation appraisal	Attending to situational cues in the environment in order to evaluate those cues and develop an attitude toward the situation.	Individuals reappraise situations and reframe their values to fit with changes to task demands.	Ployhart & Bliese, 2006; Wang, Zhan, McCune, & Truxillo, 2011
Knowledge structures	Organized framework of knowledge, often described as schema, scripts, or cognitive maps.	Rigid knowledge structures inhibit adaptation to change.	Georgsdottir & Getz, 2004; Meneely & Portillo, 2005
Strategic knowledge	Knowledge of how and when to use declarative and procedural knowledge.	Strategic knowledge informs individuals of links between the structural characteristics of the task. Strategic knowledge therefore allows for effective strategies and solutions in adaptive contexts.	Bell & Kozlowski, 2008; Strauss et al., 2015

As previously mentioned, decision-making strategies may be ineffective due to executive-level capabilities (i.e., individual differences in self-regulation). Thus, it is important to determine how self-regulation relates to adaptation, and how this decision-making process is embedded in a dual process framework. There are a number of self-regulatory variables that contribute to adaptation, which include self-monitoring variables (e.g., appraisal, referencing knowledge structures, searching decision-making repositories, metacognitive skill), self-evaluation variables (e.g., goal choice, comparing progress to the goal), and self-reaction variables (e.g., self-efficacy, affect). A summarized review of these variables, including their definitions, their contributing importance to adaptation, and relevant citations, is presented in Table 2.

In order to connect the contributors to adaptation to the dual process framework, the contributors in Table 2 have been classified under the framework in Table 3 based on the effort and resources required for their occurrence. The contributors that fall under the System 1 classification are spontaneous and automatic in nature. In the cognitive space, situation appraisal, searching current knowledge structures, and drawing from those knowledge structures happen quickly and with little effort. In the affective space, self-reactions like self-efficacy, tendencies for trait/state affect, and goal-setting tendencies often happen without conscious effort. Like personality variables, these affective variables guide cognition and behavior without costing effort and attention. Conversely, the contributors that fall under the System 2 classification require motivation and resource deployment. In the cognitive space, reappraisal, knowledge acquisition, metacognition, application of executive-level capabilities, and other key self-regulatory processes require individuals' attention and conscious effort. In the affective space, emotional regulation and goal selection require cognitive and behavioral effort to be deployed.

Using the dual process framework to align the contributors to adaptation allows for discussion of the resources required for each of these variables to occur. In the next section, the resource sensitivity of System 1 and corresponding resource intensiveness of System 2 will be discussed in order to lay foundation for the integration of conservation of resources theory.

Adaptation and resources through a dual process lens

The value of using the dual process lens to frame adaptation research is to highlight the importance of resources for individuals who have to adapt. As defined by Halbesleben et al. (2014), resources are anything considered valuable for attaining goals. Due to their value, individuals want to hold on and conserve resources by either gaining resources or preventing loss of resources (Hobfoll, 1989). Changes in resources are particularly impactful for System 1. System 1 is sensitive to loss salience such that negative events "evoke strong and rapid physiological, cognitive, emotional, and social responses" more so than positive events (Taylor, 1991, p. 67). Kahneman (2011) discusses the effects of losses and gains on System 1 such that losses lead to strong feelings of negative affect while gains lead to mild feelings of positive affect. The difference in strength between these two events is indicative of a sensitivity to loss as opposed to gain in System 1. The importance of this sensitivity should be of interest to adaptation scholars as changes in task demands will often signal an anticipated loss of resources and of lost progress toward goals. For example, the strategies that facilitated goal attainment previously may no longer reap the same result; cognitive resources will need to be expended to select different strategies after perceiving the new task demands.

Although System 1 often triggers spontaneous negative affect in response to resource loss, System 2 will have a different response. As stated previously, System 2 requires resources in order to be activated and needs to mobilize additional cognitive and attentional resources to operate while System 1 does not. System 2 requires more cognitive resources and analytic reasoning than System 1 because motivation, capacity, and opportunity are required to produce accurate and reliable responses. Since System 2 operates deliberately and consciously, it needs attentional and cognitive resources to effortfully process information and situations. When loss occurs, System 2 can deploy resources in order to minimize the impact of negative events (Taylor, 1991), deploy resources in order to gain additional resources, or not engage in order to

Table 3. Alignment of a dual process lens with variables related to adaptation.

		Dual Process Modes	
		System 1	**System 2**
Contributors to Adaptation	**Cognitive**	Situation appraisal	Situation reappraisal and reframing
		Cognitive ability	Deploying available cognitive resources
		Existing declarative, procedural, and strategic knowledge	Building declarative, procedural, and strategic knowledge
		Existing knowledge structures (e.g., schema, scripts, mental models)	Building knowledge structures (e.g., schema, scripts, mental models)
			Applying metacognitive skills
			Applying strategic knowledge
			Self-monitoring
			Self-evaluation
	Affective-motivational	Self-efficacy and other beliefs	Emotion regulation and other forms of emotional regulation
		Goal setting tendencies (i.e., goal orientation)	Goal choice
		Negative affect	
		Positive affect	
		Personality (i.e., openness to experience, conscientiousness, neuroticism)	

conserve resources. Lapses in motivation will be the primary reason for why System 2 would fail to engage (e.g., the discrepancy between the current state and desired state is perceived to be too large and the goal is abandoned).

The discussion of System 1 and 2 has mainly focused on cognitive resources, which stems from the traditional definitions of resources in self-regulation research. For instance, Kanfer and Ackerman (1989) define attentional resources as cognitive resources that are limited in availability that can be used for information processing and task performance. In the following discussion, popular resource theories and self-regulatory models will provide history about the typical definitions of resources in organizational psychology.

In their ego depletion theory, Baumeister, Bratslavsky, Muraven, and Tice (1998) discuss how self-regulation corresponds to the availability of resources. Ego depletion theory posits that volitional acts draw on some limited resource such that the resource is depleted with each volitional act that occurs. These resources are used for self-regulation, which then diminish how effective the individual can self-regulate in the future. In similar fashion to the principle of least effort, ego depletion theory proposes that individuals attempt to conserve their resources for future demands of self-regulation. In line with Kanfer and Ackerman (1989), the resources described in Baumeister and colleagues' (1998) theory are cognitive in nature.

In their model of self-regulation, Carver and Scheier (1998) borrow from control theory to explain goal attainment in individuals. They argue that goal striving exists on a negative feedback loop that seeks to reduce discrepancies between the current state and the desired goal state. The sensory system (e.g., individuals' situation perception and appraisal) detects the current state, which results in a comparator function that perceives the difference between the current state and desired end state by comparing to a referent (i.e., the goal). If there is a discrepancy between the current and desired goal states, an output function from the individual produces behavior that seeks to reduce the discrepancy. However, the environment in which the individual is operating in will also have influence on the new current state such that there are disturbances that come from the task and result from outputs from the individual's behavior. Together, they will contribute to the new current state. The cycle of self-regulation continues to repeat until discrepancies are no longer perceived and the goal is attained. The resources that power this self-regulation cycle are affective (e.g., discrepancies have effects on goal setting, self-efficacy perceptions, and negative/positive affect), behavioral (e.g., behavior is required to reduce discrepancies), and cognitive (e.g., cognitive resources are required to engage in situation appraisal and perception).

Therefore, when individuals are called to self-regulate and mobilize their resources, they must deplete their resource pool, or availability store. The goal of accuracy in decision-making and problem solving is more likely to be achieved with resource deployment as opposed to non-deployment. Kanfer and Ackerman (1989) posited that ability-motivation relationships could be explained through cognitive resources such that individuals with high cognitive ability have more attentional resources to dedicate to tasks. Cognitive ability has been found to be an important contributor to whether or not individuals adapt when faced with changing task demands (Allworth & Hesketh, 1999; Kozlowski, Toney, et al., 2001; Lang & Bliese, 2009; LePine et al., 2000; Morgan et al., 2013; Ployhart & Bliese, 2006). Cognitive ability has been posited to play a role in predicting adaptive performance because of its high validity in predicting other types of performance (Allworth & Hesketh, 1999). The reason for this is that cognitive ability allows individuals to hold more information in their cognitive processor and also allows them more resources to monitor, react, and enact strategies to attain goals (Lang &

Bliese, 2009; LePine et al., 2000). Individuals with high cognitive ability are posited to have more attentional resources to devote to tasks than individuals with low cognitive ability and these resources facilitate goal striving and attainment (Kanfer & Ackerman, 1989). In support of this idea, studies have found positive relationships between cognitive ability and adaptation (Allworth & Hesketh, 1999; Shoss et al., 2012). Other cognitive abilities (e.g., general mental ability, spatial manipulation, and working memory) exhibit a positive relationship with adaptation (Lang & Bliese, 2009; LePine et al., 2000; Morgan et al., 2013; Woltz, Gardner, & Gyll, 2000).

High cognitive ability individuals are better able to adapt than low cognitive ability individuals because they have a larger pool of cognitive resources and are able to translate those cognitive resources into task-related effort and self-regulation. These resources allow high cognitive ability individuals to engage in the effortful and motivated processing of System 2. In addition, these high cognitive ability individuals are likely to persist longer than low cognitive ability individuals because resource deployment only depletes a fraction of the resource pool; resource deployment in low cognitive ability individuals puts them at greater risk of resource depletion (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008). These kinds of cognitive individual differences have been found to impact knowledge and skill acquisition for the same reason: high cognitive ability individuals have more resources to devote to learning (Kozlowski, Toney et al., 2001).

Scholars who define adaptation as performance change have long studied the beneficial effects of self-regulation on adaptive performance and adaptive transfer. As posited earlier, the use of executive-level skills, such as applying strategic knowledge and metacognitive skills, is an effortful System 2 process that requires motivation, capacity, and self-regulation to complete.

Executive-level functioning requires individuals to think about their thinking, to monitor their cognition, behavior and affect, and take steps to modify cognition, behavior, and affect if they are not contributing to goal attainment. Therefore, scholars encourage the use of metacognitive skill and/or strategic knowledge to aid goal striving processes in order to facilitate adaptation (e.g., Bell & Kozlowski, 2002b; Bell & Kozlowski, 2008; Ford et al., 1998; Keith & Frese, 2005; Kozlowski, Gully et al., 2001; Kozlowski, Toney et al., 2001).

The theories and frameworks discussed here highlight the narrow focus on cognitive resources in organizational psychology. Across the board, the cognitive resources described above are internal to the acting individual. However, individuals live in a dynamic world where disturbances occur, much like Carver and Scheier (1998) describe, which not only require cognitive resources and System 2 engagement, but may also change the availability of individuals' valued internal affective and behavioral resources as well as valued external resources, which can affect the processing of System 1. To broaden the definition of resources past cognitive resources, the present study will rely on the conservation of resources (COR) theory proposed by Hobfoll (1989) to explain the effects of changes in different types of internal and external resources on individuals' ability to invest resources and adapt.

CHAPTER 2: INFORMING ADAPTATION WITH CONSERVATION OF RESOURCES THEORY

Conservation of resources (COR) theory states that individuals seek to gain, conserve, and protect resources in order to minimize the net loss of resources (Hobfoll, 1989). COR theory is primarily used to understand burnout (e.g., emotional exhaustion, depersonalization, and diminished personal accomplishment; Maslach, 1982) and how resource investment can prevent or stave off these phenomena (Hobfoll, 1989). Resources are defined by Hobfoll (1989) as "objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment" of those valued resources (p. 516). Examples of object resources include an individual's house or his or her personal possessions; personal characteristics can include conscientiousness and self-esteem. Conditions include marriage and employment; examples of energy resources are time and money.

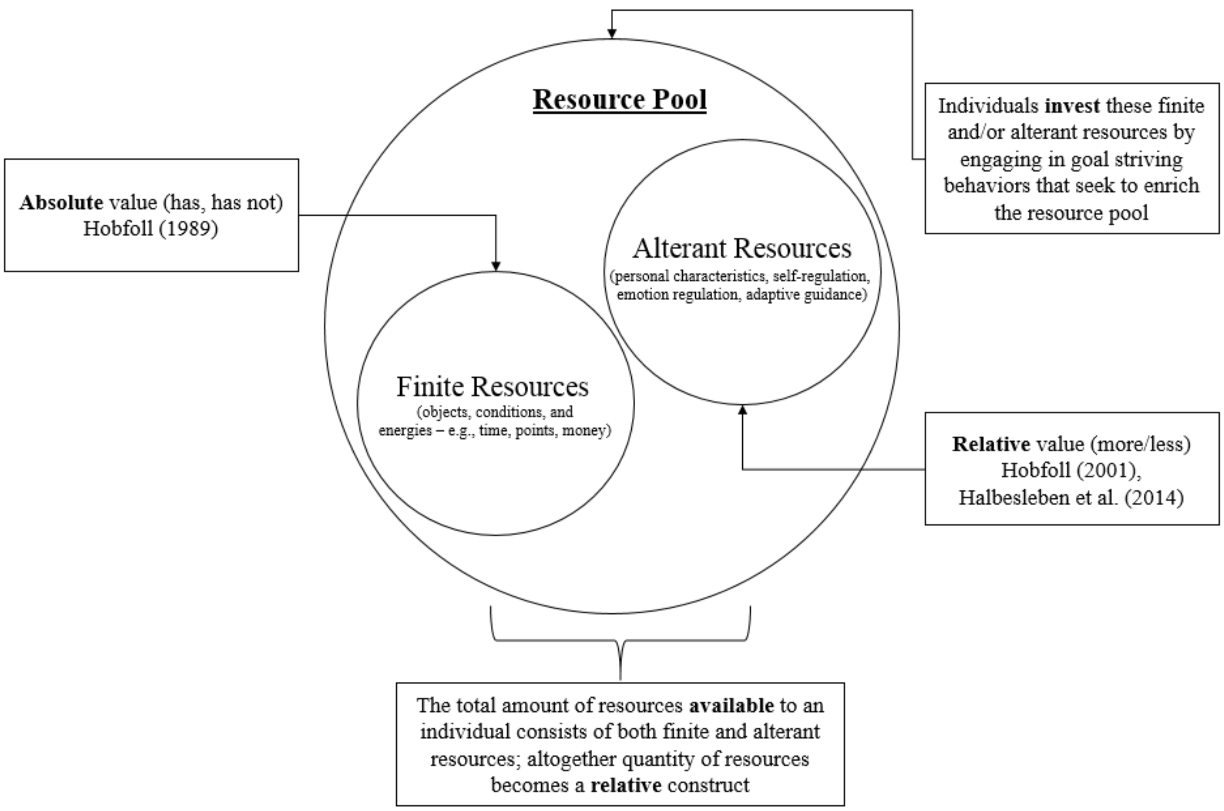
One of the criticisms that Hobfoll has received is that almost anything an individual has could be considered a valued resource (Gorgievski, Halbesleben, & Bakker, 2011; Halbesleben & Wheeler, 2015; Thompson & Cooper, 2001). To address this issue, further work on COR theory by Halbesleben et al. (2014) refined the definition of resources as "anything perceived by the individual to help attain his or her goals" (p. 1338). As a result, Halbesleben et al.'s (2014) definition provides boundaries to the use of "value" in Hobfoll's (1989) definition.

In addition, Hobfoll (1989) defines resource investment as "enrich[ing] resources by investing other resources" (p. 517). Hobfoll's (1989) definition of resource investment requires some clarification. The dictionary definition of the verb, to invest, states that it means "to make use of for future benefits or advantages" (Merriam-Webster, 2018). Halbesleben et al. (2014) define resources as anything that can be useful in goal attainment, which presumably would bestow some “future benefits or advantages”; therefore, the present study assumes that goal attainment is synonymous with resource enrichment, as stated by Hobfoll (1989). Freund and Riediger (2001) provide a useful example to describe the differences between resources and resource investment. An individual has a goal to become a concert pianist. They have the necessary resources required to become a concert pianist, including a piano, a tutor, sheet music, and time to practice. Simply possessing these resources does not make the individual a concert pianist, however; the individual needs to engage in the goal-striving behaviors that would enable him or her to become a concert pianist, such as finger exercises, studying music theory, and practicing songs on the piano. As such, the present study defines resource investment as the behaviors an individual engages in to convert resources into goal attainment.

Overall, the definition set forth by COR theory remains broad. It is evident that initially, Hobfoll’s (1989) resources were discussed as being more finite in nature. For instance, one either owns a house or does not (i.e., object resources), or has a job or does not (i.e., condition resources). In terms of energy resources, one has an absolute value of the balance in their bank account, or the amount of time left to perform a task within a day. When resources are defined as objects, conditions, and energies, it is easy to determine differences in quantity across individuals; quantity is defined absolutely such that there are “haves” and “have nots”. However, as Hobfoll began to receive criticism regarding what could be considered a resource, he created a list, which broadened the definition into less finite resources (cf. Hobfoll, 2001). The list included resources such as, “stamina/endurance,” “personal health,” “self-discipline,” and “motivation to get things done” (Hobfoll, 2001; p. 342). These resources are not finite – one does not “run out” of self-discipline – so the definition of a resource became obscured. Hobfoll’s (1989) theory contends that individuals seek to conserve their resources, and that gains and losses have differential effects on individuals over time. Words such as conservation, gains, and losses take on new meaning when resources can be finite or alterant. Freund and Riediger (2001) discuss that alterant resources can be depleted in that there is some limit on its availability, but that resource can be replenished (a la ego depletion theory), or that there are various levels of the resource such that some have more or less, but that using the resource does not result in depletion (e.g., self-efficacy). As it stands, the present study considers both finite and alterant resources in its discussion. In terms of quantity, the present study defines it relatively, as opposed to absolutely, such that between- and within-subjects, individuals can either have more or less of a given resource (e.g., he has more resources than she does; he had fewer resources a week ago than he has today). The amount of resources that the individual has available to him or her is characterized by the size of his or her resource pool. Finite resources are available in the resource pool provided that their absolute value is not zero; alterant resources are available in the resource pool provided that they are not depleted within some given time frame. Figure 1 provides a high-level schematic of how resources are described by Hobfoll (1989, 2001), Halbesleben et al. (2014), and the present study.

Given Halbesleben and colleagues' (2014) definition, resources have value for goal attainment. Therefore, the resources available to an individual can influence different emotional and work outcomes, including burnout, its components, or engagement (Alarcon, Edwards, & Menke, 2011; Chen, Westman, & Eden, 2009; Mackey, Ellen, Hochwarter, & Ferris, 2013; Neveu, 2007), physical health (Grandey & Cropanzano, 1999), turnover intentions (Grandey & Cropanzano, 1999), and job satisfaction (Mackey et al., 2013). To explain these relationships, COR theory makes a number of propositions. The first tenet of COR theory is that resource loss is more salient that resource gain (Halbesleben et al., 2014; Hobfoll, 1989, 2001). This tenet aligns with the posited sensitivity of System 1 to resource loss, specifically that loss mobilizes automatic and spontaneous physiological, cognitive, emotional, and social responses that require motivated minimization by System 2 to maintain effective decision-making (Taylor, 1991).

Figure 1. Schematic of resource constructs in COR theory.

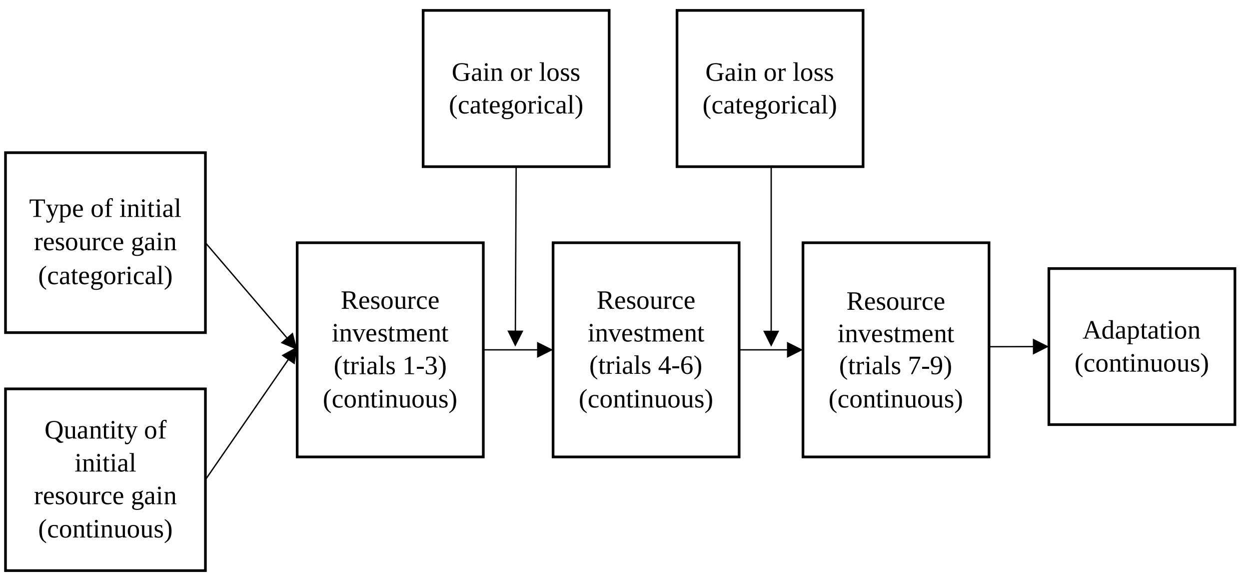


The second tenet of COR theory is that individuals must invest resources in order to gain resources, and either protect themselves from anticipated resource loss or recover from actual resource loss (Halbesleben et al., 2014; Hobfoll, 1989, 2001). The second tenet of COR theory aligns with the engagement of System 2, the motivated information processing mode. To attain the goal of resource gain, individuals need to be motivated to protect, replenish, and invest resources (Halbesleben & Wheeler, 2015). In goal striving contexts, motivation takes the form of self-regulation where individuals self-monitor, self-evaluate, and react to ensure accuracy in decision-making and progress toward the goal. System 2 controls these motivated processes and requires resource deployment to power them.

In addition to these main tenets, there are four corollaries that follow (Halbesleben et al., 2014; Hobfoll, 1989, 2001). These include (1) individuals with many resources are well-positioned for resource gains while individuals with few resources are positioned for resource losses, (2) initial resource losses lead to future resource losses (i.e., loss spirals), (3) initial resource gains lead to future resource gains (i.e., gain spirals), and (4) lack of resources leads to defensive attempts to conserve remaining resources.

Using COR theory, the present study aims to investigate the heuristic model in Figure 2. At the start of the study, participants will initially gain valuable resources for goal attainment. These include alterant energy resources (i.e., adaptive guidance) and/or alterant personal characteristic resources (i.e., emotion regulation). Some participants will not receive any initial resources (i.e., control). These alterant resources will remain with the participant throughout the entire study in line with Hobfoll (1989) (i.e., unless resources are lost, the individual has access to them). After a training period to learn the study task, the participants will embark on nine resource investment trials where they must invest resources (e.g., knowledge, skill, behavioral effort, self-regulation) to make progress toward their goal. Following the first three resource investment trials (trials 1-3), the first gain or loss manipulation will occur; participants will either gain or lose valued resources and, thus, become closer to or further from their goal. Then, they will invest resources in another three trials (trials 4-6) only to receive another gain, or be subject to another loss. Over time, participants will either receive two gains (i.e., the gain condition) or be subject to two losses (i.e., the loss condition). Another three resource investment trials will occur following that gain or loss manipulation (trials 7-9). For analysis purposes, each three-trial period will be averaged to compute three average resource investment variables for trials 1-3, 4-6, and 7-9. Overall, the two finite resource manipulations of loss and gain serve to investigate Hobfoll's (1989) loss and gain spirals over time (i.e., that loss leads to future loss; that gain leads to future gain). To examine how resource gain and loss affect adaptation, the task demands will change after the nine resource investment trials, which will prompt the participants across conditions to adapt.

Figure 2. Heuristic model.



In the following sections, the model in Figure 2 will be explained using COR theory. The first corollary of COR theory concerns the quantity of resources available to individuals and how that resource amount affects individual outcomes. The theory states that individuals who have resources are in a better position to invest those resources (Halbesleben et al., 2014; Hobfoll, 1989, 2001). This has found research support in studies of burnout. For instance, Makikangas, Bakker, Aunola, and Demerouti (2010) found that individuals' mean resource level and their trajectories over time resulted in differing trajectories of flow at work (i.e., a sensation of total involvement characterized by intense concentration). Individuals with more work-related resources reported the highest levels of flow and individuals with fewer work-related resources had the lowest levels of flow. The involvement found in these individuals' work is characteristic of continuous investment of resources over time. Studies have also looked at the negative side of not having enough resources to invest. For example, Demerouti, Bakker, and Bulters (2004) found that individuals lacking resources due to demands at work (e.g., from work pressure) were most vulnerable to additional losses. Similarly, Whitman, Halbesleben, and Holmes (2014) found that subordinates who experienced abusive supervision experienced exhaustion and withdrew from their supervisor via feedback avoidance in order to cope with the experience (i.e., conservation of resources). From these studies, it is evident that the amount of resources available to individuals sets them on a trajectory: upward if many resources are available and downward if few resources are available.

In the same vein, studies of adaptation have shown that individuals with high cognitive ability, knowledge and skill, and/or beneficial personality traits (e.g., conscientiousness, openness to experience) tend to be better able to self-regulate and invest effort in order to attain goals than those with low levels (Bell & Kozlowski, 2008; LePine et al., 2000). In the present study, individuals will strive toward a goal over time, which will require resource investment in order to attain that goal. The availability of resources is expected to influence the extent to which individuals consequently invest those resources.

By expanding the definition of resources from alterant cognitive resources to include finite resources defined by Hobfoll (1989), the individual differences and situational characteristics that can influence adaptation as performance change are broadened. An individual's resource pool (i.e., available resources) contains both alterant personal characteristics, such as cognitive ability, knowledge, and personality traits, but also finite resources that the individual possesses, such as job status and monetary compensation. Therefore, when considering all resources that are helpful in facilitating goal attainment, COR theory would predict that individuals with different resource availabilities would be more or less willing to invest their resources (Hobfoll, 1989, 2001).

Hypothesis 1: The initial quantity of resources available to an individual is positively related to average resource investment[1] (trials 1-3) such that individuals with more resources will tend to invest more resources on average during trials 1-3 than individuals with fewer initial resources during trials 1-3.

According to COR theory, individuals' initial resource availabilities impact the amount of resources that they are able to invest. For example, individuals with more resources are able to invest resources without much risk, whereas individuals with fewer resources would be putting themselves at greater risk of depletion and poor emotional outcomes, especially if the resource investment does not guarantee the elimination of loss (Scholer, Zou, Fujita, Stroessner, & Higgins, 2010). While the amount of resources is important to determining the extent of resource investment, there is an open question as to whether or not the *type* of resources available are related to the extent of resource investment.

The constructs that would be considered resources during resource investment and adaptation stem from the review shown in Table 2. Using Hobfoll's (1989) definition of resources, we can classify contributors to adaptation into two different categories of resources: personal characteristics and energies. Personal characteristics describe relatively stable

[1] The present study will investigate resource investment longitudinally such that nine resource investment trials will occur in total. For the purposes of testing between-subjects effects using structural equations modeling, three averages will be created to operationalize an average resource investment variable for the first three trials (trials 1-3), the second three trials (trials 4-6), and the third three trials (trials 7-9).

tendencies of the individual that aid in stress resistance (Hobfoll, 1989). In the adaptation literature, personal characteristics include self-regulation, cognitive ability, goal orientation, affectivity, openness to experience, and conscientiousness. On the other hand, energies are resources that are not face-valuable, but rather can be translated into valued resources or can be used to acquire valued resources (e.g., time, money, knowledge) (Hobfoll, 1989). In the adaptation literature, energies include job experience and knowledge.

The definition created by Halbesleben et al. (2014) states that any of the aforementioned resources would be valuable if they assisted in goal attainment. It is conceivable that many different resources could be useful in goal attainment, but it would be useful for the field to experimentally compare the utility of different resources in order to empirically determine which resources are better suited for achieving positive outcomes. The dual process framework implies that resources are more or less valuable depending on the system that is primarily guiding information processing during adaptation. For System 1 processing, skills that reduce the impact of affective variables on information processing would benefit individuals' emotional outcomes in adaptive tasks. Of the System 1 variables listed in Table 3, negative affect has the most deleterious effects on adaptive performance because it requires resource deployment to minimize it, which detracts resources from on-task behavior. Negative affect, usually operationalized as anxiety or frustration in adaptation studies, depletes attentional resources that could be allocated to adaptive goal- and task-related efforts (Drach-Zahavy & Somech, 1999; Mumford et al., 1993). Individuals who tend to display negative affect or are faced with negative affect may perform poorly in tasks that require adaptation (Bell & Kozlowski, 2008).

Taylor (1991) describes a pattern of mobilization-minimization for negative events whereby negative events mobilize physiological, cognitive, and affective responses (a System 1 response), which prompts deployment of physiological, cognitive, and behavioral minimization strategies to dampen those responses (a System 2 response). A popular strategy to minimize responses to negative events is emotion regulation, which reduces the impact of negative affect (Gross, 1999). Emotion regulation is an effortful process and requires resources to occur (Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998); therefore, emotion regulation is powered by System 2, but targeted toward spontaneous phenomena guided by System 1. Emotion regulation is a coping strategy that shifts focus back to task demands; it is used to cope with emotions that are elicited from task stimuli during goal striving processes (Bell & Kozlowski, 2008; Keith & Frese, 2005; Webb, Miles, & Sheeran, 2012). When task demands change, the level of performance required to complete the task also changes. This change can induce negative affect during goal striving as individuals become anxious that they will not attain the goal, or angry or frustrated when goal progress does not move as quickly as before. As such, empirical research has found that emotion regulation and adaptation constructs are positively associated with one another (Bell & Kozlowski, 2008; Keith & Frese, 2005). In the same vein, Diefendorff, Richard, and Yang (2008) found that individuals use a number of emotion regulation strategies to minimize the impact of affective events at work, including negative events.

There are a number of strategies individuals can use to regulate emotions, including distraction, concentration, reappraisal, and suppression (Webb et al., 2012). Distraction is a strategy that directs attention to something else that is unrelated to the emotional stimulus or response (Gross, 1998a; Sheppes, Scheibe, Suri, & Gross, 2011; Thiruchselvam, Blechert, Sheppes, Rydstrom, & Gross, 2011; Webb et al., 2012). Concentration directs attention to the emotional stimulus or response and prompts individuals to focus on the causes and implications of those emotions (Gross, 1998a; Webb et al., 2012). Reappraisal prompts individuals to reinterpret the response or stimulus in a different manner (e.g., interpreting a situation differently, imagine a negative event had a positive outcome) (Diefendorff et al., 2008; Gross, 1998a; Gyurak, Gross, & Etkin, 2011; Sheppes et al., 2011; Thiruchselvam et al., 2011; Webb et al., 2012). Finally, suppression prompts individuals to control their emotions and not express or experience the emotion they feel (Gyurak et al., 2011; Webb et al., 2012). Of these strategies, reappraisal has been found to be the most effective type of emotion regulation strategy for modifying emotional outcomes (e.g., negative affect) (Webb et al., 2012).

In concurrence with Webb et al. (2012), the present study will focus on the emotion regulation strategy of reappraisal and define it as a personal characteristic resource, following the operationalization of self-regulation as a personal resource by past scholars (e.g., Bouckenooghe, Raja, & Abbas, 2014). As Hobfoll (1989) states, personal characteristics are individual tendencies that aid in stress resistance, which reappraisal has been shown to do (Gross, 1999). Nevertheless, emotion regulation has its disadvantages such that it reduces the capacity for executive-level control because it is cognitively taxing (Schmeichel, 2007). Since reappraisal requires System 2 engagement and resource deployment to occur, it is likely that other resources would benefit individuals more than reappraisal, especially during early resource investment phases where on-task behavior is valued and the goal is to gain resources and avoid loss of additional resources.

During goal striving, resources that target improving the efficiency of System 2 may be a better alternative to resources that target System 1. Energy resources, in the form of knowledge, have been shown to be useful for guiding resource allocation (Bell & Kozlowski, 2002b) and for adapting to new task demands (Chen et al., 2005). These are considered energy resources in that possessing them is not intrinsically valuable, but valuable in that they can be translated into other forms (e.g., performance, decision-making). Specifically, energy resources in the form of adaptive guidance have been shown to help individuals allocate resources during goal striving (Bell & Kozlowski, 2002b; Kanar & Bell, 2013). Adaptive guidance provides individuals with knowledge to assist them in making effective goal-related decisions (Bell & Kozlowski, 2002b). Furthermore, adaptive guidance provides feedforward information as a supplement to feedback information in order to guide individuals' future decisions and improve the quality and focus of their self-regulation (i.e., self-monitoring, self-evaluation, self-reactions). First and foremost, adaptive guidance influences self-evaluation by providing additional information that helps individuals understand their progress toward a goal. Adaptive guidance also influences self-monitoring by providing information about where to allocate resources in the future. Finally, adaptive guidance influences self-reactions by helping individuals make progress toward mastery and improve their ability to deal with task demands (Bell & Kozlowski, 2002b). In terms of its relations to adaptation, adaptive guidance has been shown to positively relate to strategic knowledge and performance, or when and how to use declarative and procedural knowledge effectively (Bell & Kozlowski, 2002b; Kanar & Bell, 2013).

As mentioned above, both reappraisal and adaptive guidance can be considered resources according to Hobfoll's (1989) definition. These resources are valuable insofar as they help individuals attain their goals (Halbesleben et al., 2014). Specifically, these resources will help stave off loss of other resources from negative affect (e.g., reappraisal) and will provide individuals with strategies that will help enrich their resource pools (e.g., adaptive guidance). The selection of these two resources stems from the dual process framework; reappraisal is a personal characteristic resource that will target System 1 whereas adaptive guidance is an energy resource that will target System 2 (i.e., facilitating the allocation of other resources to attain the goal). Reappraisal is expected to influence resource investment by minimizing negative affect in order to free up cognitive resources and reinvest them toward goal attainment. Adaptive guidance is expected to influence resource investment by guiding the individual toward additional resources that can be used for goal attainment.

In order to gain additional resources, individuals enrich their resource pool via resource investment. Resource investment is the process where individuals are motivated to gain resources by expending current resources (Halbesleben & Wheeler, 2015); for the purposes of the present study, resource investment is defined as the behaviors an individual engages in to convert resources into goal attainment. In particular, individuals invest their resources in efforts where the best return on investment is likely (Halbesleben & Wheeler, 2011). As such, when individuals' finite and alterant resources are depleted, individuals tend to be more careful in where they invest their resources, opting for more low-risk investment (Baltes, 1997; Hobfoll, 2001). The second tenet of COR theory states that individuals must invest resources in order to gain resources, and either protect themselves from losing resources, or recover from losing resources. Combined with the position that initial gains lead to future gains (Hobfoll, 1989), it would be expected that gaining initial resources should lead to resource investment that increases the likelihood of future gains.

The types of resources discussed presently should result in various types of investment because they target two different information processing modes. Adaptive guidance is expected to be more positively related to resource investment initially (trials 1-3) than reappraisal because adaptive guidance immediately guides resource investment toward gaining additional knowledge and skills that can improve learning and performance. As a resource, reappraisal will not be as important as adaptive guidance early on (trials 1-3) because there are few opportunities for the induction of negative affect at the start of goal attainment. Following COR theory, individuals who initially gain resources that target both information processing modes will be best suited for initial resource investment (trials 1-3) because they have the most resources available to them than any other group, and will be best positioned for resource allocation toward other resources (i.e., a System 2 phenomenon). In addition, they will also be able to deal with negative affect when it occurs (i.e., a System 1 phenomenon).

Hypothesis 2: Initial resource gain of adaptive guidance and reappraisal will result in more average resource investment (trials 1-3) than only adaptive guidance or reappraisal.

Hypothesis 3: Adaptive guidance will result in more average resource investment (trials 1-3) than reappraisal.

According to Hobfoll (1989), resource investment that results in gains should lead to corresponding resource investment so that potential resource losses are thwarted. Evidence to support this point has been found in a number of organizational psychology studies. For example, Vinokur and Schul (2002) found that job search motivation yielded reemployment in a sample of individuals who had recently lost a job. Therefore, motivated resource investment allowed individuals to enrich their resource pool with finite condition resources (e.g., employment). Similarly, Halbesleben and Wheeler (2008) found that work engagement and job embeddedness allowed individuals to gain resources and invest those resources to yield high job performance. In this study, work engagement was defined as a form of resource investment that involves absorption, vigor, and dedication at work (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002) while job embeddedness was characterized by resource investment into relationships at work to establish fit (Mitchell, Holtom, Lee, Sablynski, & Erez, 2001). By investing resources in these ways, individuals were able to enrich their resource pools by reaping the benefits of improved job performance. Scholars have also found that resource investment defined as voice (i.e., “expressing change-oriented ideas and suggestions; p. 216) used energy resources (e.g., time) and helped individuals gain additional resources to reduce stress and improve job performance (Ng & Feldman, 2012). In addition, personal characteristic resources, specifically conscientiousness, have been shown to allow individuals to strategically invest their resources to maximize later resource gains (Halbesleben, Harvey, & Bolino, 2009).

Based on the studies above, if resource investment successfully leads to resource gains, then individuals will continue to invest resources to enrich their resource pools over time. Following COR theory, if resource investment leads to resource losses, individuals will still continue to invest resources, but may engage in more defensive resource investment strategies over time to conserve resources.

Hypothesis 4: Average resource investment is positively related to subsequent average resource investment.

During adaptation, individuals will be required to deploy and invest finite or alterant resources in order to meet the changed demands of the task. Across studies, resource deployment via self-regulatory processes has been shown to positively relate to adaptation. For instance, the deployment of cognitive resources for metacognition (i.e., an executive-level capability that allows individuals to self-monitor their decision-making strategies in order to plan the allocation of effort toward a goal) has been shown to positively relate to adaptation (Bell & Kozlowski, 2008; Bell & Kozlowski, 2010; Caldwell & O’Reilly, 1982; Ford et al., 1998; Heimbeck et al., 2003; Ivancic & Hesketh, 2000; Keith & Frese, 2005; Smith et al., 1997; Washburn et al., 2005). Similarly, applying strategic knowledge (i.e., the knowledge of how and when to use declarative and procedural knowledge) during goal striving has been shown to be positively related to adaptation (Bell & Kozlowski, 2008). By investing effort during a task, individuals monitor which decision-making strategies help advance goal attainment. In turn, they gain knowledge about the task and their performance, and are given an opportunity to practice their skills.

Hypothesis 5: Average resource investment (trials 7-9) will be positively related to adaptation.

As previously discussed, the first tenet of COR theory describes loss saliency (i.e., resource loss is more salient than resource gain) (Hobfoll, 1989, 2001). In their meta-analysis, Lee and Ashforth (1996) showed that job demands were strongly and positively related to emotional exhaustion. In their coding, job demands were classified as role ambiguity, role clarity, role conflict, role stress, stressful events, workload, work pressure, and physical comfort. These demands use and deplete finite and alterant resources, which relates to experiencing emotional exhaustion (Bakker, Demerouti, & Verbeke, 2004; Demerouti et al., 2001; Schaufeli & Bakker, 2004). In finding that job demands and exhaustion exhibited a positive relationship, the meta-analysis provided evidence that individuals were sensitive to resource loss, or even the possibility of resource loss (Lee & Ashforth, 1996). In addition, COR theory states that initial resource losses (gains) lead to future resource losses (gains) (Hobfoll, 1989, 2001).

COR theory also states that a lack of resources in an individual's resource pool will lead to defensive attempts to conserve remaining resources in that pool (Halbesleben et al., 2014; Hobfoll, 1989, 2001). Hobfoll (2001) states that an individual who experiences emotional exhaustion will be less likely to invest the limited finite or alterant resources in his or her resource pool, and would rather maintain a defensive strategy to protect his or her resources. In support of Hobfoll, Halbesleben (2010) found that exhaustion was positively related to performing safety workarounds at work (e.g., high-risk behavior that allows for less effort to be invested). In addition, scholars have also found that exhaustion (i.e., resource depletion) is positively related to organizational citizenship behaviors such that individuals invest in relationships that glean social support rather than investing via on-task, work-related behaviors (Halbesleben & Bowler, 2007; Halbesleben & Wheeler, 2011).

In the studies above, gain and loss are defined as actual or perceived increases or decreases in the quantity of resources that an individual has available. In self-regulation research, however, gains and losses are often studied with regulatory focus. Regulatory focus is characterized by the needs, standards, and outcomes that guide individuals' self-regulation (Brockner, Paruchuri, Idson, & Higgins, 2002; Higgins, 1997, 2000). Two types of regulatory foci exist, including promotion focus and prevention focus. The needs, standards, and outcomes that drive the regulatory foci vary across promotion and prevention. Needs vary such that promotion-focused individuals seek growth, development, and nurturance while prevention-focused individuals seek security, safety, and protection (Higgins, 1997, 2000). Standards vary such that promotion-focused individuals try to meet ideal standards (e.g., hopes, wishes, and aspirations) while prevention-focused individuals try to meet ought standards (e.g., duties, obligations, and responsibilities) (Higgins, 1997, 2000).

Regulatory focus shares a positive relationship with performance outcomes, but each type of regulatory focus differs in the approach by which individuals strive toward the goal (Johnson, Shull, & Wallace, 2011). Promotion-focused individuals work toward the attainment of positive outcomes while prevention-focused individuals work toward the avoidance of negative outcomes (Higgins, 1997, 2000). When promotion-focused individuals align current states with ideal end states, they experience positive outcomes (gains); if they do not, they experience negative outcomes (nongains) (Higgins, 1997, 2000). With their focus on positive outcomes, promotion-focused individuals seek to achieve and will often engage in risky behavior to do so (Scholer et al., 2010). When prevention-focused individuals align current states with ought end states, they experience positive outcomes of nonloss; if they do not, they experience loss (Higgins, 1997, 2000). With their focus on negative outcomes, prevention-focused individuals seek security and engage in risk-averse behavior (Scholer et al., 2010). When it comes to adaptation, it would be expected that promotion-focused individuals would exhibit an exploratory approach and would be more likely to exhibit adaptive behaviors; however, prevention-focused individuals would be more risk averse and comfortable following procedures, rules, and standards that align with their ought self (Lanaj, Chang, & Johnson, 2012).

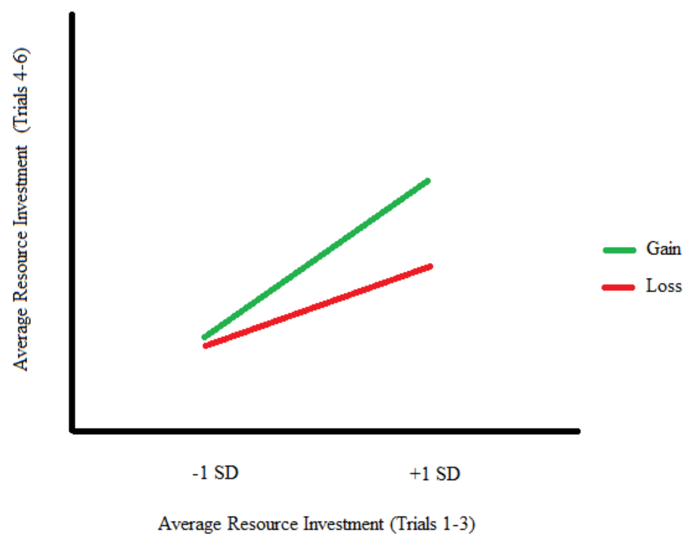
In psychology, regulatory focus has been conceptualized as both a stable individual difference and a situationally dependent variable. Situational influences on regulatory focus include inducing loss and gain, and encouraging a focus on negative or positive outcomes (de Lange & van Knippenberg, 2007, 2009; Higgins, Shah, & Friedman, 1997). In these manipulations, loss induces a prevention focus while gain induces a promotion focus. Similarly, being prompted to focus on negative outcomes induces a prevention focus, while being prompted to focus on positive outcomes induces a promotion focus. Thus, gaining and losing while self-regulating can change individuals' regulatory focus, which prompts a change in their outcome focus (i.e., gain/nongain versus nonloss/loss).

As Hobfoll (1989) states, resource loss results in defensive attempts to conserve resources. As a result, it would be expected that prevention-focused individuals would strive toward nonloss goals and take fewer risks than promotion-focused individuals because of their focus on vigilance and safety (Bryant & Dunford, 2008). Conversely, promotion-focused individuals would strive toward gain goals and take more risks because of their focus on achievement. Thus, following loss, individuals would be oriented toward a prevention focus, and would attempt to conserve resources by not investing them immediately. Following gain, individuals would be oriented toward a promotion focus, and would take greater risks and invest more resources than prevention-focused individuals in order to enrich their resource pools. In the present study, the gain and loss would act as moderators of the resource investment (trials 1-3) to resource investment (trials 4-6) relationship such that individuals who are subject to external gains have a more positive relationship (invest more resources following trials 1-3) than individuals who are subject to external losses (invest fewer resources following trials 1-3). A depiction of this moderation is shown in Figure 3 below.

Previously, the present study has argued that initial resource gains in energy and/or personal characteristic resources would lead to further gains (i.e., Hypothesis 1 and 2). In Hypothesis 6, it is argued that individuals who receive another gain will be more apt to invest resources because it is a low-risk act; they have more resources to reinvest toward goal progress without major risk of depleting their pool. These individuals' System 1 responds with a spontaneous positive reaction to the gained goal progress; these promotion-focused individuals would be expected to exhibit riskier behavior than prevention-focused individuals as a result of the gain induction. Thus, those who receive a gain will show a steeper slope between resource investment phases. Conversely, those who initially received energy and/or personal characteristic resources, and then experience a loss will attenuate in their progress toward their goal as a result of defensive attempts to conserve resources. System 1 is expected to respond with a spontaneous negative reaction to the lost goal progress, and individuals are expected to exhibit less risky behavior due to an induced prevention focus. Thus, those who experience a loss will show an attenuated positive slope between resource investment phases.

Hypothesis 6: Subsequent resource changes moderate the positive relationship between average resource investment (trials 1-3) to average resource investment (trials 4-6) such that individuals who gain resources will have a more positive slope from average resource investment (trials 1-3) to average resource investment (trials 4-6) than individuals who lose resources.

Figure 3. Visual depiction of hypothesis 6.



Losses and gains are important to consider over time because they will impact goal striving activities. Two examples will help illustrate the impact of gain and loss spirals over time. Assembly line supervisor, Jane, is assigned the goal to build 1950 engines per week. On Monday, the shift runs smoothly without many problems, but workers are physically tired after a long day. On Tuesday, three workers call in sick because of how tired they feel from the previous day; this loss slows production down for the day and goal progress suffers. On Wednesday, the shift leader announces that certain tasks on the line will change to increase productivity starting Friday. On Thursday, the remaining workers on the team are physically tired because they have had to increase physical and cognitive effort to attempt progress toward the goal; as a result, production suffers. In this example, the loss induced by the workers calling out sick attenuates production; a second loss further decreases production as the members of team lose physical and cognitive resources. Progress to the goal is decelerated at first, and then further decelerated such that the goal seems unattainable.

Consider if the team in the production example received resource gains. John's goal is to build 1950 engines per week. On Monday, the shift runs smoothly without many problems, but workers are physically tired after a long day. On Tuesday, the industrial engineers share new knowledge about how to perform the tasks more efficiently; workers translate that knowledge into more efficient performance and feel less tired throughout the day. As a result, progress is accelerated toward the goal. On Wednesday, the shift leader announces that certain tasks on the line will change to increase productivity starting Friday. On Thursday, John rewards his team by buying them all lunch for making sufficient progress toward the goal. In this example, the gain induced by the knowledge from the industrial engineers helps accelerate goal progress; a second gain further increases production as the members of the team eat a full meal and enrich their cognitive and physical resources. Progress to the goal is accelerated and then further accelerated such that the production goal seems attainable.

According to COR theory, initial resource losses lead to future resource losses (Hobfoll, 1989, 2001). These multiple, successive losses are called loss spirals such that initial losses lead to a chain of future losses, depleting individuals' resource pools (Demerouti et al., 2004). In their study on emotional outcomes, Demerouti et al. (2004) provided evidence for a reciprocal relationship (i.e., a loss spiral) between work-home interference and exhaustion such that negative experiences trigger other negative experiences over time.

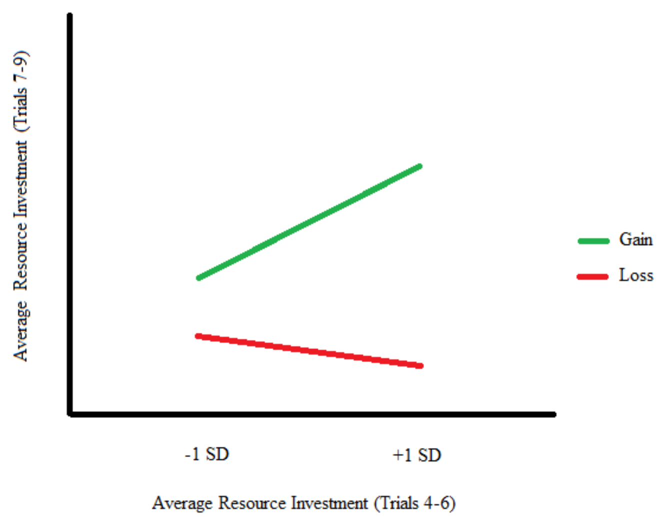
In the other direction, COR theory states that initial resource gains lead to future resource gains (Hobfoll, 1989, 2001). These multiple, successive gains are called gain spirals such that gaining resources enriches individuals' resource pools, which increases the likelihood that further gains will be realized following resource investment (Llorens, Schaufeli, Bakker, & Salanova, 2007). In support of gain spirals, Hakanen, Peeters, and Perhoniemi (2011) found reciprocal relationships (i.e., a gain spiral) between job resources and engagement, as well as home resources and marital satisfaction. Similarly, Halbesleben and Wheeler (2015) found reciprocal relationships (i.e., a gain spiral) between coworker-based perceived social support and trust, which led to resource investment from coworker to coworker. Finally, Xanthopoulou, Bakker, Demerouti, and Schaufeli (2009) found that gains in job resources (e.g., coaching) positively related to work engagement which predicted financial returns. Altogether, the reciprocal relationships between these different types of resources indicate that increases in one type of resource will allow for increases in another related resource.

Previously, the present study has argued that initial resource gains in energy and/or personal characteristic resources would lead to further gains (i.e., Hypothesis 1 and 2) and further gains would lead to steeper positive slopes between resource investment at two different time points. When these same individuals experience further gain, the slope between resource investment (trials 4-6) and resource investment (trials 7-9) will continue to be positive, however, the slope will be less steep than the relationship between resource investment (trials 1-3) and resource investment (trials 4-6). The reason for this has been shown in prior research where promotion-focused individuals choose risky strategies early, but then switch to conservative strategies later once they have made sufficient progress toward the goal, feel protected against loss, and do not feel the same need to invest resources to stave off potential loss (Zou, Scholer, & Higgins, 2014). System 1 does not feel threat and information processing follows the status quo. As such, System 2 does not need to intervene to facilitate goal attainment.

After receiving initial gains in energy and/or personal characteristic resources then experiencing loss, the slope between resource investment at different time points is positive, but attenuated due to attempts to conserve resources and prevent further loss. When these same individuals experience further loss, the slope between resource investment (trials 4-6) and resource investment (trials 7-9) will be negative because individuals' finite and alterant resource pools have been depleted and further resource investment would only continue to deplete them (Hobfoll, 1989, 2001). System 1 is threatened by the loss of resources and responds with spontaneous negative affect (e.g., frustration, anger, disappointment, anxiety) (Taylor, 1991). System 2 can be activated to minimize the mobilization of negative affect, but this will draw further resources from the individuals' pool. A depiction of this moderation is depicted in Figure 4 below.

> *Hypothesis 7:* A resource spiral moderates the positive relationship between average resource investment (trials 4-6) to average resource investment (trials 7-9) such that individuals who have gained resources over time (i.e., experienced a gain spiral) will have a positive slope from average resource investment (trials 4-6) to average resource investment (trials 7-9) whereas individuals who have lost resources over time (i.e., experienced a loss spiral) will have a negative slope from average resource investment at (trials 4-6) to average resource investment (trials 7-9).

Figure 4. Visual depiction of hypothesis 7.

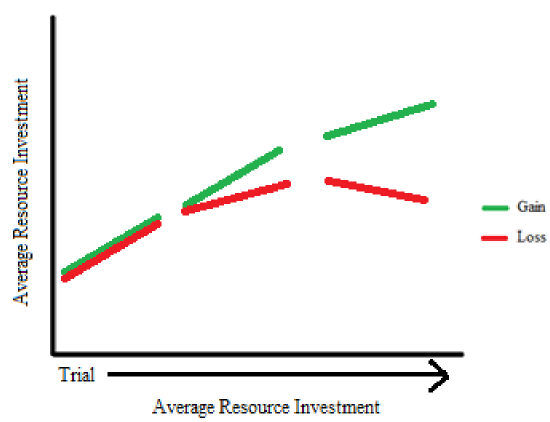


To sum up Hypothesis 6 and 7, it is expected that participants in the gain condition would have positive slopes between average resource investment periods, following gain spirals posited by Hobfoll (1989). The loss conditions, however, will have a weaker positive slope between the first average resource investment (trials 1-3) and the second average resource investment (trials 4-6) because they will attempt to conserve resources. Following the second bout of loss, the slope will become more negative, following loss spirals posited by Hobfoll (1989). An example of the slopes expected over time are shown in Figure 5.

The effects of loss and gain have been hypothesized to have differential impacts on resource investment over time. However, it should not be forgotten that these individuals have energy and personal characteristic resources in their pool (e.g., adaptive guidance and reappraisal respectively) that may be more or less effective in conserving and gaining resources over time.

In their study of resource investment over time, Makikangas et al. (2010) measured perceptions of job resources (e.g., “I receive sufficient information about the goal of my work”) and flow (e.g., “When I am working I forget everything else around me”). Participants filled out the same questionnaires over three time points. The authors used latent growth curve modeling and a more specialized analysis, growth mixture modeling, to investigate mean-level change over time as well as relationships between resources and flow over time. The analyses showed that there were not any mean-level changes in resources over time, but the variance was significant such that the higher the level of job resources, the less growth in it. In addition, their analyses showed that the levels and changes in job resources and flow were positively related. The results from the growth mixture modeling showed that a model with five latent trajectory classes was the best fitting model. These included (1) moderate work-related resources, (2) declining work-related resources, (3) high work-related resources, and (4) low work-related resources. Each class had substantially different trajectories of job resources and flow. Overall, their results provided support for COR theory in that some trajectory classes showed evidence of loss spirals, as well as partial support for gain spirals such that there were reciprocal relationships between job resources and flow that allowed them to stay at about the same level.

Figure 5. Expected slopes over time.



The Makikangas et al. (2010) study was one of few studies to investigate changes in resource pools over time using appropriate longitudinal analyses. The weaknesses with the survey design, however, reside in the opportunity for detectable resource loss and gain events to occur over three time points, spread six weeks apart. The strengths to the present study reside in that the changes in finite resources will be manipulated so that the effects on resource investment over time can be clearly investigated. The Makikangas et al. (2010) study was able to investigate the changes in resources over three waves, whereas the current study is experimental and will be better able to tease apart the relationships between resources and resource investment since gains and losses will be induced.

In the present study, it is expected the control groups will have the lowest levels of mean resource investment across time because they start off with the fewest resources. Following COR theory, individuals with more resources are better positioned for resource gains; therefore, the groups who initially receive any adaptive guidance or reappraisal resource will be more apt to gain resources over time, and thus have a higher level of mean resource investment than the control groups. Specifically, the reappraisal resource groups will have the next highest levels of mean resource investment across time. The reappraisal groups will not have resources that are as useful for investment as the adaptive guidance groups because the adaptive guidance groups' resources will guide them early on about how to allocate alterant resources to maximize finite resource enrichment. The reappraisal group's alterant resource will be more useful for investment when negative affect occurs (e.g., from external losses). Finally, the combined adaptive guidance and reappraisal resource groups will have the highest levels of mean resource investment over time. The combined adaptive guidance and reappraisal resource groups initially have the largest resource availability and therefore will have sufficient resources to invest in order to enrich their pool, following COR theory (i.e., individuals who have resources are in a better position to invest those resources).

Hypothesis 8a: There will be mean differences in resource investment across trials based on experimental condition.

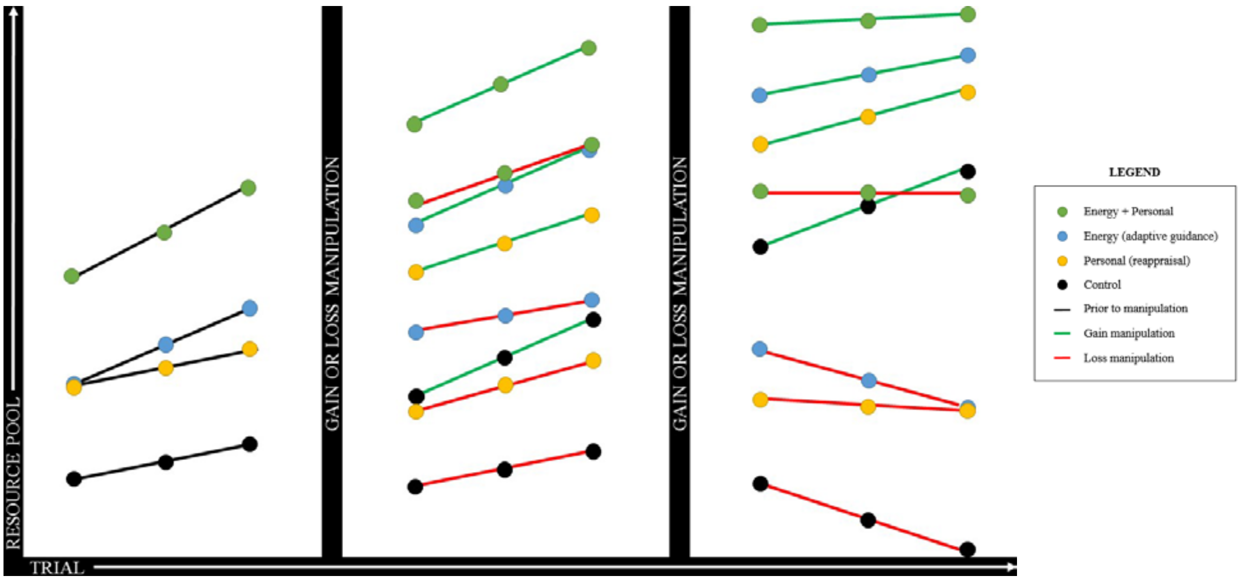
According to COR theory, the gain spiral group (i.e., the group that receives a finite resource gain) with both energy and personal characteristic resources will have the steepest and most positive slope (Hobfoll, 1989, 2001). These individuals will have sufficient resources to dedicate to resource investment in their pursuit of gaining more resources. In addition, these individuals are generally better positioned than other groups for resource gains because they have larger resource pools (Hobfoll, 1989, 2001). As this group will receive gains from the experimental manipulation both initially and over time, it follows that these gains will reap further gains (Hobfoll, 1989, 2001). Initial resource gains in both adaptive guidance and reappraisal should set the conditions for gaining other resources (e.g., knowledge, skill, performance, self-efficacy); further gains over time in these other resources will enrich the resource pool and allow the individual to reinvest these resources and pursue more gains.

Across the board, the four gain spiral groups will have steep positive slopes across the nine trials. It is likely that these groups will plateau in their resource investment trajectories toward the end of the nine trials, as they do not require high System 2 engagement to continue to gain resources. According to COR theory, individuals invest resources in order to gain resources (Hobfoll, 1989, 2001), but self-regulation research has shown that promotion-focused individuals (those motivated toward gain outcomes) choose risky options early and then switch to a conservative option when they achieve a gain (Zou et al., 2014). As mentioned previously, progress toward the goal and protection against loss contribute to this phenomenon (Zou et al., 2014). Therefore, over time, it is expected that individuals who are subjected to a gain spiral (i.e., multiple finite resource gains) would have a steep and positive investment trajectory early on, but then even out as time passes as they perceive progress toward their enrichment goal (i.e., feelings of protection against resource loss).

Overall, the four loss spiral (i.e., finite resource loss) groups will have steep initial positive slopes in the first three resource investment trials (trials 1-3), especially for the groups who initially receive adaptive guidance or reappraisal resources (i.e., initial gains lead to future gains, and individuals invest resources to gain resources). However, following the first manipulated loss, these positive investment trajectories will attenuate as individuals attempt to conserve their current resources. Once the loss spiral takes hold in the second manipulated loss, these groups' resource investment slopes will become negative such that losses beget further losses. Of these loss spiral groups, experimental groups that initially receive the reappraisal resource will have the least negative slope because they are able to deal with negative affect better than the control and energy resource groups, and reallocate their alterant resources to the task. Specifically, research has shown that individuals who use reappraisal significantly reduced negative affective responses to loss (Yang, Gu, Tang, & Luo, 2013). Emotion regulation research has also shown that individuals who use reappraisal strategies tend to take more risks and have decreased sensitivity to loss than individuals who use other strategies (Di Rago, Panno, Lauriola, & Figner, 2012). Figure 6 shows a depiction of the hypothesized differences.

Hypothesis 8b: There will be slope differences in resource investment across trials based on experimental condition.

Figure 6. Hypothesized mean-level and slope differences between experimental groups.



Recall the automobile production example from earlier. In both examples, the production supervisors had experienced changes in resources that put them farther or closer to the engine production goal. Jane experienced losses while John experienced gains. In the middle of the week, both supervisors received news from the shift leader that the tasks on the line would undergo changes to improve productivity. Who will be better able to adapt to the new changes in the tasks: Jane or John?

Adaptation requires individuals to recognize that the task demands have changed (Chen et al., 2005). If individuals do not recognize the need for increased effort to perform the task, they will be less likely to select and invest the resources that match the task demands (van de Tooren & de Jonge, 2011). Situation appraisal is a System 1 process that does not require many resources; it functions relatively automatically. Situation reappraisal, however, will be required when the task demands change; individuals will need to figure out how to perform in the task to meet their desired goal. When individuals have experienced finite resource loss, they will be unlikely to invest alterant resources to determine the new task demands. According to COR theory, individuals who are subject to resource losses will engage in defensive attempts to conserve resources. Therefore, when task demands change, individuals who are subjected to losses will engage in the behaviors that worked before the demands changed, in order to not invest other resources that might put them at risk; this is a high-risk situation that will put their already dwindling resources in peril. In the case of Jane, her team will be less likely to meet the demands of the new tasks.

Individuals who have experienced gain spirals have accumulated resources should be better positioned for further resource gains (Hobfoll, 1989, 2001; Hakanen et al., 2011; Halbesleben & Wheeler, 2015; Xanthopoulou et al., 2009). When task demands change, they have more resources available to dedicate to figuring out the new task demands without a lot of risk. Following COR theory, by investing resources to figure out the task demands, these individuals put themselves in a position to gain further resources and will likely gain more resources as a result (Hobfoll, 1989, 2001). Individuals with large resource pools have lower risk of losing resources than individuals with small resource pools; therefore, they can invest their resources to learning the new task demands without risk of depletion. In the case of John, his team will be more likely to meet the demands of the new task.

Hypothesis 9: Individuals who have experienced a loss spiral will be less likely to adapt than individuals who have experienced a gain spiral.

In the section that follows, the analytic strategy, sample, design, task, and measures will be described to test the model shown in Figure 2.

CHAPTER 3: METHOD

Operational constraints

The method to test the a priori hypotheses was amended due to operational constraints within the administration of the psychology research subject pool. To test the eight cells proposed, approximately 800-1000 participants needed to attend the study to meet the sample size requirements. The administrators of the psychology research subject pool were only able to accommodate approximately 500 students' worth of psychology research credits. In an attempt to increase the sample size, another 100 students' worth of management research credits were added from the management research subject pool. Since the number of credits available was not large enough to test the original a priori hypotheses, Hypothesis 1, which posited that individuals with more resources would invest more resources on average than individuals with fewer initial resources, was removed from the analysis. In addition, Hypothesis 2, which posited that a resource intervention that included both adaptive guidance and reappraisal would result in more average resource investment than only one of the interventions on their own, was removed. In the end, the conditions which would have combined both adaptive guidance and reappraisal were removed from the design; the control conditions where participants would have received neither intervention were removed as well. Thus, a 2x2 design was proposed which fully crossed the resource interventions (adaptive guidance v. reappraisal) and the finite resource manipulations (gain spiral v. loss spiral).

In addition, a pilot study that occurred from November to December 2017 altered aspects of the final study. First, state regulatory focus was removed as a manipulation check and control variable. The correlations between state promotion and prevention focus, and their relationships with other study variables were inconsistent with theoretical rationale on the topic of regulatory focus (see Summerville & Roese, 2008 for a discussion on the topic). Second, the operationalization of the finite resource manipulations were edited from an absolute change (e.g., +/-500 points) to a proportional change (e.g., +/- 60% of points) to ensure that the strength of the manipulation was consistent across individuals (relative to their level of performance). Third, the operationalization of the focal resource investment variable was changed to a composite of various study variables; the prior operationalization was based on one sole variable, which showed unexpected negative correlations with performance (i.e., the number of points gained across trials). Finally, a number of study variables were included as descriptive variables, including goal choice, goal commitment, goal orientation, and on-task cognition. No hypotheses were made regarding these variables; their purpose was only to describe the sample in order to interpret the results from the a priori hypotheses. For more information on the design of and decisions made from the pilot study, please refer to Appendix A.

Analytic strategy

Although COR theory posits changes in resource pools and investment over time, studies testing COR theory tend to use cross-sectional methodologies (Halbesleben et al., 2014). Using cross-sectional methodologies cannot establish causal relationships or chronological order, therefore experimental and longitudinal designs would be a better fit for testing the tenets of COR theory (Halbesleben et al., 2014). Resource investment, especially following resource gains, has been assumed, but rarely been investigated in studies of COR theory (Halbesleben & Wheeler, 2015). Recent efforts have been made to test the tenets of COR theory over time using time-lagged samples (Halbesleben & Bowler, 2007), experience sampling methodologies (Halbesleben & Wheeler, 2011), and latent change score modeling (Halbesleben & Wheeler, 2015). To understand the phenomena appropriately, the present study will use a longitudinal design to examine trajectories of resource gain and loss over time across different types of resources.

To test hypotheses 1-7, a structural equations model was fit to the data. Specifically, path analysis was used with Mplus version 7.4 (Muthen & Muthen, 1998-2017) with maximum likelihood estimation. To test the hypotheses, average resource investment was calculated for three time points: (1) the first three trials before the first finite resource manipulation, (2) the second three trials following the first finite resource manipulation, and (3) the third three trials following the second finite resource manipulation. To test hypotheses 8a and 8b, multiple analyses were conducted. To test the a priori model, a piecewise growth model was fit to the data specifying known classes, which corresponded to randomly assigned condition, using procedures from Muthen and Muthen (1998-2017). Post-hoc analyses were then used to examine the data differently. First, mixed repeated measures analysis of variance (ANOVA) was used to determine the nature of the interaction between resource intervention and the finite resource manipulations. Second, latent class analysis was used to determine if there were underlying classes that fit the data better than the known classes assigned in the piecewise growth model. Third, discontinuous growth modeling was used to determine if there were statistically significant discontinuous shifts in the data (Bliese, Adler, & Flynn, 2017; Bliese & Lang, 2016).

Participants

In total, 528 participants were recruited from a large Midwestern university through the management and psychology departments’ online systems for research participation (19.3% from management; 80.7% from psychology). Participants received research credits for attending both parts of the two-part study. These credits were allocated toward their grade for their management or psychology courses. Fifteen participants had incomplete data due to absences during the second part of the study. Participants were also removed from the analysis due to failing attention and manipulation checks (N = 30 and N = 68, respectively). Note that some participants failed multiple checks, so the 98 participants who failed are not all unique. Following the removal of these participants from the analysis, 426 participants remained in the final sample.

A power analysis was conducted for an a priori sample size with an effect size of .10 (Bell & Kozlowski, 2002b; Bell & Kozlowski, 2008) using techniques from Preacher and Coffman (2006). An a priori sample size of 402 was computed from a null root mean square error of approximation (RMSEA) of .05, an alternative RMSEA of .08, alpha (α) of .05, degrees of freedom of 22, and desired power (β) of .80. An ad-hoc power analysis was performed to confirm that the path analysis model had enough power to detect an effect. Using techniques from Preacher and Coffman (2006), the resulting ad-hoc power was .84.

The final sample (N = 426) was 65.7% female with a mean age of 19.71 (SD = 1.65). The sample was 69.7% White, 15.5% Asian, 9.6% Black or African American, and 5.1% some other race. In terms of ethnicity, 6.1% of participants were Hispanic or Latino. The sample was mostly made up of freshmen (37.1%), followed by juniors (23.9%), sophomores (22.3%), seniors (14.1%), and students who had been in school for five or more years (2.6%). The sample mainly consisted of social science majors (24.5%), followed by natural science majors (17.3%), business majors (16.5%), communication arts and sciences majors (10.4%), education majors (6.8%), nursing majors (5.4%), and engineering majors (5.0%). A small proportion of the sample came from other majors such as agriculture and natural resources (3.1%) and arts and letters (.9%). The remaining proportion of the sample were undecided (4.7%), double-majored (3.3%), attended honors colleges (1.2%), or were in other majors (.9%).

Design

The present study employed a 2 (adaptive guidance v. reappraisal) by 2 (finite resource gains, or gain spiral v. finite resource losses, or loss spiral) mixed design with 9 repeated measures. Participants were randomly assigned to one of four conditions.

Task

A computer-based, radar-tracking simulation called TANDEM was used. TANDEM has been used as a valid performance task in a number of studies (Bell & Kozlowski, 2008; Ford et al., 1998; Gully, Payne, Koles, & Whiteman, 2002). Each participant has a “ship” in the middle of the radar screen that he or she must protect from roaming targets or contacts (i.e., other ships, aircraft, or submarines) in order to earn points in the simulation. There are numerous targets that appear on screen that have different characteristics that can be programmed by the experimenter; this allows for control of many aspects of the simulation. To perform well in the task, participants must make a number of intermediate decisions about the targets before making a final decision (i.e., to clear or shoot the target).

A digital instruction manual educates the participant on how to make accurate decisions. Decisions that need to be made are the type of the contact (e.g., air, submarine, surface), the class of the contact (e.g., civilian, military), and the intent of the contact (e.g., hostile, peaceful). If the contact is hostile, the participant must shoot the contact in order to earn points; if the target is peaceful, he or she must clear the contact in order to earn points. If one of these four decisions is made incorrectly, the participant will lose points.

In the instruction manual, each participant is also given information about how to zoom in and out of the main screen. The default main screen visibly shows one perimeter that can cause point loss should targets cross it; this perimeter, called the inner perimeter, is located 10 nautical miles outside of the participant’s ship. In order to protect this inner perimeter, participants are not required to zoom in or out from the main screen. When contacts cross the inner perimeter, the participant loses 10 points. To excel in the simulation, however, it is necessary to zoom out in order to monitor a second perimeter called the outer perimeter. The outer perimeter can be located by zooming out three times. The outer perimeter is invisible and must be located using marker targets. Marker targets are stationary targets that sit just inside the outer perimeter and serve no other function than to “mark” where the outer perimeter is. Participants must learn to hook these targets to locate the outer perimeter so that they can hook and execute targets that may penetrate it. When targets cross the outer perimeter, the participant loses 10 points.

Once the participants review and study the information about how to make decisions in the simulation, they are taken to a trial. During a trial, participants must select (i.e., hook) targets by clicking the right mouse button. Hooking targets retrieves the information necessary to make type, class, and intent decisions. While hooking targets, participants must remain aware of other roaming targets and not allow those targets to penetrate the inner or outer perimeters. Thus, participants will be required to use the zoom function during the trial to ensure that they do not lose points. One hundred points are awarded for correctly making target decisions (e.g., type, class, intent, and engagement); 100 points are lost for incorrectly making these decisions, and 10 points are lost for allowing targets to penetrate either perimeter.

Following the completion of a trial, participants are taken to a screen that displays performance feedback. There are four pages of performance feedback. The first page of feedback provides information about participants’ scores. For instance, participants are told how many points they accrued, the number of targets they hooked, the number of targets they engaged correctly and incorrectly, and how many points each of those correct and incorrect engagements cost them. The second page of feedback provides information about participants' decisions. Here, participants find out the number of correct type, class, intent, and engagement decisions they made. The third page of feedback tells participants about how many targets they allowed to cross the inner and outer perimeters as well as the number of points they lost as a result of the perimeter intrusions. Finally, the fourth page of feedback tells participants the following: (1) the average time they spent per target, (2) the number of pop-up targets they engaged (i.e., targets that the experimenter programs to appear on screen later in the simulation), (3) how many pop-up targets they engaged correctly, (4) the number of high-priority targets they engaged (i.e., the number of targets that were programmed to cross the perimeters), (5) the number of marker targets they hooked (i.e., targets necessary to hook in order to determine the location of the outer perimeter), and (6) the number of times they zoomed in and out.

Procedure

Multiple task phases occurred over two days. In total, the duration of the study lasted approximately four hours. On the first day, two phases occurred. First, participants entered a familiarization phase where they were introduced to the study and interacted with the simulation in order to understand its features. Second, participants were taken to a training phase where they learned to operate and earn points in the simulation over three training blocks. Another four phases occurred on the second day, which was scheduled one to two days later. First, participants watched a video familiarizing them with the agenda for the day. Following the video, participants engaged in a training booster phase where they had a chance to review the instruction manual and practice their newly learned skills in a refresher trial. Then, participants embarked on a resource investment phase where they were instructed to accrue points over nine trials. Next, participants entered an adaptation phase where they performed the simulation with more novel and complex task demands than the previous nine trials. Finally, participants were debriefed.

Day 1: Familiarization phase. Participants were first asked to read an informed consent form and provide consent if they agreed to participate. Participants then completed numerous surveys that asked for demographic information, cognitive ability, trait regulatory focus, conscientiousness, trait affectivity, goal orientation, goal choice, and goal commitment. Once all participants were finished with the surveys, the experimenter showed a video that demonstrated the fundamental components of the task. Specifically, the video highlighted how to hook targets, how to zoom in and out, and demonstrated the proper sequence for making decisions in the simulation. Following the completion of the video, the experimenter answered any questions that participants had. Once all questions were answered, the experimenter started another video that led participants through the remainder of the familiarization phase. Once participants were logged into the simulation, they were given 2.5 minutes to look over the instruction manual, which provided in-depth information about the topics presented in the video. Once 2.5 minutes elapsed, participants engaged in a 60-second familiarization trial where performance was not recorded. The purpose of the familiarization trial was to expose participants to the menus and targets they would need to click and hook in order to perform in the simulation. Participants did not receive performance feedback following the familiarization trial, but they were shown what the feedback would look like. Altogether, the familiarization phase lasted approximately 30 minutes.

Day 1: Training phase. Participants engaged in a total of three training blocks. Before each training block, participants were given specific instructions on how to proceed during that block (see Appendix B for the specific instructions). There were three training blocks with three training trials per block, for a total of nine training trials total. In the first block, participants were told to study areas in the manual that would help them make decisions about the targets (e.g., type, class, intent, and engagement). Following completion of the first block, participants were allowed to take a five minute break. For the second block, participants were instructed to review topics that helped them prevent targets from crossing the perimeters. Specifically, participants were told to focus on how to operate the zoom function. For the third and final block, participants were told to study topics that helped them prioritize targets and balance tradeoffs. Specifically, participants were told that they needed to make tradeoffs between type, class, intent, and engagement decisions and the potential for perimeter intrusions. Once all training blocks were complete, participants were allowed to take a five minute break. After five minutes elapsed and the break ended, participants responded to a knowledge assessment. Altogether, the training phase lasted approximately 90 minutes.

Each training trial cycled through three phases: study, practice, and feedback. Participants had 2.5 minutes to study the instruction manual, which contained information about how to perform all aspects of the simulation. If participants felt that they did not need to read the instruction manual, they could exit the manual before the 2.5 minutes were finished. After their review time had finished, participants started a four minute trial where they could apply their knowledge and hone their skills during this practice period. Once the practice trial ended, participants were automatically directed to performance feedback pages. Participants could review their veridical performance feedback for 2.5 minutes. In addition to performance feedback, participants also received aspects of the experimental manipulation during the feedback portion of the cycle.

Day 2: Training booster. Upon returning for the second day, participants watched a short video detailing the study agenda. After finishing the video, participants engaged in the practice trial from the ninth training trial to refresh their memory. Like the training trials on the first day, participants had 2.5 minutes to review the instruction manual before the refresher trial. Participants also had another 2.5 minutes to review performance feedback following the refresher trial. Once participants finished the refresher trial, they took the same knowledge assessment from the previous day. Altogether, the training booster phase lasted approximately 25 minutes.

Day 2: Resource investment. Nine resource investment trials followed the training booster and knowledge assessment. Each trial followed the same cycle as the training trials: study, effort, and feedback. The cycle was programmed to be same length as the training trials (i.e., nine minutes), but participants could still exit the instruction manual before the allotted time elapsed. Any points earned in the resource investment trials helped participants attain their goals that they selected on the first day of the study. There were three variants of the resource investment trial. Each trial required participants to execute three high-priority contacts (e.g., contacts that were programmed to cross the outer or inner perimeters). The orientation of the trial was rotated each time it was presented to participants. An example depiction of the trial in shown in Appendix C.

The feedback portion of the cycle containing the experimental manipulations carried through into the resource investment trials, following the notion that unless resources are lost, they are available to an individual in their resource pool (Hobfoll, 1989). Altogether, the resource investment phase lasted approximately 60-80 minutes depending on how quickly participants progressed through the instruction manual and feedback pages.

Day 2: Adaptation. The adaptation trial followed the same cycle as the training and resource investment trials: study, practice, and feedback. Participants could study the instruction manual for 2.5 minutes and review feedback for another 2.5 minutes. Unlike the training and resource investment trials, the duration of the practice trial increased from four minutes to ten minutes.

In line with the learning process performance change approach to performance adaptation, the adaptation trial was more complex than resource investment and training trials, following Wood's (1986) taxonomy. Participants were required to zoom out and prioritize multiple high-priority targets (i.e., targets that were programmed to cross the inner or outer perimeter) by querying their speeds and proximities to the inner and outer perimeters during the adaptation trial. Following prior research (e.g., Bell & Kozlowski, 2008; Ford et al., 1998; Kozlowski, Gully et al, 2001), the adaptation trial had more total targets and pop-up targets, more pop-up targets near the inner perimeter, higher point deductions for perimeter intrusions (inner = -175; outer = -125), more high-priority targets that threatened the outer perimeter, and a longer time interval (i.e., 10 minutes). Altogether, the adaptation phase was approximately 11-15 minutes in duration depending on how quickly participants progressed through the instruction manual and feedback pages. More information regarding the operationalization of the adaptation trial can be found in the measures section.

Day 2: Debrief. Participants were debriefed on the purpose and background of the study by reading a debrief form approved by the Institutional Review Board (IRB). Altogether, the debrief phase lasted approximately five minutes.

Summary. Figure 7 shows a schematic of how the procedure was executed. The experiment was conducted over two days to ensure that participants had the time to learn the simulation. The first day ensured that a base level of learning was established via the training trials and knowledge assessment; the second day allowed the experimenter to change the task demands knowing that participants had an understanding of the routine demands one to two days prior.

Incentives

Cash incentives were used to motivate participants to learn the simulation, apply their knowledge and skills, and invest resources over time. Cash incentives were advertised in writing via the study recruitment materials. Upon arriving to the lab, participants were again informed of the cash incentives in writing via the informed consent form. Participants were verbally reminded of the cash incentives again in the introductory video on the first study day and the video agenda on the second study day. Cash incentives were offered for (1) the top three average knowledge assessment scores across the two days and (2) the top three summed performance scores for the nine resource investment trials and final adaptation trial. The incentives were independent such that a participant could receive a cash prize for both a knowledge assessment score and a performance score. For both categories, first place received $50.00, second place received $40.00, and third place received $30.00.

Each set of cash prizes was offered to each experimental condition. That is, participants were only competing against other participants in the same experimental condition as them. Therefore, participants who lost points due to their experimental condition did not compete against those who had gained points due to their experimental condition.

Figure 7. Experimental procedure.

DAY 1		DAY 2			
Familiarization	Training	Training Booster	Resource Investment	Adaptation	Debrief
Informed consent (10 min.)	Read training block instructions (3 min.)	Read training block 3 instructions (1 min.)	Study (2.5 min.) x 9	Study (2.5 min.)	Read debrief form (10 min.)
Introductory video (15 min.)	Study (2.5 min.) x 9	Study (2.5 min.)	Perform (4 min.) x 9	Perform (10 min.)	
Study (2.5 min.)	Practice (4 min.) x 9	Practice (4 min.)	Feedback (2.5 min.) x 9	Feedback (2.5 min.)	
Perform (1 min.)	Feedback (2.5 min.) x 9	Feedback (2.5 min.)			
	Breaks (10 min.)	Knowledge test (15 min.)			
	Knowledge test (15 min.)				
= ~30 min.	= ~110 min.	= 25 min.	= 81 min.	= 15 min.	= 10 min.

Manipulations

Adaptive guidance. The manipulation carried forward through all trials in all phases, including training, resource investment, and adaptation. The manipulation appeared as an addition to the four feedback pages that all participants received. Participants received adaptive guidance following every practice and resource investment trial.

Adaptive guidance was provided in the form of which topics to practice and study in future trials. The guidance is adaptive in that the study topics are determined by the participant's performance on each trial (Bell & Kozlowski, 2002b). There were three levels of adaptive guidance. The first level reflected a failure to reach a minimum level of performance (i.e., below 50^{th} percentile). The second level reflected an ability to reach a minimum level of performance (i.e., between 50^{th} and 85^{th} percentile). The third level reflected an ability to reach a desired level of performance (i.e., 85th percentile and above). The topics to practice and study based on performance were programmed in the simulation code by the experimenter. The specific instructions for adaptive guidance are provided in Appendix D. The framing varied slightly from the training to resource investment periods; specifically, phrases that referred to "practice" were removed during the resource investment period.

Emotion regulation. The manipulation carried forward through all trials in all phases, including familiarization, training, resource investment, and adaptation. The manipulation was first introduced in the familiarization video on the first study day. In the video, the narrator spoke the following, accompanied by colorful visuals (see Appendix E):

> *"As you learn the task today, you may experience negative emotions, such as anxiety, nervousness, anger, frustration, annoyance, boredom, disinterest, or disappointment. You may become frustrated when reading the instruction manual or hooking targets, you may become annoyed with the menus in the training trials, or you may become anxious when you don't perform as well as you had hoped you would. These emotions are normal, but they can negatively affect your learning and performance in the simulation today. When people become anxious or frustrated, they tend to focus on their emotions rather than the task at hand and use up valuable resources that should be used toward the task. As you learn about the simulation today, you will be given a number of strategies for how to deal with any negative emotions that you experience today. These strategies will be shown on the feedback pages with asterisks around them. Please read these strategies carefully and use the strategies that work best for you. In addition, you will also be asked to fill out surveys throughout the study. Please read these surveys carefully, and answer honestly. Thank you for your time and attention – please press next on your computer screen to continue with the study."*

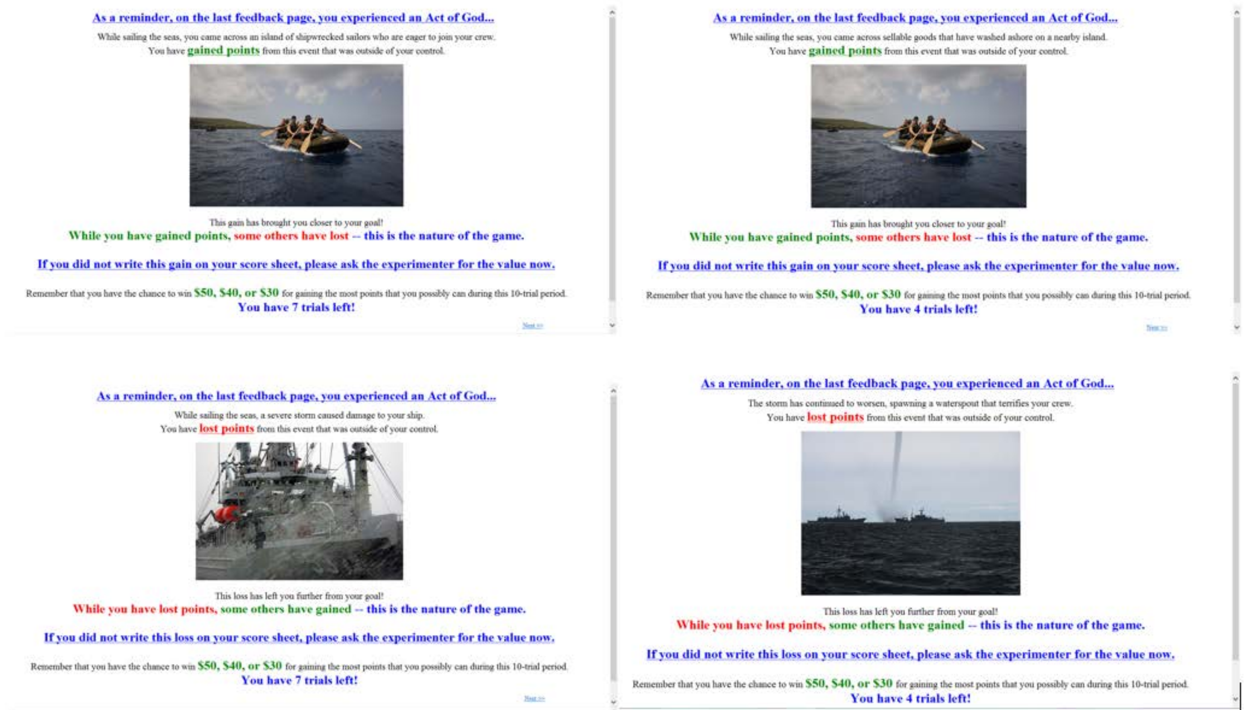
Throughout the trials, the manipulation appeared on the introduction page to the performance feedback, following every practice and resource investment trial. Participants were provided with an emotion regulation strategy and told how to use it as they reviewed their upcoming performance feedback. In total, seven emotion regulation strategies were derived from the reappraisal literature and provided to participants. The schedule of the emotion regulation manipulation can be found in Table 4. On the second study day, participants received the manipulation multiple times and through different media types. They were first reminded of the strategies during the video agenda. On their computer desks, participants had tangible, colored flashcards that corresponded to strategies they had endorsed on a survey on the first study day (see Appendix E). In addition, participants were prompted via written instruction to review their colored flashcards before the second, fifth, and eighth trials.

Finite resource manipulations. The gain and loss spiral manipulations occurred during the nine trials of resource investment phase. The finite resource loss or gain came in the form of lost or gained points, which determined participants' eligibility for a cash prize. A pilot study determined the appropriate point change to amount to 60% of the participant's score on the third and sixth trial. Thus, participants gained or lost 60% of the prior trial's points twice. The presentation of the finite resource manipulation was embedded into the feedback pages following the third and sixth trial. In the feedback presentation, the exact value of the point change was presented and was accompanied by an explanation of why the point change occurred. This presentation was not salient and it was possible that off-task participants could click through the presentation without noticing the point change. Therefore, an additional presentation of the point change was given immediately following the feedback portion of the cycle (see Figure 8). The second presentation was eye-catching, colorful, and used imagery to grab the attention of participants. This presentation was not able to accommodate the programming required to show the exact value of the point change; therefore, instructions were included to notify off-task participants to contact the experimenter regarding the value of the point change (see Figure 8).

Table 4. Schedule of the emotion regulation manipulation.

Trial	Category	Instructions Shown to Participants	References
1	Increase positive emotion	As you review your activity, think about the positive aspects of what you are seeing. Think about what you did well in the last trial. Focus on specific areas in which you excelled. Then, think about areas of improvement as opportunities. These opportunities arise from learning about how you performed. Focus on specific areas of improvement and think about how will improve your performance.	Lu & Stanton, 2010; McRae et al., 2010; Richards, Butler, & Gross, 2003; Shiota & Levenson, 2009; Watkins, Cruz, Holben, & Kolts, 2008
2	Decrease negative emotion	As you review your activity, think about what you are reading in such a way that you actively feel fewer negative emotions. Interpret the feedback first; then, continue to read and interpret it until it no longer elicits a negative response and is less toxic for you. Reduce the intensity of your negative emotional experience by imagining your performance getting better.	Banks, Eddy, Angstadt, Nathan, & Phan, 2007; Goldin, Manber-Ball, Werner, Heimberg, & Gross, 2009; Hajcak & Nieuwenhuis, 2006; Masuda et al., 2010; Ochsner, Bunge, Gross, & Gabrieli, 2002; Ochsner et al., 2004; Shiota & Levenson, 2009; Urry, 2010
3	Control emotion	As you review your activity, control your emotions. Analyze the causes and reasons for any emotions that you might have. Think about what your emotional response has been, then notice whether you like or dislike feeling this way. Consider whether these feelings are an appropriate response to the feedback you are reading, and whether these emotions get in the way of your performance.	Ayduk & Kross, 2008; Kross, Davidson, Weber, & Ochsner, 2009; Low, Stanton, & Bower, 2008
4	Stay calm	As you review your activity, remain calm. Be mindful of your emotions; allow any thoughts or feelings that occur to naturally rise and fall. As you read, notice any tension in your body and gently let it go. Take a few moments to notice your breathing and allow whatever comes to come, whatever goes to go, and whatever stays to stay.	Butler et al., 2003; Erisman & Roemer, 2010
5	Normalize emotion	As you review your activity, realize that all feelings, including negative feelings, are normal, healthy, and temporary reactions. You might describe your emotions as thoughts that are passing through your mind or bodily sensations such as tension or a racing heart. Whatever you are feeling, allow that this is your emotional experience right now. Do not judge or evaluate how you are feeling.	Chapman, Rosenthal, & Leung, 2009; Farb et al., 2010; Kuehner, Huffziger, & Liebsch, 2009; Low et al., 2008
6	Reinterpret emotional stimulus	As you review your activity, imagine that you had better outcomes in areas that need improvement. Imagine how you would feel if you saw performance improve in those areas. Think about how you would feel when you read the feedback after the next trial. Imagine yourself achieving your goals for the simulation and the emotions you would feel.	Rusting & DeHart, 2000; Urry, van Reekum, Johnstone, & Davidson, 2009
7	Detached observer	As you review your activity, adopt a neutral, analytical, and objective attitude toward its contents. As you review the feedback, be an impartial observer. Think about the feedback objectively and analytically rather than personally, or in any way emotionally relevant to you. For instance, imagine yourself as the scientist running the study, looking at the technical aspects of your performance.	Ayduk, Mischel, & Downey, 2002; Beauregard, Lévesque, & Bourgouin, 2001; Goldin, McRae, Ramel, & Gross, 2008; Gross, 1998b; Johns, Inzlicht, & Schmader, 2008; Kim & Hamann, 2007; Lévesque et al., 2004; Ochsner et al., 2004; Ray, Wilhelm, & Gross, 2008; Rohrmann, Hopp, Schienle, & Hodapp, 2009; Schmeichel, Volokhov, & Demaree, 2008; Sheppes & Meiran, 2007; Sheppes, Catran, & Meiran, 2009; Shiota & Levenson, 2009; Vohs & Schmeichel, 2003; Williams, Bargh, Nocera, & Gray, 2009
8	Select	As you review your activity, use the strategy you like best to deal with your emotions.	
9	Select	As you review your activity, use the strategy you like best to deal with your emotions.	

Figure 8. Finite resource manipulations.



Measures

Demographic information. Demographics were collected during the familiarization phase. Participants' year in school, major, gender, age, race, and ethnicity were collected to identify sample characteristics (see Appendix F).

Cognitive ability. Cognitive ability was collected during the familiarization phase. Cognitive ability has been shown to positively relate to adaptive performance, thus it was included as a control variable (Bell & Kozlowski, 2008; Gully et al., 2002; Sitzmann, Bell, Kraiger, & Kanar, 2009). Participants' SAT and ACT scores were collected as a proxy for cognitive ability (see Appendix F). SAT and ACT scores are valid and suitable measures of intelligence (Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008). Thus, cognitive ability was measured using participants' ACT or converted ACT scores. SAT scores were converted into ACT composite scores using the concordance table provided on the ACT website (www.act.org/content/dam/act/unsecured/documents/ACTCollegeBoardJointStatement.pdf).

The cognitive ability variable could range from 11 to 36, in line with the minimum and maximum possible ACT scores. The present sample had a minimum ACT or converted ACT score of 13.00 and maximum of 35.00 (*M* = 25.77, *SD* = 3.50).

Regulatory focus. Trait regulatory focus was collected during the familiarization phase. Regulatory focus can be influenced by situational characteristics such that gains induce a promotion focus while losses induce a prevention focus (Florack & Hartmann, 2007). Regulatory focus was included as a control variable. During the familiarization phase, regulatory focus was measured using a modified version of Neubert, Kacmar, Carlson, Chonko, and Roberts' (2008) 18-item promotion/prevention scale (see Appendix G). The modifications changed the workplace focus to an academic focus.

After a review of regulatory focus measures, Neubert et al. (2008) was determined to be the most appropriate regulatory focus measure for the present study because the items encompass the needs (e.g., achievement/security), standards (e.g., ideal/ought), and outcomes (e.g., gain/loss) described in the definition of regulatory focus (see Appendix G). Other scales were not chosen for numerous reasons. Higgins' scales heavily subscribe to the ideal versus ought self-guide definition. These scales ask about the individual's parenting and childhood, what "really matters" to the individual, and how they feel they have performed over their entire life (Higgins, Roney, Crowe, & Hymes, 1994; Higgins et al., 2001; Semin, Higgins, Gil de Montes, Estourget, & Valencia, 2005). The heavily used scale by Lockwood, Jordan, and Kunda (2002) was not chosen because of convergent validity issues with behavioral inhibition, behavioral activation, and affect (Summerville & Roese, 2008). Another scale by Cunningham, Raye, and Johnson

(2005) was rather short, with only four items. As a result, it did not fully encompass the criterion domain because it primarily focused on the outcomes of individuals, not their needs and standards. Pennington and Roese (2003) also have a measure, but they did not provide corresponding scale development or validity information. The Pennington and Roese (2003) measure was specific to their study goals and was primarily focused on participants' performance on an exam and subsequent goals over time.

Response options for the modified Neubert et al. (2008) measure ranged from 1 (strongly disagree) to 5 (strongly agree). A sample item for prevention focus was "I focus my attention on avoiding failure at school"; a sample item for promotion focus was "I tend to take risks at school in order to achieve success." Cronbach's alpha for prevention focus was .87; Cronbach's alpha for promotion focus was .82.

Conscientiousness. Conscientiousness was collected during the familiarization phase. Conscientiousness has been shown to buffer relationships between performance and emotional outcomes (Halbesleben et al., 2009). Forty-eight items from the NEO PI-R will be used to measure conscientiousness as a control variable (Costa & McCrae, 1992a) (see Appendix H). The NEO personality inventory has been a staple of personality research since 1985 and measures the five factor model of personality (e.g., conscientiousness, openness to experience, agreeableness, extraversion, and emotional stability) (Costa & McCrae, 1985). For the conscientiousness factor, the internal consistency of the Form R is satisfactory ($\alpha = .91$) (Costa & McCrae, 1992b). Other scales such as the Big Five Inventory (BFI) (John, Donahue, & Kentle, 1991) and mini-IPIP (Donnellan, Oswald, Baird, & Lucas, 2006) were considered given that they have similar internal consistency statistics and convergent validity with the NEO inventory. However, these scales were not chosen because they contain fewer items than the NEO inventory. Since only one personality factor will be measured here, the present study has opted for 48 items to measure conscientiousness instead of three or four items (respectively), especially since certain facets of conscientiousness may affect resource investment and adaptation differently.

Specifically, Halbesleben et al. (2009) found that conscientiousness attenuated the relationship between organizational citizenship behaviors (i.e., a form of resource investment) and work interference with family (WIF) such that highly conscientious individuals had lower WIF than low conscientiousness individuals. This finding suggests that dependable and orderly individuals are more likely to be able to anticipate future resource demands and allocate resources effectively to meet those demands (Halbesleben et al., 2009). As a result, conscientiousness would likely impact resource investment patterns in the present study.

At the same time, LePine and colleagues (2000) have found negative impacts of the dependability facet of conscientiousness on adaptation. Specifically, LePine et al. (2000) found that highly conscientious individuals performed more poorly than individuals low in conscientious following changes in task demands. They suggested that the dependability facet of conscientiousness was to blame; highly dependable individuals may have imposed order or tried to find order after task demands changed, which was to their detriment, whereas individuals low in dependability were better able to perform under new task demands because they did not seek to find order or impose a methodical approach. As a result of the LePine et al. (2000) and Halbesleben et al. (2009) studies, controlling for conscientiousness is important because it could have benefits for resource investment and detriments for adaptation.

Response options for the NEO-PI-R ranged from 1 (strongly disagree) to 5 (strongly agree). A sample item for the dependability facet of conscientiousness was “I try to do jobs carefully, so they won't have to be done again". Cronbach's alpha for the 24 items of the dependability facet was .82; Cronbach's alpha for all 48 conscientiousness items was .90.

Trait affectivity. Trait affectivity was collected during the familiarization phase. Trait affectivity was included as a control variable because loss can induce negative emotions (Hobfoll, 2002). Trait affectivity was measured using the 20-item Positive and Negative Affect Schedule (PANAS) with general instructions (e.g., how the individual feels generally, not in this moment, today, or over longer time periods) (Watson, Clark, & Tellegen, 1988; see Appendix I). The PANAS has high internal consistency ($\alpha = .88$ for general positive affect; $\alpha = .87$ for general negative affect), its positive and negative factors are discriminately different, and there is evidence of convergent and discriminant validity (Watson et al., 1988).

Instructions given to participants were "Indicate to what extent you generally feel this way, that is, how you feel on the average." Response options ranged from 1 (very slightly or not at all) to 5 (extremely). Sample items for positive affect are "Proud" and "Inspired"; sample items for negative affect are "Distressed" and "Nervous". Cronbach's alpha for positive affect was .85; Cronbach's alpha for negative affect was .84.

Goal orientation. Trait goal orientation was collected during the familiarization phase. Vandewalle's (1997) 13-item measure of trait goal orientation was used to collect descriptive data about the participants' goal orientation. Response options ranged from 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alphas were as follows: trait mastery ($\alpha = .83$), trait performance prove ($\alpha = .77$), trait performance avoid ($\alpha = .82$). For more information about the goal orientation measure, see Appendix K.

Goal choice. In order to determine how many participants wanted to strive toward the cash incentive, a short questionnaire about goal choice was included to provide descriptive data about the sample. Participants could choose from the following goals: (1) cash incentive, (2) photo in the psychology building, (3) both, or (4) neither. The most popular choice was to strive toward the cash incentive (54.5%), followed by both cash and photo (35.4%), neither (9.4%), and then just the photo (0.7%). Regardless of the goal that participants chose, they received research credit that contributed to their course grade. For more information about the goal choice measure, see Appendix K.

Goal commitment. In order to determine how committed participants were to the goal they chose, Hollenbeck, Williams, and Klein's (1989) 5-item goal commitment scale was used. Goal commitment was measured for descriptive purposes. A sample item is "It's hard to take this goal seriously". Response options ranged from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was .79. For more information about the goal commitment scale, see Appendix K.

Emotion regulation manipulation checks. Participants in the reappraisal conditions received questionnaires regarding how effective or ineffective they believed the reappraisal instructions to be in regulating their emotions. Participants generally believed that the reappraisal instructions were effective in regulating their emotions. The effectiveness scale ranged from 1 (ineffective) to 3 (effective). Of the seven emotion regulation strategies, participants stated that the instructions to remain calm were most effective (M = 2.77, SD = .53) and that the instructions to decrease negative emotions were the least effective (M = 2.44, SD = .73).

Participants also responded to a scale asking which instructions they would be more or least likely to use to regulate their emotions throughout the remainder of the simulation. Responses ranged from 1 (definitely will not use) to 5 (definitely will use). Participants in the reappraisal conditions endorsed the instructions to remain calm as the most popular choice to use in the remainder of the simulation (*M* = 3.85, *SD* = 1.09) and the least popular choice was decreasing negative emotions (*M* = 3.36, *SD* = 1.15).

Declarative and strategic knowledge. A declarative and strategic knowledge assessment was given to participants to ensure that they had learned the simulation and knew how to invest alterant resources and gain points. Average scores on the knowledge assessment were used to determine the recipients of a portion of the cash incentives. Declarative and strategic knowledge were measured using Bell and Kozlowski's (2008) 22-item measure, as this is the most popular, internally consistent, and valid measure for the TANDEM simulation (see Appendix J). The data were coded dichotomously such that 0 = incorrect and 1 = correct. The Kuder-Richardson 20 test (KR20), a special case of Cronbach's alpha, was used to assess internal consistency. The procedures for the KR20 test are the same in SPSS as the procedures for calculating Cronbach's alpha and the generally acceptable cutoff is .70. The KR20s were .58 for the declarative items (time 1), .52 for the strategic items (time 1), .64 for the declarative items (time 2), and .52 for the strategic items (time 2). Overall, the inter-item correlations for each set of items were low (i.e., below .30), but removing any one item did not improve the KR-20s. One reason for why the internal consistency measures are so low may be due to the use of both "should" and "would" in the instructions for the items. There is research evidence that the use of "would" often produces more favorable characteristics than items that use "should," and that replacing "would" with "should" for the same item results in low correlations (Ployhart & Ehrhart, 2003). The current knowledge assessment uses both terms throughout the test; thus, future work should validate the assessment using only the term "would" in the instructions.

Resource investment. Resource investment was operationalized as a composite of three strategic behaviors: (1) number of zoom outs, (2) number of marker targets hooked, and (3) number of high-priority outer perimeter target engagements. The nature of declarative and strategic knowledge in the experimental paradigm helped how resource investment should be operationalized.

Originally, both basic/declarative and strategic behaviors were to be included in the resource investment operationalization; however, principal component analysis with varimax rotation showed that the basic behaviors loaded onto one component, and the strategic behaviors loaded onto another component. At the conclusion of this analysis, it was decided that strategic behaviors would be more discriminating than basic behaviors in assessing the extent of an individual's resource investment. In order to operate the simulation, individuals need to know the basic declarative knowledge and skills required to gain points (e.g., how to click on targets, how to make class, type, and intent decisions). Once participants had completed the first part of the study, they had engaged in nine 4-minute trials where they had time to practice their skills and apply their knowledge. The amount of practice was evident in the scores on the knowledge assessment. By the end of the first part of the study, participants had learned the declarative knowledge and skills required to operate the simulation; the mean declarative knowledge score was 74.6% (SD = 18.98). By the start of the resource investment period on the second day of the study, the mean declarative knowledge score had significantly increased to 76.9% (SD = 19.48; $t(424) = -3.43$, $p < .01$). The distribution of the declarative knowledge assessment scores shows that most participants had scored above 50%. Therefore, most participants knew the basic components of the task and how to earn points during the simulation.

To excel in the simulation and have a chance at winning the cash incentives, however, participants needed to use strategic knowledge and skills (e.g., monitor perimeters to prevent targets from crossing them, and subsequently losing points). Engaging in these strategic behaviors is evident when participants have higher performance scores – these participants would have zoomed out to the outer perimeter and have eliminated targets that would have caused them to lose points. Participants must zoom out at some point in order to increase their scores, otherwise they would only be able to engage a fixed number of targets that show up on the default screen. To learn how to zoom out and engage targets at the outer perimeter, many more alterant resources are required to be invested into the task. Participants needed to read different sections of the instruction manual, engage in those strategic behaviors in the simulation and make tradeoffs between the perimeters, and interpret different sections of their performance feedback. For instance, one of the performance feedback sections provides information about how many marker targets the participant hooked (i.e., an indicator that they engaged targets at the outer perimeter). Anecdotally, during the feedback portions, the experimenter often received questions from participants about what a marker target even was, whereby the experimenter would direct him or her to the corresponding section in the instruction manual. This is to say that learning about the strategic components of the simulation was not obvious and required extra alterant resource investment on the part of the participant to engage in these behaviors.

Therefore, it was decided that engaging in strategic behaviors, such as zooming out, hooking marker targets, and engaging high-priority outer perimeter targets, would indicate that the participant had invested alterant resources into learning the simulation. Other candidates were discussed, such as the amount of time spent reading the instruction manual and performance feedback pages, but these behaviors decreased over time as participants became more familiar with the simulation and the topics discussed in these sections. In addition, this operationalization had issues in that it would not be possible to determine whether or not the participant actually spent time reading and digesting the material on the screen. It is entirely possible that the data could show a participant reading about a topic for a long duration, but in actuality, the participant could be off-task waiting for the 2.5 minutes to run out before proceeding onto the next trial.

Another candidate was the amount of time spent holding down the right mouse button to receive information about the target (as operationalized in the pilot study; see Appendix A). The simulation tracks how long participants hold down the menus; doing so provides the participant with the information he or she needs to make a type, class, or intent decision. However, this variable had similar weaknesses to the instruction manual and feedback. When participants became skilled at the game, they did not need to hold down the menus for as long because they were familiar with the information they should receive and where that information fits into their decision-making process. Overall, the aforementioned strategic behaviors should have continued to increase over time if the participant was investing resources as they strived toward their goal. Basic behaviors (i.e., decision-making regarding a target) were necessary to receive any points at all in the simulation, and time variables regarding the instruction manual, performance feedback pages, and menu querying would decrease over time once participants' skills were practiced.

To determine if the three strategic variables to be used for the resource investment composite loaded onto one component, principal component analysis was conducted using varimax rotation. Only one component was extracted such that the one component accounted for 75.5% of the variance; all loadings were in excess of .82. To create the composite, each variable was standardized, then multiplied by its component score, and summed up. There were nine repeated measures of this variable, corresponding to the nine instances of resource investment trials.

Average resource investment. Following the logic above, average resource investment was operationalized as the average of the resource investment composites. These composites consisted of the number of zoom outs, marker targets hooked, and high-priority outer perimeter targets hooked during the first three resource investment trials (trials 1-3), the second three resource investment trials (trials 4-6), and the final three resource investment trials (trials 7-9). The average resource investment variables were created to analyze the path analysis model more easily at the discontinuous shift points (following trial 3 and trial 6).

On-task cognition. In order to determine if participants in the reappraisal conditions were more off-task than those in the adaptive guidance conditions, a measure of on-task cognition was included. Bell's (1999) eight item measure of on-task cognition for the TANDEM simulation was included. A sample item is "I daydreamed while doing the task". Response options ranged from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha for the eight item measure was .64. Item-total statistics showed that the fifth item, "I took mental breaks during the task," was hurting the internal consistency. When this item was dropped, the Cronbach's alpha increased to .72. For descriptive purposes throughout the rest of the analysis, a seven item mean was computed without the "I took mental breaks…" item included. The full measure is provided in Appendix K.

Adaptation. In line with the learning process performance change approach, adaptation was operationalized according to prior research (cf. Baard et al., 2014). Adaptation occurred in a single trial followed by a total of 19 learning and resource investment trials. The first study day required participants to learn the task across nine trials. At the beginning of the second study day, participants were provided with one trial where they could read the instruction manual and practice their skills after the 1-2 day hiatus. Then, participants continued to use their knowledge and skills in nine resource investment trials where they could accrue points to help them achieve their goals.

Following this multi-trial learning and practice phase, participants were presented with a single adaptation trial. Adaptation was operationalized as changes in behavior to align with novel, complex demands as opposed to behavior aligned with routine demands (as in the learning and practice phase). Individuals adapted if they yielded more superior behavioral performance relative to others who did not align behavior with the new task environment. The task demands in the adaptation trial were different from the routine demands in the learning and practice phases such that they were more difficult, complex, and longer in duration with increased component, coordinative, and dynamic complexity (Wood, 1986). This operationalization is consistent with past research using the learning process performance change approach (e.g., Bell and Kozlowski, 2002b; Bell & Kozlowski, 2008; Bell & Kozlowski, 2010; Chen et al., 2005; DeRue, Hollenbeck, Johnson, Ilgen, & Jundt, 2008; Ford et al., 1998; Keith & Frese, 2005; Kozlowski & Bell, 2006; Kozlowski, Gully, et al., 2001; Marks, Zaccaro, & Mathieu, 2000; Moon et al., 2004; Scaduto, Lindsay, & Chiaburu, 2008; Zaccaro, Banks, Kiechel-Koles, Kemp, & Bader, 2009). Specifically, adaptation was operationalized similarly to Bell (1999). A standardized composite was computed consisting of number of zoom outs, number of marker targets hooked, and number of high-priority outer perimeter target engagements. Therefore, the present operationalization defined performance as behaviors, not outcomes.

The composite varied from the resource investment operationalization in that the context was substantially different. The resource investment trials had a total of 30 targets to execute. Four of these targets “popped up” such that they were not initially shown on screen; they appeared on screen every thirty seconds. Only one outer perimeter target was considered high-priority in the resource investment trials; that is, only one outer perimeter target was programmed to cross the outer perimeter. The adaptation trial increased component complexity by doubling the total number of targets from thirty to sixty. Coordinative complexity was increased in the adaptation trial by changing the speeds of the targets and their proximity to the perimeters such that participants were required to perform zooming out, hooking marker targets, and making speed queries to identify high priority contacts, more frequently than in the resource investment trials in order to maintain similar levels of performance. Finally, dynamic complexity was increased in the adaptation trial by increasing the number of pop-up targets. Specifically, two of these pop-up targets were high-priority such that if participants did not execute these two pop-up targets, they would lose points due to perimeter crossings. The amount of points that were lost due to perimeter crossings was substantially higher in the adaptation trial; inner perimeter intrusions increased from -10 points to -175 points and outer perimeter intrusions increased from -10 points to -125 points. In order to allow participants to learn the new task demands, the adaptation trial increased in duration by six additional minutes.

Therefore, in order to adapt, participants needed to change their cognition and behavior in response to novel task demands. To mitigate a decline in point values from the resource investment trials, they needed to learn the new task demands and increase the frequency of strategic behaviors (i.e., speed queries, zoom outs, hooking marker targets, and executing high-priority targets). In line with the learning process performance change approach, this process was not measured; rather, only the output of the adaptation trial was observed in terms of the behavioral composite. Therefore, for hypothesis testing, the composite from the adaptation trial was compared to the composites from the resource investment trials such that a positive association was expected.

CHAPTER 4: RESULTS

Descriptive statistics and correlations

Descriptive statistics and bivariate correlations are presented in Table 5. Cronbach's alphas are reported on the diagonal where appropriate. Note that on-task cognition is listed twice; first with a mean of all original eight items and second with a mean of seven items due to internal consistency concerns.

The sample was highly conscientious (M = 3.68, SD = .38), and specifically dependable (M = 3.64, SD = .40); high means for conscientiousness and its dependability facet may be due to the early data collection period (January to March 2018) when some students are keen to finish their research requirements at the start of the semester. The kurtosis of the means of the regulatory foci was high (Kurt[prevention] = 3.10; Kurt[promotion] = 2.28). The distribution for prevention focus was leptokurtic such that most participants responded above the midpoint of 3.00. The sample was particularly prevention-focused, which may also be associated with the early time in the semester in which the data were collected (i.e., these students participated in research because they felt obligated and wanted to be secure in their course grades). In support of this idea, prevention focus was positively correlated with conscientiousness (r = .41, p < .01). In addition, the sample was committed to the goals they chose (M = 3.71, SD = .63), which was again correlated with the conscientiousness of the sample (r = .24, p < .01). The sample was generally on-task (M = 3.78, SD = .62), which was positively associated with conscientiousness (r = .26, p < .01). Altogether, the participants were conscientious, which was positively associated with other individual differences related to goal striving.

The scores on the knowledge assessment differed from one day to the next. The distributions were within the normal limits of skewness and kurtosis, and the mean did increase

Table 5. Descriptive statistics and correlations for study variables.

		Min.	Max.	M	SD	1	2	3	4	5	6	7	8
1.	Cognitive ability	13.00	35.00	25.77	3.50								
2.	Conscientiousness	2.48	4.71	3.68	.38	.04	(α = .90)						
3.	Promotion focus	1.00	5.00	3.98	.51	.03	.41**	(α = .82)					
4.	Prevention focus	1.00	5.00	4.31	.52	.05	.41**	.56**	(α = .87)				
5.	Positive Affect	1.50	5.00	3.53	.63	-.00	.47**	.39**	.25**	(α = .85)			
6.	Negative Affect	1.00	4.50	2.03	.64	.03	-.22**	-.06	-.03	-.06	(α = .84)		
7.	Goal commitment	1.80	5.00	3.71	.63	-.06	.24**	.18**	.11*	.23**	-.16**	(α = .79)	
8.	Knowledge (Time 1)	9.09	100.00	63.67	15.54	.36**	.10*	-.07	.02	-.01	-.06	.10*	(α = .68)
9.	Knowledge (Time 2)	9.09	95.45	66.35	15.43	.36**	.12*	-.03	-.01	-.01	-.08	.13**	.76**
10.	On task cognition	1.88	5.00	3.67	.56	.00	.23**	.10*	.17**	.15**	-.12*	.28**	.15**
11.	On task cognition (Reduced to 7 items)	1.57	5.00	3.78	.62	-.01	.26**	.12*	.18**	.18**	-.14**	.30**	.16**
12.	Mean zoom outs[2]	0.00	45.56	6.30	5.86	.10	.00	-.09	-.06	.03	.00	.12*	.28**
13.	Mean marker hooks[3]	0.00	4.00	1.37	1.32	.07	.01	-.11*	-.08	.00	.02	.10*	.30**
14.	Mean outer hooks[4]	0.00	1.00	.39	.40	.15**	.08	-.09	-.03	.04	-.01	.15**	.40**
15.	Mean RI (11-13)	-.94	3.01	.05	.94	.15**	.05	-.13**	-.08	.02	-.01	.14**	.40**
16.	Mean RI (14-16)	-.97	3.17	.04	.95	.09	.03	-.10*	-.08	.03	.00	.13**	.33**
17.	Mean RI (17-19)	-1.03	3.34	.04	.92	.10*	.01	-.08	-.02	.03	.02	.12*	.31**
18.	Adaptation	-1.24	2.97	.05	.96	.15**	.01	-.10*	-.04	.02	.04	.09	.40**

		9	10	11	12	13	14	15	16	17
9.	Knowledge (Time 2)	(α = .69)								
10.	On task cognition	.13**	(α = .62)							
11.	On task cognition (Reduced to 7 items)	.14**	.96**	(α = .72)						
12.	Mean zoom outs[5]	.27**	.16**	.15**						
13.	Mean marker hooks[6]	.32**	.24**	.23**	.64**					
14.	Mean outer hooks[7]	.42**	.25**	.25**	.71**	.84**				
15.	Mean RI (11-13)	.41**	.24**	.25**	.83**	.86**	.90**			
16.	Mean RI (14-16)	.34**	.23**	.22**	.85**	.90**	.92**	.92**		
17.	Mean RI (17-19)	.33**	.22**	.21**	.82**	.88**	.90**	.85**	.93**	
18.	Adaptation	.39**	.20**	.20**	.73**	.77**	.80**	.80**	.83**	.82**

[2] Mean number of zoom outs (trials 1-9)
[3] Mean number of marker targets hooked (trials 1-9)
[4] Mean number of high priority outer perimeter targets hooked for trials 1-9
[5] Mean number of zoom outs (trials 1-9)
[6] Mean number of marker targets hooked (trials 1-9)
[7] Mean number of high priority outer perimeter targets hooked for trials 1-9

from the first day to the second day. A paired samples t-test showed that scores on the knowledge assessment significantly differed from one time point to the next such that second day knowledge assessment scores were significantly higher than first day knowledge assessment scores (M_{D1} = 64.67, SD_{D1} = 15.54; M_{D2} = 66.35, SD_{D2} = 15.43, $t(424) = -5.18$, $p < .01$). The results of the paired samples t-test provide evidence that participants learned about the simulation from one day to the next.

In terms of behavior, there was variance in the extent to which participants engaged in strategic activity. The distribution of the mean number of zoom outs over the nine trials was positively skewed ($\gamma = 2.11$) and leptokurtic (Kurt[mean zoom outs] = 7.79). On average, 24.6% of participants either did not zoom out or zoomed out less than two times. Similarly, 17.1% of participants did not hook any marker targets across the nine trials, but skewness and kurtosis were in the normal limits. Finally, 39.0% of participants did not engage a high-priority outer perimeter target. These three variables were positively associated with knowledge of the simulation on the first day ($r_{\text{zoom}} = .28$, $p < .01$; $r_{\text{marker}} = .30$, $p < .01$; $r_{\text{outer}} = .40$, $p < .01$), goal commitment ($r_{\text{zoom}} = .12$, $p < .05$; $r_{\text{marker}} = .10$, $p < .05$; $r_{\text{outer}} = .15$, $p < .01$), and on-task cognition ($r_{\text{zoom}} = .15$, $p < .01$; $r_{\text{marker}} = .23$, $p < .01$; $r_{\text{outer}} = .25$, $p < .01$). In addition, the mean of high-priority outer perimeter targets hooked was weakly, but positively associated with cognitive ability ($r = .15$, $p < .01$). Overall, participants tended to engage in these strategic resource investment behaviors on average if they were paying attention to the task, were committed to their goal, and had the necessary knowledge to do so.

The means of the repeated measures are found in Figure 9. The gain conditions (adaptive guidance/gain, or AGG; reappraisal/gain, or RG) are shown in shades of green (AGG = dark green, RG = lime green); the loss conditions (adaptive guidance/loss, or AGL; reappraisal/loss, or RL) are shown in shades of red (AGL = dark red, RL = pink). Two distinct patterns emerge in the means of the resource investment composite over time (top left panel). Following the second trial, means in the AGG and RL conditions decrease whereas means in the AGL and RG conditions increase. These means stay relatively stable until the eighth trial where the means of adaptive guidance conditions sharply decrease and the means of the reappraisal conditions sharply increase. The steep change in resource investment is highly influenced from the number of marker targets hooked during the eighth trial (bottom left panel). Overall, the means of the resource investment composite over time indicate that there may be an interaction between the resource intervention and finite resource manipulations.

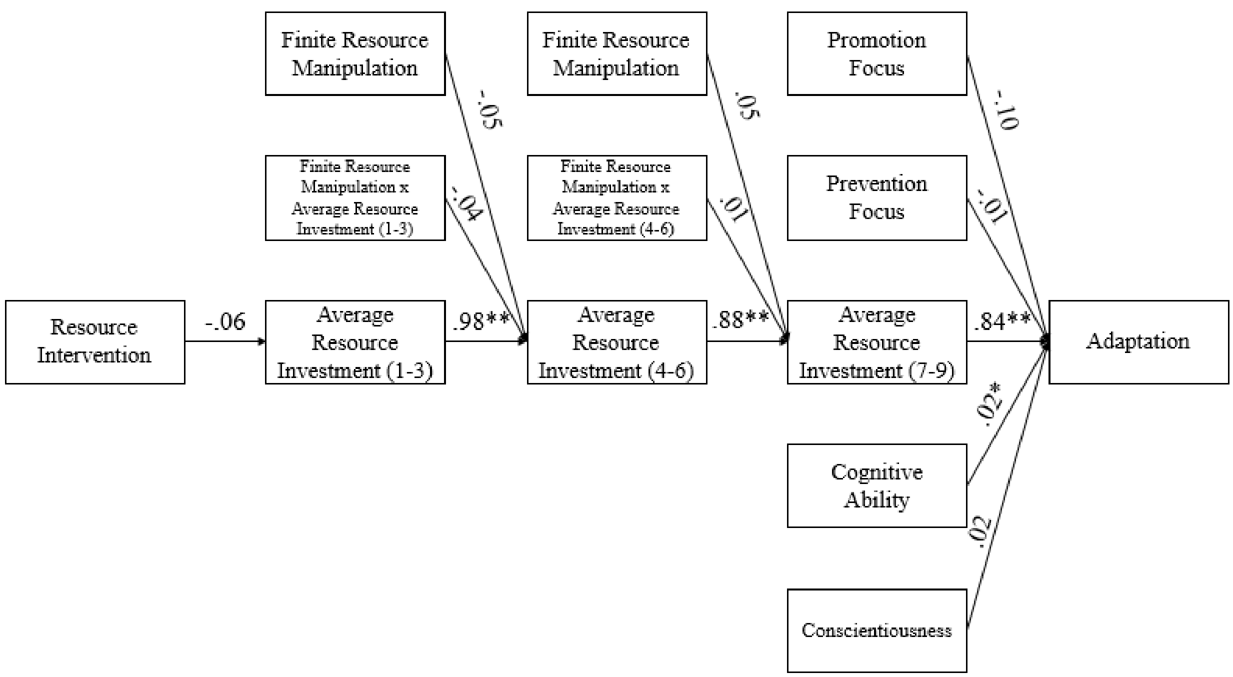
Figure 9. Means of the resource investment composite and its components over time.

Note. AGG = adaptive guidance/gain, AGL = adaptive guidance/loss, RG = reappraisal/gain, RL = reappraisal/loss.

A priori hypothesis testing

Path analysis. The path model shown in Figure 10 was analyzed using maximum likelihood estimation in Mplus version 7.4 (Muthen & Muthen, 1998-2017). Cognitive ability, trait promotion focus, trait prevention focus, and conscientiousness were included in the model as control variables. The global fit indices showed that the model did not fit well (χ^2 = 1901.65, df = 26, p < .01; RMSEA = .43; CFI = .50; TLI = .27; SRMR = .27). Examination of the modification indices showed that adding reciprocal paths would have improved model fit (e.g., average resource investment from trials 4-6 predicting average resource investment from trials 1-3), but these paths did not make sense given the experimental design. Overall, the modification indices showed evidence of multicollinearity between the resource investment averages.

Figure 10. A priori path model.



Note. The variables labeled “Finite Resource Manipulation x Average Resource Investment” are products such that the “x” is a multiplication sign. *p < .05, *p < .01.

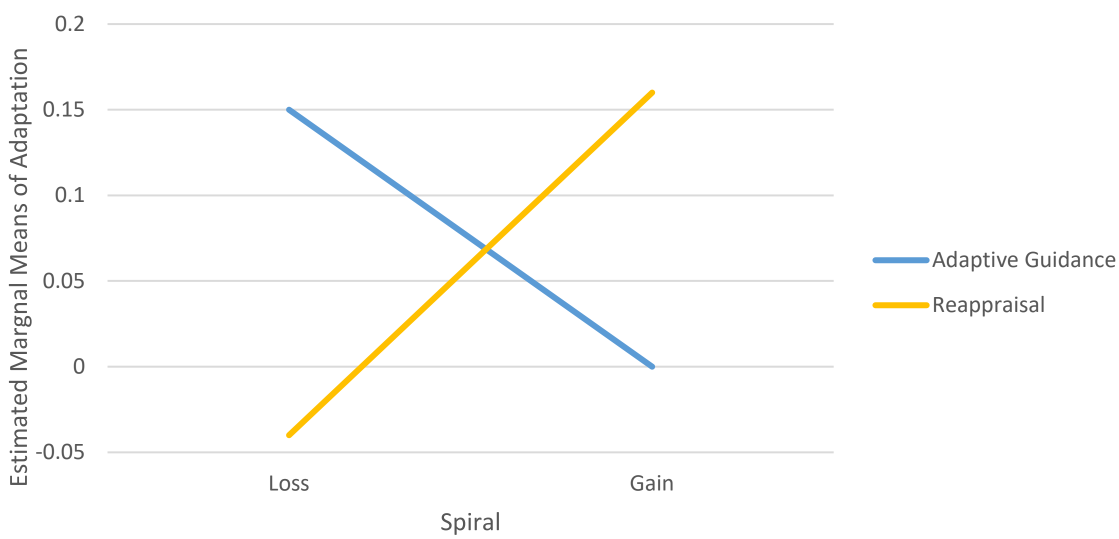
The path model provided evidence for a number of a priori hypotheses. Hypothesis 4 posited that average resource investment (trials 1-3) would be positively related to average resource investment (trials 4-6); this path was positive and significant ($\beta = .98$, $p < .01$). Hypothesis 4 also posited that average resource investment (trials 4-6) would be positively related to average resource investment (trials 7-9); this path was positive and significant ($\beta = .88$, $p < .01$). Hypothesis 5 posited that average resource investment (trials 7-9) would be positively related to adaptation; this path was positive and significant ($\beta = .84$, $p < .01$). Given the high degree of multicollinearity between these variables, the absolute values of these path coefficients are large. These variables are path dependent, or autoregressive, which may have been better handled using a cross-lagged model (Selig & Little, 2012).

A number of hypotheses did not find support. Hypothesis 3 posited that individuals who received adaptive guidance would invest more resource investment in the first three trials than individuals who received reappraisal; the path coefficient was not significant ($\gamma = -.06$, $p = .55$). Hypothesis 6 posited that subsequent resource changes would moderate the positive relationship between average resource investment (trials 1-3) to average resource investment (trials 4-6). There was no evidence for this hypothesis; the path coefficients from the moderator and interaction term were not significant ($\gamma = -.05$, $p = .24$; $\gamma_{int} = -.04$, $p_{int} = .41$). Similarly, hypothesis 7 posited that finite resource manipulations would moderate the positive relationship between average resource investment (trials 4-6) to average resource investment (trials 7-9). There was no evidence for this hypothesis; the path coefficients from the moderator and interaction term were not significant ($\gamma = .05$, $p = .17$; $\gamma_{int} = .01$, $p_{int} = .76$).

Hypothesis 9 posited that individuals who experienced a loss spiral would be less likely to adapt than individuals who had experienced a gain spiral. A 2 (adaptive guidance v.

reappraisal) by 2 (gain spiral v. loss spiral) between-subjects ANOVA was conducted on the adaptation variable. The main effect of the resource intervention (adaptive guidance v. reappraisal) was not significant (F = .02, p = .90). Similarly, the main effect of the finite resource manipulations was not significant (F = .05, p = .83). However, the interaction between resource intervention and the finite resource manipulations was marginally significant (F = 3.43, p = .07). Figure 11 shows the interaction.

Figure 11. Interaction between resource intervention and finite resource manipulations on adaptation.



Note. Cognitive ability and promotion focus were included as covariates.

Piecewise growth modeling. Hypothesis 8 was tested using piecewise growth modeling with known classes (i.e., the experimental conditions) in Mplus version 7.4 (Muthen & Muthen, 1998-2017). Despite numerous attempts to improve the Mplus output, a warning message continued to state that the psi matrix was not positive definite. When the model was analyzed without specifying known classes, global fit indices showed that the model fit well ($\chi 2$ = 150.81, df = 40, $p < .01$; CFI = .98; TLI = .97; SRMR = .03); however, the same warning was produced regarding a non-positive definite psi matrix.

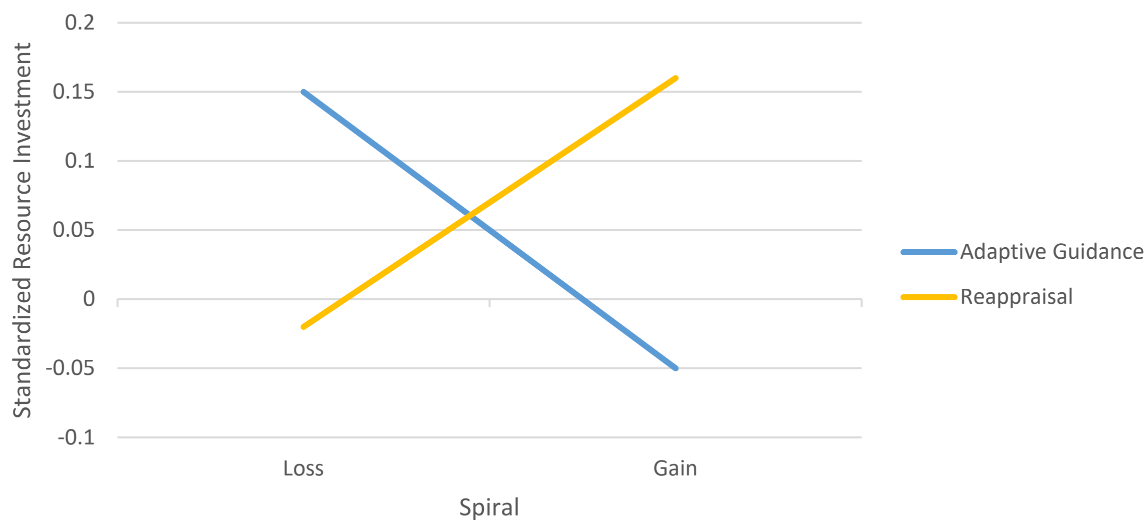
Post-hoc analyses

Mixed repeated measures ANOVA. To follow up on the results from the piecewise growth model, a mixed repeated measures ANOVA was conducted. The necessary assumptions were all met except for the assumptions of sphericity ($W = .33$, $p < .01$) and normality. The nine studentized residuals for the dependent variables were determined to be non-normal from the Shapiro-Wilk test ($.78 < W < .96$, $p < .01$). Violating the sphericity and normality assumptions increases Type I error rate, but there are corrections and methods to control Type I error. To control Type I errors from violating the sphericity assumption, the Greenhouse-Geisser correction estimates the epsilon statistic in order to correct the degrees of freedom for the F-distribution. The Greenhouse-Geisser correction is available in the SPSS statistical package. To control Type I errors from violating the normality assumption, bootstrapping methods can be used to determine parameter estimates. The bootstrap-F method is more robust and effective in controlling Type I error than other methods (Berkovits, Hancock, & Nevitt, 2000).

Within-subjects effects were marginally significant for resource investment over time ($F = 1.85$, $p = .09$). Within-subjects effects were marginally significant for the interaction between resource investment and cognitive ability ($F = 1.99$, $p = .07$). Within-subjects effects were significant for the interaction between resource investment and resource intervention ($F = 8.80$, $p < .01$). In addition, the interaction between resource investment and finite resource manipulations was marginally significant ($F = 2.01$, $p = .07$). The three-way interaction between resource investment, resource intervention, and finite resource manipulations was not significant ($F = 1.43$, $p = .23$).

Between-subjects, the main effect of resource intervention on resource investment was not significant ($F = .05$, $p = .82$); the main effect of finite resource manipulations on resource investment was also not significant ($F = .02$, $p = .89$). However, the interaction between resource intervention and finite resource manipulations was significant ($F = 4.30$, $p = .04$). The interaction is shown in Figure 12. The parameter estimates for the interaction between resource intervention and finite resource manipulations were significant for the third trial ($B = -.50$, $p = .02$, 95% CI [-.91, -.10]), sixth trial ($B = -.41$, $p = .04$, 95% CI [-.80, -.02]), seventh trial ($B = -.50$, $p = .01$, 95% CI [-.89, -.11]), and eighth trial ($B = -.41$, $p = .03$, 95% CI [-.78, -.04]).

Figure 12. Interaction between resource intervention and finite resource manipulations on resource investment.



Note. Cognitive ability was included as a covariate.

Latent class analysis. As an exploratory analysis, latent class analysis was used to determine if the underlying latent classes corresponded to the randomly assigned conditions. Mplus version 7.4 was used to conduct the latent class analysis with maximum likelihood estimation (Muthen & Muthen, 1998-2017). Figure 13 shows the mean resource investment trajectories over time for the four different classes.

Figure 13. Resource investment over time by latent class.

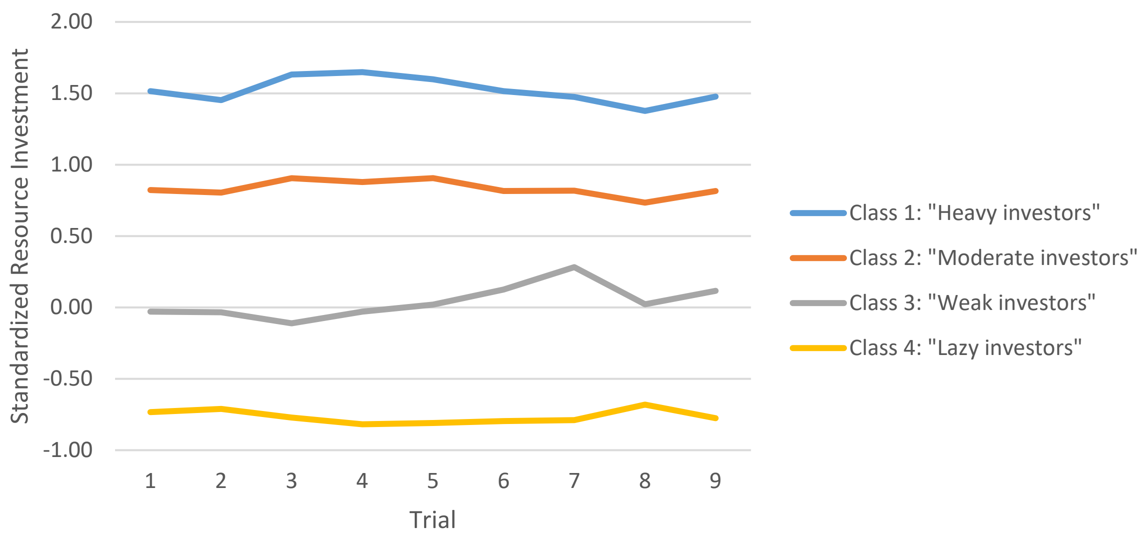


Figure 13 shows that the classes are distributed according to mean levels of resource investment. Class 1 has the highest mean resource investment, known as "heavy investors"; Class 2 has the second highest mean resource investment, known as "moderate investors"; Class 3 has the second lowest mean resource investment "weak investors"; Class 4 has the lowest mean resource investment, known as "lazy investors". The breakdown of the individual differences of these four classes are shown in Table 6.

Table 6 shows that the differentiating characteristics across these classes are on-task cognition, knowledge of the simulation, and goal commitment. Post-hoc testing using Tukey's HSD indicated that there were significant mean differences on (1) on-task cognition such that lazy investors had lower on-task cognition than moderate and heavy investors, (2) knowledge on day 1 such that lazy investors had lower knowledge scores than moderate and heavy investors, and weak investors had lower knowledge scores than moderate investors, (3) knowledge on day 2 such that lazy and weak investors had lower knowledge scores than moderate and heavy investors, and (4) goal commitment such that lazy investors had lower goal commitment than heavy investors. These results harken back to the patterns seen in the bivariate correlations (see Table 5); those who invested resources into the task tended to be on-task, knowledgeable about the simulation, and committed to their goals.

Table 6. Descriptive statistics of individual differences by latent class.

	Class 4 (49.3%) "Lazy investors"		**Class 3 (11.7%) "Weak investors"**		**Class 2 (25.8%) "Moderate investors"**		**Class 1 (13.1%) "Heavy investors"**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Cognitive ability	25.52	3.57	25.27	3.85	26.07	3.33	26.55	3.20
Conscientiousness	3.67	.37	3.67	.41	3.69	.40	3.72	.33
Prevention focus	4.35	.49	4.26	.52	4.26	.60	4.29	.42
Promotion focus	4.05	.48	3.88	.56	3.92	.57	3.95	.47
Positive affect	3.52	.65	3.52	.66	3.52	.56	3.64	.62
Negative affect	2.03	.68	1.97	.60	2.09	.62	1.99	.60
On-task cognition	3.65[a]	.66	3.73[ab]	.65	3.92[b]	.50	4.02[b]	.53
Trait mastery	3.96	.58	3.78	.53	3.99	.57	4.03	.60
Trait performance prove	3.48	.81	3.28	.89	3.40	.75	3.42	.73
Trait performance avoid	2.92	.77	2.65	.70	2.80	.83	2.83	.77
Knowledge (Day 1)	58.42[a]	15.15	62.64[ac]	15.43	71.12[b]	12.89	69.75[bc]	14.08
Knowledge (Day 2)	61.30[a]	16.31	63.45[a]	16.25	73.60[b]	10.71	73.62[b]	10.12
Goal commitment	3.64[a]	.65	3.72[ab]	.69	3.75[ab]	.57	3.92[b]	.59

Note. On-task cognition is comprised of seven items instead of the original eight items. A, B, and C denote significant mean differences between groups based on post-hoc testing using Tukey's HSD. Class 3 was marginally different (p = .07) from Class 1 for on-task cognition; Class 3 was marginally different (p = .06) from Class 1 for knowledge on Day 1.

Discontinuous growth modeling. Given the nature of the experimental design, discontinuous growth modeling was used post-hoc to determine if there were slope differences from one time point to another. Procedures from Bliese and Lang (2016) were used to a discontinuous growth model with two discontinuities. The model was specified with dummy-coded time-related covariates. The discontinuities, or transitions (TRANS), were specified in the model as the gains or losses that occurred following the third resource investment trial and the sixth resource investment trial. TRANS1 is a dummy-coded value for the first transition period (trials 4-9) versus the initial period (trials 1-3); TRANS2 is a dummy-coded value for the second transition (trials 6-9) versus the initial period (trials 1-5). TIME is an incrementing variable that increases by 1 with each trial. Variables RECOV1 and RECOV2 represent the recovery slopes based on TIME such that RECOV1 is fixed at 0, then increments by 1 starting at the first transition, and is then fixed to zero at the start of the second transition; RECOV2 is fixed at 0 and then increments by 1 starting at the second transition. Table 7 shows the estimated values. The values are interpreted according to expected values and observed values, but there are no differences between the different variables; these variable estimates indicate that there was no significant discontinuous change.

Table 7. Estimated values from the discontinuous growth model.

	Estimate
(Intercept)	.05
TIME	-.00
TRANS1	-.01
TRANS2	-.01
(Intercept)	.05
TIME	.00
TRANS1	-.01
TRANS2	-.02
RECOV1	-.01
RECOV2	-.01
(Intercept)	.05
TIME.A	.00
TRANS1	-.02
TRANS2	-.01
RECOV1	-.00
RECOV2	-.01

ANOVA on on-task cognition. An exploratory 2 (adaptive guidance v. reappraisal) by 2 (gain spiral v. loss spiral) between-subjects ANOVA was conducted on on-task cognition. It was expected that participants in the reappraisal conditions would have lower scores on on-task cognition than participants in the adaptive guidance conditions. The main effect of resource intervention on on-task cognition was significant ($F = 4.10$, $p = .04$), but the main effect of finite resource manipulations on on-task cognition was not significant ($F = .62$, $p = .43$). In addition, the interaction between resource intervention and finite resource manipulations was not significant ($F = 1.62$, $p = .20$). Contrary to expectations, participants in the reappraisal conditions had significantly higher on-task cognition ($M_{\mathrm{R}} = 3.84$, $SD_{\mathrm{R}} = .59$, $M_{\mathrm{AG}} = 3.71$, $SD_{\mathrm{AG}} = .65$). It is possible that the reappraisal groups were more on-task than the adaptive guidance groups because they had to think more critically about how their performance feedback was associated with their emotions and psychological well-being. The adaptive guidance groups were not encouraged to think critically about their behavior; it only instructed them on what to focus on in the next trial.

CHAPTER 5: DISCUSSION

The present study had three aims. The first aim was to integrate COR theory with self-regulation and adaptation research in order to show that the self-regulatory processes that contribute to adaptation are inherently resource-based (summarized in Table 3). By making these connections, the tenets of COR theory were tested by examining the between-subjects effects of resource spirals on adaptation. Adaptation was defined as an event-based change in performance following changes in task demands. Task demands changed according to Wood's (1986) taxonomy where participants had to deal with many more targets and pop-up targets than the previous trials, and lost more points for perimeter intrusions. There was partial support for the hypothesis that individuals who received finite resource losses would be less likely to adapt than those who received finite gains; the present study found evidence for a marginally significant interaction between resource interventions and resource spirals on adaptation. Marginally, the adaptive guidance/loss and reappraisal/gain groups invested more alterant resources than the reappraisal/loss and adaptive guidance/gain groups.

The present study also added to the understanding of COR theory by experimentally manipulating gain and loss spirals through finite resource manipulations. Historically, studies that test COR theory employ survey methods over time (e.g., Makikangas et al., 2010). Longitudinal survey methods capture perceptions of gain and loss over time, but COR theory posits changes in actual resource pools and resource investment, not perceived resource pools and resource investment. The present study tested COR theory by longitudinally studying an objective measure of alterant resource investment. In addition, the present study objectively manipulated individuals' finite resource pools (i.e., points that could be converted into cash). Experimental control allows the present study to clearly show how gain and loss spirals are associated with individuals' resource investment. Specifically, using mixed repeated measures ANOVA, the present study found a significant between-subjects interaction between resource intervention and resource spiral on resource investment. As shown in Figure 9, a pattern develops whereby the reappraisal/gain and adaptive guidance/loss groups have higher mean resource investment than the reappraisal/loss and adaptive guidance/gain conditions.

The interactions described above can be interpreted by discussing the resource sensitivities of Systems 1 and 2. Prospect theory defines loss aversion as the intuition that individuals are more sensitive to losing resources, primarily finite resources, than they are to gaining resources (Kahneman & Tversky, 1984). Prospect theory assumes that individuals think in terms of changes rather than absolute states such that subjective value of a finite prospect is evaluated on the change in one's resources, not the absolute value of one's resources (Kahneman & Tversky, 1984). The value function of a prospect, then, has a much steeper slope for losses than gains. Kahneman (2011) contends that loss aversion is a System 1 characteristic. Recall that System 1 is characterized as the automatic, heuristic decision-making information processing mode. Kahneman (2011) would posit that System 1 is more sensitive to loss than System 2 because of the intuitive nature by which System 1 evaluates finite prospects. System 2, on the other hand, is the effortful mode of processing that requires attention and motivation to operate, usually when accuracy is desired (Smith & DeCoster, 1999; Smith & DeCoster, 2000). While System 1 often triggers spontaneous negative affect in response to loss, System 2 responds differently (Taylor, 1991). When an individual loses resources, System 2 can either engage to invest resources with the goal of enriching the resource pool, or, if return on investment is unlikely, not engage in order to conserve remaining resources. System 2 will detect a discrepancy between the current state and the desired goal state. If the discrepancy is large, the goal will be abandoned and resources will not be invested; however, if the discrepancy is small, System 2 will engage and the individual will invest resources in order to reduce the discrepancy (Carver & Scheier, 1998).

Recall that the reappraisal intervention was targeted toward System 1 while the adaptive guidance intervention was targeted toward System 2. When the reappraisal group was subjected to loss, they aligned with prospect theory, control theory, and COR theory; loss aversion played a role. They invested fewer alterant resources and likely abandoned their goal because the discrepancy between the current state of their finite resources and the desired state was perceived to be too large; there was a perceived need to conserve resources. The pattern of resource investment for the reappraisal/gain group also aligned with prospect theory and COR theory. When the reappraisal/gain group was subjected to a gain, they invested more resources than the reappraisal/loss group. In line with prospect theory, the slope of the reappraisal/gain group was less steep than the slope of the reappraisal/loss group (see Figure 9). Conversely, when the adaptive guidance group was subjected to loss, they followed control theory because System 2 was already engaged via the resource intervention manipulation. They determined the discrepancy to be manageable because they had already been using effortful, motivated information processing as a result of the adaptive guidance manipulation. Therefore, when they were subjected to loss, they deployed more alterant resources in order to enrich their finite resource pool. The resource investment shown by the adaptive guidance/gain group can be explained through the dual process theories as well. System 2 was already engaged for these individuals and they were motivated to invest resources; however, once they gained finite resources through means that were unrelated to their resource investment, their resource investment attenuated. The principle of least effort played a role; if the adaptive guidance/gain group could enrich their finite resource pool without investing alterant resources, then there was no need to expend additional energies. Carver and Scheier (1998) discuss a similar phenomenon, which they call disturbances. When an environmental disturbance occurs (such as a finite resource gain), System 2 will again check the discrepancy between the current state and desired end state, and change the output accordingly. Since the adaptive guidance/gain group showed lower mean resource investment, it is possible that their comparator functions arrived at this conclusion and limited the extent of resource investment.

Following the seventh trial in Figure 9, another pattern appears whereby both reappraisal groups show a steep increase in resource investment from trials 7 to 8, but both adaptive guidance groups show a steep decrease in resource investment from trials 7 to 8. The most likely reason for this change lies in the adaptive guidance manipulation. Recall that the number of marker targets was included in the resource investment composite (i.e., stationary targets located near the outer perimeter that participants needed to hook in order to guard against outer perimeter intrusions). Just before the second resource manipulation, the adaptive guidance presented at the end of trial 6 provided information regarding how many marker targets were hooked and what that amount meant for performance moving forward. Thus, if the manipulation worked, adaptive guidance participants would have followed instructions and focused their attention on marker targets in trial 7. At the end of trial 7, however, the adaptive guidance manipulation changed to focus on the tradeoffs that participants should make between monitoring the inner and outer perimeters. While hooking marker targets are still an important factor in monitoring the outer perimeter, it is likely that participants chose to focus on hooking targets near the inner perimeter rather than the outer perimeter, which would have caused a drop in the total number of marker targets hooked. While the resource intervention can explain the decreases in resource investment for the adaptive guidance groups, what can explain the corresponding increases for the reappraisal groups? Prior to the eighth trial, participants in the reappraisal condition received the following prompt: “Are you using your strategies on the colored paper? When you experience negative emotion, remember to use the strategies found on your desk to help you. Take a moment to read through these again before continuing on in the study.” The emotion regulation strategies did not prompt individuals to look at the instruction manual, or to focus on hooking marker targets; if participants followed the instructions, they would have read the strategies about regulating emotions and moved onto the next trial when they were finished. It is possible that the reminder to view the emotion regulation strategies prompted participants to think about other ways that they could invest alterant resources into the task to improve their performance (e.g., review the instruction manual). Perhaps they saw that they only had two trials left before the adaptation trial, and decided to dedicate resources to the outer perimeter to prepare for it. Either way, the resource intervention manipulations are the only explanation to the changes that were seen in the number of hooked marker targets; the trial that both adaptive guidance and reappraisal groups received was the same.

Overall, there was evidence for between-subjects effects of resource intervention and finite resource manipulation on both resource investment and adaptation. However, the global fit indices of the a priori model using an SEM framework were not satisfactory, which was likely due to the high multicollinearity of the resource investment variables. The modification indices aligned with this notion. Specifically, there were large modification indices (i.e., greater than 100) for reciprocal relationships between the average resource investment variables, as well as the reciprocal relationships between the average resource investment variables and the interaction variables. A cross-lagged model may have been better suited for the data, but it was difficult to determine how to test such a model, despite consulting with a number of quantitative scientists. The piecewise growth model was recommended by consulting quantitative scientists, but did not provide meaningful results regarding discontinuous shifts in mean resource investment trajectories.

Thus, post-hoc analyses employing discontinuous growth modeling and latent class analysis were used to examine the data differently as one of the aims of the present study was to close evidentiary gaps in COR theory by investigating its key tenets over time. To examine the effects of gain and loss over time, within-person resource investment was measured over nine trials. However, the results of a mixed repeated measures ANOVA on resource investment showed that there were only marginally significant within-person main effects of finite resource manipulation over time. Other growth modeling techniques employed in the present analysis did not find evidence for within-person changes in resource investment over time. There is some evidence to show that participants' resource trajectories varied over time, but these can mainly be attributed to the spikes at the eighth resource investment trial. To look closer at the nature of resource investment in the sample, latent class analysis was used to determine the underlying latent classes that existed in the data. The results of the latent class analysis showed that the data could be better explained by individual differences and classic motivation theories. Specifically, classes differed based on goal commitment, on-task cognition, and knowledge of the simulation, but there were not any obvious changes within-person.

The differences in resource investment found by the latent class analysis can be explained by Campbell (1990); performance is a function of the knowledge, skills, and motivation of the individual. To heavily invest resources in the task in order to maximize the chance of attaining the goal, participants first need to be committed to that goal. Then, they needed to have the knowledge and skills required to reach the goal while directing their attention to the task. Recall that Table 3 provided a list of adaptation-related variables classified into System 1 and System 2 categories. Dual process theories state that individuals' decision-making processes will most often be guided by System 1, which generally presents the best tradeoff between accurate decisions and the necessary effort required (Alter & Oppenheimer, 2009; Payne et al., 1993). The individual differences that varied across classes fit into the System 1 category shown in Table 3, providing evidence that the strong habits and tendencies of participants in this study may have guided resource investment more than the experimental manipulations.

Limitations

The present study had limitations that threaten construct validity and external validity (Shadish, Cook, & Campbell, 2002). In terms of construct validity, participants may have reacted to the experimental situation such that they could anticipate when a finite resource manipulation would occur. Gains and losses were evenly scheduled such that participants received them every three trials during the resource investment period. There is some anecdotal evidence for this limitation. One participant wrote on their score sheet that they anticipated receiving another resource manipulation at the end of the ninth trial; they wrote in the margin near the ninth trial: "Prediction: Act of God". Although precautions were taken to ensure that the gain and loss appeared to be a normal part of the simulation (e.g., by placing the manipulation in the performance feedback pages), the saliency of the secondary graphic depiction of the gains and losses may have cued the participants on the purpose and hypotheses of the study. Outside experimental settings, gain and loss do not occur at predictable intervals. In the experimental setting, participants could have expected the gain or loss to occur, which could have impacted how they invested alterant resources. Participants could have altered their behavior because they believed they were being observed with respect to the gain or loss, instead of behaving naturally.

In addition, external validity was threatened due to the interaction of the predicted relationships with the experimental setting. If the present study had been conducted in natural settings, such as at work or school, the results could be different. In the experimental setting, the finite resources that were manipulated were points generated by the simulation. While these points could be converted into cash prizes, losing points did not have real-world consequences that could significantly affect an individual's subjective well-being. For instance, regardless of whether participants lost or gained points, they ultimately received the psychology research credits they needed to maintain good academic status as students. Studies of COR theory typically investigate the effects of finite object, condition, or energy resource loss on physiological and psychological well-being; losing 60% of one's bank account balance is a much stronger loss manipulation than losing 60% of one's points in a psychology research study. Post-hoc analyses provided evidence that the finite resource manipulation did not determine latent class membership, but rather that latent class membership was influenced by individual differences in motivation (e.g., goal commitment, task knowledge, and on-task cognition). Overall, the results based on this experimental paradigm and undergraduate population may not generalize to naturalistic settings where finite resource gain and loss may have greater associations with physiological and psychological well-being.

Another weakness to the present study is that important variables were not included that could have helped explain patterns of resource investment. In particular, motivation-related variables should have been measured on a more frequent basis to understand how the finite resource manipulation affected goal choice and commitment over time. Freund and Riediger

(2001) contend that when loss spirals occur, individuals may reevaluate their goals and restructure their overall goal hierarchy. In particular, the selective optimization with compensation (SOC) model posits that mental, physical, and social resources are limited, but that three strategies (e.g., selection, optimization, and compensation) can be employed to deal with resource limitations. Individuals can *select* goals that are likely to provide returns on investment, *optimize* the cognitive or behavioral strategies they use to attain their goal, and/or *compensate* by using an alternative strategy to maintain a certain level of functioning when previous strategies are no longer available or useful (Bajor & Baltes, 2003). Items regarding the nature of goal setting and striving before and after finite resource manipulations could have helped to explain why some individuals chose to heavily invest alterant resources while others did not.

Practical implications

The differential effects of the operating information processing mode and finite resource gains and losses are important for practical issues in the workplace. Three popular human resource trends will be discussed here, including agility, high potential identification and, performance improvement.

Recently, the Society for Industrial and Organizational Psychology (SIOP) (2015) identified an increased focus on agility and flexibility in work and business focus as a popular human resources (HR) trend. As organizations continue to operate in a constantly changing market with varied customer needs, they require employees who will be able to adapt to new technology and ways of working. When change occurs, employees may lose time, patience, and other energy resources as they come up to speed. The results of the present study indicate that organizations should focus on interventions that will engage motivated System 2 processing. When losses occur, motivated employees will be more apt to resolve discrepancies between their current working state and goal state. Organizations can stave off further resource loss by eliminating barriers to adaptation, such as hosting training programs for new technology or embedding technical support. The results of the present study also indicate that organizations should clearly communicate the reasons why employees need to adapt. Employees need to understand what their goal is in order to perceive discrepancies between their current state and desired end state, and what strategies to use to strive toward that goal (Bajor & Baltes, 2003; Carver & Scheier, 1998).

SIOP (2015) also identified performance management, particularly on continuous performance improvement, as an important HR trend. The results of the present study show that feedforward methods, such as adaptive guidance, can help adaptation and resource investment toward some goal when loss occurs. As organizations move to performance management systems that employ continuous feedback (as opposed to a system that focuses on the annual performance review), the role of the manager increases in importance. For instance, Smith (2017) notes that Adobe provides leaders with training and tools to ensure they provide their employees with constructive feedback. In particular, the primary focus should not be past performance, but rather how to improve by setting goals for the future, and developing action plans to reach those goals (Epstein, 2016). Principles from adaptive guidance can help structure action plans and provide employees with specific behaviors to employ to reach their goals. Based on the results of the present study, when employees lose status through poor performance reviews, adaptive guidance can help to motivate alterant resources and continue efforts toward goal attainment.

Another hot trend in human resources is how to manage high potential talent. Gelens, Hofmans, Dries, and Pepermans (2014) define high potential talent as employees who have been differentiated from the rest of the workforce, that is, those employees who have received "investment of disproportionate resources where one expects disproportionate returns, in those specific jobs and those specific people within jobs that help create strategic success" (p. 161). In particular, a recent popular issue is whether to notify high potential individuals of their differentiated status. There is research evidence that notifying employees of their high potential status is positively related to perceived justice (Gelens et al., 2014); however, there are concerns that identifying an employee as high potential could have detrimental effects on their work motivation (Babcock, 2012). Based on the results of the present study, it is possible that receiving a condition gain (i.e., high potential status) could have positive or negative relations with the amount of resource investment the employee provides. If the high potential employee has beneficial personality characteristics and habituated goal setting/striving tendencies that guide information processing (i.e., System 1), receiving such a condition gain would be positively associated with resource investment, as was seen in reappraisal/gain group in the present study. However, if the high potential employee has been engaging System 2 and heavily investing resources to attain the goal of high potential status, reaching that goal may prompt them to conserve resources, and invest fewer resources moving forward (as was seen with the adaptive guidance/gain group). Either way, more research evidence is necessary to determine how high potential identification relates to motivation in the workplace.

Future directions

As research on the effects of loss and gain moves forward, the precision and utility of COR theory within the motivation space warrants discussion. In support of COR theory, the present study found that the resource investment by participants in the System 1 intervention groups aligned with Hobfoll's (1989) propositions (i.e., loss was associated with decreased resource investment; gain was associated with increased resource investment). However, the theory failed to anticipate the results found in the System 2 intervention groups (i.e., loss was associated with increased resource investment; gain was associated with decreased resource investment). The present study found a boundary condition for when the theory would be useful, such that when effortful information processing was used, the theory did not hold up. In addition to this boundary condition, the present study previously discussed how the definitions of resources and resource investment are broad and require more specificity to be able to precisely hypothesize how resource pools (and the types of resources within them) are associated with their investment. According to Sutton and Staw (1995), strong theory needs to "discern conditions in which the major proposition or hypothesis is most and least likely to hold" (p. 376). Therefore, in order for COR theory to be a strong theory, it needs to better explain why certain resources would be invested and when.

Moving forward, COR theory needs to more clearly explain the connections between resources and resource investment, how resource investment differs from other goal-striving activities, how resources are defined in terms of quantity, type, and value, and how these qualitative differences affect how they are invested. The present study made an attempt to distinguish between Hobfoll's original (1989) object, condition, and energy resources and Halbesleben and colleagues' (2014) resources that aid in goal attainment; the present study described Hobfoll's (1989) resources as finite, and more general goal-relevant resources as alterant (e.g., cognitive and behavioral resources, such as attention and on-task behavior). In doing so, the present study provided clarity around the quantity of finite resources (i.e., defined according to absolute quantity) and alterant resources (i.e., defined according to limited and relative quantity). Currently, COR theory includes similar cognitive and self-regulatory resources in their definition. To strengthen the theory, COR theory needs to be more clearly distinguished from self-regulation theories, such as Baumeister and colleagues' (1998) ego depletion theory and Carver and Scheier's (1998) control theory.

In addition, the definition of and underlying processes that guide resource investment, and their systematic reasons for occurrence and nonoccurrence need to be more clearly delineated (Sutton & Staw, 1995). It is noteworthy that it was difficult to find a definition of resource investment from Hobfoll's major (1989, 2001) work. In regards to its definition, Hobfoll (1989) stated, "people may also enrich resources by investing other resources, such as when people give aid to kith or kin. Such resource investment is not necessarily tit for tat (Clark, 1983), but rather, the model suggests that people take a long-term outlook toward the conservation of resources" (p. 517). The example provided by Hobfoll confuses the definition of resource investment; in fact, Hobfoll (1989) does not define what investment is nor what it means to enrich resources. The work by Halbesleben and colleagues (2014) improves the definition by bounding investment by behaviors that are goal-relevant, but in doing so causes more confusion around how COR theory is different from other motivation theories, such as goal setting theory (Locke & Latham, 2002) and control theory (Carver & Scheier, 1998). Nevertheless, the problem remains that the way in which resource investment is studied does not allow the process to be examined. Much of the evidence for COR theory is based on cross-sectional survey methods (Halbesleben et al., 2014), which threaten internal validity (e.g., ambiguous temporal precedence), and external validity (e.g., interaction of the causal relationship with settings and units) (Shadish et al., 2002). The question of temporality is a difficult one to answer, especially given the confusion around how to define resources. There is likely variance in how quickly or slowly finite and alterant resources deplete, which would have implications for how available these resources are for investment. As mentioned previously, the present study used a longitudinal design by investigating resource investment of alterant resources over nine trials. The design is considered longitudinal because it measures a phenomenon over more than three time points, which is important to determine the slope of how the phenomenon changes over time (Donnellan & Conger, 2007). While there are limitations in the design due to the amount of experimental control, the setting, and the study population, the large number of observations was sensitive enough to show the differentiation in resource investment that occurred between groups. To increase the clarity of these resource phenomena, future studies in this area should investigate them longitudinally in order to benchmark their dynamics and establish trigger points for potential intervention. Altogether, the lack of clarity in the resource definition, boundary conditions, and connections between resource phenomena leave COR theory with limited utility for researchers investigating motivational processes. Should research continue in this area, researchers should proceed with caution and consider why and how resource phenomena would lead to motivation outcomes across contexts.

Conclusion

The present study found interaction effects between finite resource manipulation and initial resource intervention on resource investment over time, and adaptation. These findings have implications for COR theory and information processing theories as well as practice, which have been explained previously.

APPENDICES

APPENDIX A: SUMMARY OF PILOT STUDY

A pilot study was conducted with the primary purpose of determining the utility of including reappraisal as a resource intervention factor. Secondary purposes of the study were to determine a suitable point amount for the finite resource manipulation, to establish acceptable internal consistency metrics for the proposed scales, and to identify procedural issues that needed to be remedied before data collection.

A total of 127 undergraduate students were recruited from a large Midwestern university using the online psychology research subject pool. The data from 110 participants were retained for analysis; two participants did not attend the second day of the study and 15 participants failed manipulation checks. The data were collected from November 28 to December 8, 2017. The sample was 50.0% male and had a mean age of 19.83 (SD = 2.08). Approximately 65.5% of the sample was white, 16.4% were Black or African-American, 12.7% were Asian, and the remainder were multiracial, American Indian or Alaska Native, or Native Hawaiian or other Pacific Islander. Approximately 6.4% of the sample was Hispanic or Latino. In terms of their college tenure, 37.3% of the sample were freshmen, 22.7% were sophomores, 24.5% were juniors, and 15.4% were seniors or above. Approximately 36.4% of the sample belonged to the College of Social Science, 23.6% from the College of Natural Science, 10.0% from the College of Communication Arts and Sciences, 6.4% were undecided majors, 5.5% from Broad College of Business, 5.5% from College of Education, 4.5% had double majors, 4.5% from College of Engineering, 2.7% from College of Nursing, .9% from the Lyman Briggs program.

The experimental procedure was the same as the full study (see page X). The results of the study led the author to the following decisions:

1. Include the reappraisal conditions in the full data collection as initially proposed due to marginally significant negative effects on positive affect.
    a. Include a measure of on-task cognition to describe how off-task participants in the reappraisal condition were.
2. Remove the state promotion and prevention focus measures as manipulation checks due to odd patterns of correlation with other measures (see Summerville & Roese, 2008 in Appendix G for the removed measure).
3. Propose a new resource investment operationalization due to nonsignificant results with the declarative behavior operationalization (i.e., time spent querying decision menus).
4. Propose a new finite resource manipulation because the strength of the manipulation varied across individuals (i.e., an absolute loss of 500 points was more damaging to a participant who had only accrued 600 points as opposed to a participant who had accrued 1500 points).
5. Measure goal choice, goal commitment, and goal orientation in order to explain patterns of resource investment.

APPENDIX B: TRAINING BLOCK INSTRUCTIONS

Block 1: Trials 1-3
In this block, the major focus of training is getting familiar with the simulation and making contact decisions. You should focus on the following training topics:

1. Using the mouse to operate the simulation.
2. Hooking targets and accessing the pull down menus.
3. Making TYPE decisions.
4. Making CLASS decisions.
5. Making INTENT decisions.
6. Making FINAL ENGAGEMENT decisions.
7. Viewing right button feedback after making target decisions.

Please press "next" when you are finished reading.

Block 2: Trials 4-6
In this block, the major focus of training is preventing contacts from crossing the defensive perimeters. You should focus on the following training topics:

1. Using the zoom function to view the "big picture" and monitoring the inner and outer perimeters.
2. Using marker contacts to locate the outer defensive perimeter.
3. Watching for pop-up contacts that appear suddenly on your screen.

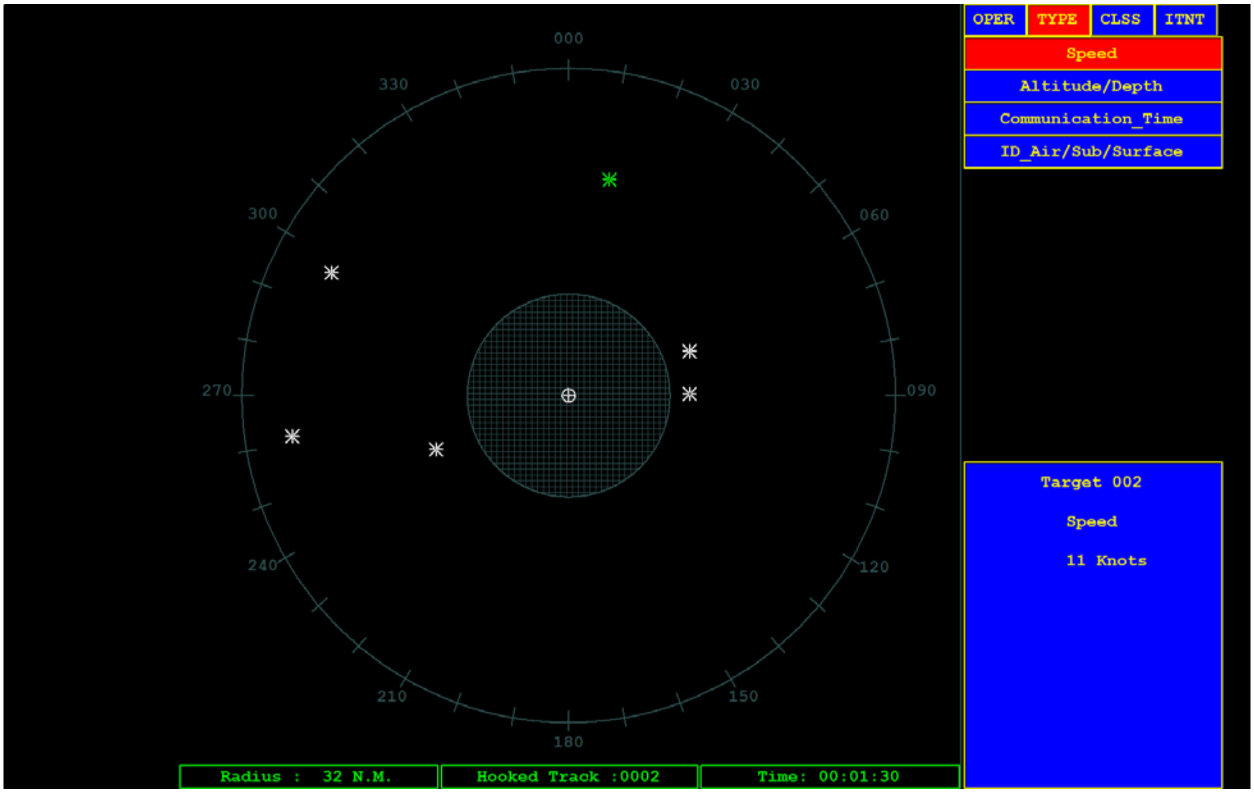
Please press "next" when you are finished reading.

Block 3: Trials 7-9
In this block, the major focus of training is being able to apply strategies that are used to better prevent targets from crossing the defensive perimeters. You should focus on the following training topics:

1. Prioritizing targets located on the radar screen to determine high and low priority targets and the order in which targets should be prosecuted.
2. Making trade-offs between targets that are approaching your inner and outer perimeters.

Please press "next" when you are finished reading.

APPENDIX C: DEPICTION OF A TANDEM TRIAL



APPENDIX D: ADAPTIVE GUIDANCE MANIPULATION

Participants received the following adaptive guidance, depending on their performance in the prior trial; participants only received the text from one bullet point per category per trial (e.g., hooking targets) based on their performance.

<u>First three trials</u>

Hooking targets

- In the last practice trial you did not hook a target. This is a critical skill that you must learn. You should study the material on hooking targets in your instruction manual and practice hooking targets in the next practice trial.
- You hooked at least one target in the last practice trial. Good job! You should now concentrate on learning how to make correct Type, Class, Intent, and Final Engagement decisions.

Type decisions (programmed in the system as TCOR)

- In the last practice trial, you did not make any correct Type decisions. This is an important skill that you need to learn. You should study information on Target Type in your instruction manual and practice making correct Type decisions in the next trial.
- In the last practice trial, you made ~TCOR~ correct Type decisions. This indicates that you have learned how to make correct Type decisions; however, you need to increase the number of correct Type decisions you are making. You should continue to review the information on Target Type in your instruction manual, and practice making Type decisions in the next practice trial.
- In the last practice trial, you made ~TCOR~ correct Type decisions. This indicates that you have learned how to make correct Type decisions; however, you need to increase the number of correct Type decisions you are making. You should continue to review the information on Target Type in your instruction manual, and practice making Type decisions in the next practice trial.
- In the last practice trial, you made ~TCOR~ correct Type decisions. This indicates that you have learned how to make correct Type decisions; however, you need to increase the number of correct Type decisions you are making. You should continue to review the information on Target Type in your instruction manual, and practice making Type decisions in the next practice trial.
- In the last practice trial, you made ~TCOR~ correct Type decisions. This indicates that you have learned how to make correct Type decisions; however, you need to increase the number of correct Type decisions you are making. You should continue to review the information on Target Type in your instruction manual, and practice making Type decisions in the next practice trial.

- In the last practice trial, you made ~TCOR~ correct Type decisions. You are doing very well at making correct Type decisions. You still need to become more proficient at making Type decisions, so you should continue to study the information on Target Type in your instruction manual and practice making correct Type decisions in the next practice trial.
- In the last practice trial, you made ~TCOR~ correct Type decisions. You are doing very well at making correct Type decisions. You still need to become more proficient at making Type decisions, so you should continue to study the information on Target Type in your instruction manual and practice making correct Type decisions in the next practice trial.
- You made ~TCOR~ correct Type decisions in the last practice trial. You have achieved the desired level of proficiency on making correct Type decisions. You should focus your study and practice on other areas in which you may need to improve your performance.

Class decisions (programmed in the system as CCOR)

- In the last practice trial, you did not make any correct Class decisions. You need to be able to make correct Class decisions if you are going to perform well in the simulation. You should study the information on Target Class in your instruction manual and practice making correct Class decisions in the next practice trial.
- In the last practice trial you made ~CCOR~ correct Class decisions. This indicates that you have learned how to make correct Class decisions. However, you need to increase the number of correct Class decisions you are making during a trial. You should continue to review the information on Target Class in your instruction manual, and practice making correct Class decisions in the next practice trial.
- In the last practice trial you made ~CCOR~ correct Class decisions. This indicates that you have learned how to make correct Class decisions. However, you need to increase the number of correct Class decisions you are making during a trial. You should continue to review the information on Target Class in your instruction manual, and practice making correct Class decisions in the next practice trial.
- In the last practice trial you made ~CCOR~ correct Class decisions. This indicates that you have learned how to make correct Class decisions. However, you need to increase the number of correct Class decisions you are making during a trial. You should continue to review the information on Target Class in your instruction manual, and practice making correct Class decisions in the next practice trial.
- In the last practice trial you made ~CCOR~ correct Class decisions. This indicates that you have learned how to make correct Class decisions. However, you need to increase the number of correct Class decisions you are making during a trial. You should continue to review the information on Target Class your instruction manual, and practice making correct Class decisions in the next practice trial.

- You are doing very well at making correct Class decisions. You made ~CCOR~ correct Class decisions in the last trial. You still need to be able to make more correct Class decisions during a trial, so you should continue to review the material on Target Class in your instruction manual and practice making correct Class decisions in the next practice trial.
- You are doing very well at making correct Class decisions. You made ~CCOR~ correct Class decisions in the last trial. You still need to be able to make more correct Class decisions during a trial, so you should continue to review the material on Target Class in your instruction manual and practice making correct Class decisions in the next practice trial.
- You are doing very well at making correct Class decisions. You made ~CCOR~ correct Class decisions in the last trial. You still need to be able to make more correct Class decisions during a trial, so you should continue to review the material on Target Class in your instruction manual and practice making correct Class decisions in the next practice trial.
- You made ~CCOR~ correct class decisions in the last trial. You have achieved a very high level of proficiency on making correct Class decisions. You should focus your study and practice on other areas in which you may need to improve your performance.

Intent decisions (programmed in the system as ICOR)

- You did not make any correct Intent decisions in the last practice trial. You need to learn how to make correct Intent decisions if you are going to perform well at the game. You should study the information on Target Intent in the instruction manual and practice making correct Intent decisions in the next practice trial.
- You made ~ICOR~ correct Intent decisions in the last practice trial. You have learned how to make correct Intent decisions; however, you need to increase the number of correct Intent decisions you are making during a trial. You should continue to review the information on Target Intent in your instruction manual, and practice making correct Intent decisions in the next practice trial.
- You made ~ICOR~ correct Intent decisions in the last practice trial. You have learned how to make correct Intent decisions; however, you need to increase the number of correct Intent decisions you are making during a trial. You should continue to review the information on Target Intent in your instruction manual, and practice making correct Intent decisions in the next practice trial.
- You made ~ICOR~ correct Intent decisions in the last practice trial. You have learned how to make correct Intent decisions; however, you need to increase the number of correct Intent decisions you are making during a trial. You should continue to review the information on Target Intent in your instruction manual, and practice making correct Intent decisions in the next practice trial.

- You made ~ICOR~ correct Intent decisions in the last practice trial. You have learned how to make correct Intent decisions; however, you need to increase the number of correct Intent decisions you are making during a trial. You should continue to review the information on Target Intent in your instruction manual, and practice making correct Intent decisions in the next practice trial.
- You made ~ICOR~ correct Intent decisions in the last practice trial. You have learned how to make correct Intent decisions; however, you need to increase the number of correct Intent decisions you are making during a trial. You should continue to review the information on Target Intent in your instruction manual, and practice making correct Intent decisions in the next practice trial.
- You made ~ICOR~ correct Intent decisions in the last practice trial. You are doing very well at making correct Intent decisions. However, you need to make more correct Intent decisions during each trial. You should continue to study the information on Target Intent in your instruction manual and practice making correct Intent decisions in the next practice trial.
- You have achieved a high level of proficiency at making correct Intent decisions. You made ~ICOR~ correct Intent decisions in the last practice trial. You should focus your study and practice on other areas in which you may need to improve your performance.

Final engagement decisions (programmed in the system as FENGCOR)

- You did not make any correct Final Engagement decisions in the last practice trial. This is a critical skill that you must learn. You should study the material on making Final Engagement decisions in your instruction manual and practice making correct Final Enagagement decisions in the next practice trial.
- By making ~FENGCOR~ correct Final Engagement decisions in the last practice trial, you showed that you have learned how to make Final Engagement decisions. However, you need to increase the number of correct Final Engagement decisions you are making during a practice trial. You should continue to review the information in the instruction manual on Final Engagement decisions, and practice making Final Engagement decisions in the next practice trial.
- By making ~FENGCOR~ correct Final Engagement decisions in the last practice trial, you showed that you have learned how to make Final Engagement decisions. However, you need to increase the number of correct Final Engagement decisions you are making during a practice trial. You should continue to review the information in the instruction manual on Final Engagement decisions, and practice making Final Engagement decisions in the next practice trial.
- By making ~FENGCOR~ correct Final Engagement decisions in the last practice trial, you showed that you have learned how to make Final Engagement decisions. However, you need to increase the number of correct Final Engagement decisions you are making during a practice trial. You should continue to review the information in the instruction manual on Final Engagement decisions, and practice making Final Engagement decisions in the next practice trial.

- By making ~FENGCOR~ correct Final Engagement decisions in the last practice trial, you showed that you have learned how to make Final Engagement decisions. However, you need to increase the number of correct Final Engagement decisions you are making during a practice trial. You should continue to review the information in the instruction manual on Final Engagement decisions, and practice making Final Engagement decisions in the next practice trial.
- By making ~FENGCOR~ correct Final Engagement decisions in the last practice trial, you showed that you have learned how to make Final Engagement decisions. However, you need to increase the number of correct Final Engagement decisions you are making during a practice trial. You should continue to review the information in the instruction manual on Final Engagement decisions, and practice making Final Engagement decisions in the next practice trial.
- The fact that you made ~FENGCOR~ correct Final Engagement decisions shows that you have become proficient at making correct Final Engagement decisions. However, you still need to be able to make more correct Final Engagement decisions during each practice trial. You should continue to review the material in the instruction manual on making correct Final Engagement decisions and practice this skill in the next practice trial.
- The fact that you made ~FENGCOR~ correct Final Engagement decisions shows that you have become proficient at making correct Final Engagement decisions. However, you still need to be able to make more correct Final Engagement decisions during each practice trial. You should continue to review the material in the instruction manual on making correct Final Engagement decisions and practice this skill in the next practice trial.
- You made ~FENGCOR~ correct Final Engagement decisions in the last practice trial. You have reached a high level of proficiency at this skill. You should focus your study and practice on other areas in which you may need to improve your performance.

Second three trials

Zooming out (programmed in the system as ZMOT)

- You didn't zoom out at all during the last practice trial. It is important that you learn to zoom out so that you can see the big picture of what's going on. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.

- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. In order to defend your perimeters and see all the action, you need to zoom out more often. You should study the material in your instruction manual on zooming out and practice zooming out in the next practice trial.
- In the last practice trial, you zoomed out ~ZMOT~ times. You are doing an excellent job of seeing the big picture and watching all the action. Focus now on other areas in which you need to improve, but make sure you continue to zoom out to see the big picture.

Pop-up targets (programmed in the system as POPFE)

- You didn't engage any of the Pop-Up Targets in the last practice trial. It is important that you learn how to locate Pop-Up Targets. You should review the material in your instruction manual on Pop-Up Targets and practice this skill in the next practice trial.
- In the last practice trial, you engaged ~POPFE~ Pop-Up targets. This is good but you are still missing some of the Pop-Up Targets. You should review the material in your instruction manual on Pop-Up Targets and practice this skill in the next practice trial.
- In the last practice trial, you engaged ~POPFE~ Pop-Up targets. This is good but you are still missing some of the Pop-Up Targets. You should review the material in your instruction manual on Pop-Up Targets and practice this skill in the next practice trial.
- In the last practice trial, you engaged ~POPFE~ Pop-Up targets. This is good but you are still missing some of the Pop-Up Targets. You should review the material in your instruction manual on Pop-Up Targets and practice this skill in the next practice trial.

- In the last practice trial, you engaged ~POPFE~ Pop-Up targets. This is good but you are still missing some of the Pop-Up Targets. You should review the material in your instruction manual on Pop-Up Targets and practice this skill in the next practice trial.
- You engaged ~POPFE~ in the last practice trial. Good job. This shows that you are doing a good job of watching the whole picture. Focus now on other areas in which you may need to improve your performance, but make sure you continue to recognize the Pop-Up Targets.

Marker targets (programmed in the system as TMHKS)

- You didn't hook any of the marker targets in the last practice trial. It is important that you learn how to use the marker targets to locate your outer defensive perimeter. You should study the material in your instruction manual on defensive perimeters and practice this skill in the next practice session.
- You hooked ~TMHKS~ marker targets in the last practice trial. That is good because it means you are learning to locate your outer defensive perimeter; however, you are missing some of the marker targets. You should study the material in your instruction manual on defensive perimeters and practice this skill in the next practice session.
- You hooked ~TMHKS~ marker targets in the last practice trial. This means you are doing an excellent job of locating your outer defensive perimeter. You should focus now on other areas in which you may need to improve, but make sure you continue to locate the marker targets.

Inner perimeter intrusions (programmed in the system as INNPEN)

- You didn't allow any inner penalty intrusions in the last practice trial. Good work. You should concentrate now on some other areas in which you may need improvement, but make sure you continue to defend your inner perimeter.
- You allowed ~INNPEN~ inner penalty intrusions in the last practice trial. You need to make sure you monitor your inner perimeter and limit the number of targets that cross into your inner penalty circle. You should review the material in your instruction manual on defensive perimeters and practice this skill in the next practice trial.

Outer perimeter intrusions (programmed in the system as OUTADJ)

- You didn't allow any outer penalty intrusions in the last practice trial. Good work. You should focus now on other areas in which you need to improve, but make sure you continue to defend your outer perimeter.
- You allowed ~OUTADJ~ outer penalty intrusions in the last practice trial. You need to make sure you monitor your outer perimeter and limit the number of targets that cross it. You should review the material in your instruction manual on defensive perimeters and practice this skill in the next practice trial.

<u>Final three trials</u>

High-priority targets (programmed in the system as HP)

- In the last practice trial, you didn't engage any of the high priority targets. This means that you haven't learned how to prioritize targets. You should study the material in your instruction manual on prioritization strategies and practice engaging high priority targets in the next practice trial.
- In the last practice trial, you only engaged ~HP~ high priority targets. This means that you haven't learned how to prioritize targets. You should study the material in your instruction manual on prioritization strategies and practice engaging high priority targets in the next practice trial.
- In the last practice trial, you engaged ~HP~ high priority targets. This is good, but you are still missing some of the high priority targets. To maximize your prioritization strategy, you should study the material in your instruction manual on prioritization strategies and practice engaging high priority targets in the next trial.
- In the last practice trial, you engaged ~HP~ high priority targets. Nice work. This shows that you have learned how to prioritize targets. You should concentrate now on other areas in which you need to improve, but make sure you continue to apply your prioritization strategies.

Part 1: Making tradeoffs between targets (inner perimeter target speed programmed as INSPQ)

- In the last practice trial, you didn't check the speed of any of the targets near your inner defensive perimeter. This means that have not learned how to make trade-offs between targets approaching your inner and outer defensive perimeters. You should study the material in your instruction manual on making trade-offs between targets and you should practice this skill in the next practice session.
- In the last practice trial, you checked the speed of ~INSPQ~ targets near your inner defensive perimeter, which is good. However, you are still ignoring several of the targets near your inner defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.
- In the last practice trial, you checked the speed of ~INSPQ~ targets near your inner defensive perimeter, which is good. However, you are still ignoring several of the targets near your inner defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.
- In the last practice trial, you checked the speed of ~INSPQ~ targets near your inner defensive perimeter, which is good. However, you are still ignoring several of the targets near your inner defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.

- In the last practice trial, you checked the speed of ~INSPQ~ targets near your inner defensive perimeter. Hopefully you are using this information to make trade-offs between targets approaching your inner and outer defensive perimeters. You should concentrate now on other areas in which you need to improve your performance, but make sure you continue to make trade-offs between targets.

Part 2: Making tradeoffs between targets (outer perimeter target speed programmed as OTSPQ)

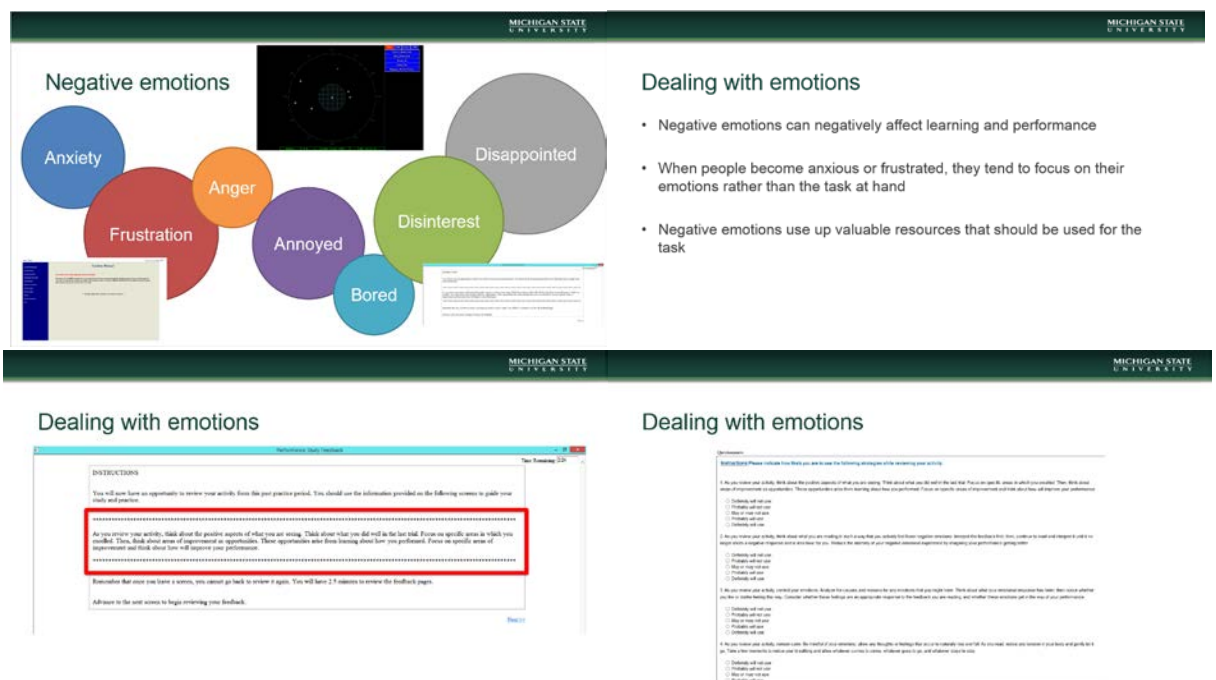
- In the last practice trial, you didn't check the speed of any of the targets near your outer defensive perimeter. This means that have not learned how to make trade-offs between targets approaching your inner and outer defensive perimeters. You should study the material in your instruction manual on making trade-offs between targets and you should practice this skill in the next practice session.
- In the last practice trial, you checked the speed of ~OTSPQ~ targets near your outer defensive perimeter, which is good. However, you are still ignoring several of the targets near your outer defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.
- In the last practice trial, you checked the speed of ~OTSPQ~ targets near your outer defensive perimeter, which is good. However, you are still ignoring several of the targets near your outer defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.
- In the last practice trial, you checked the speed of ~OTSPQ~ targets near your outer defensive perimeter, which is good. However, you are still ignoring one of the targets near your outer defensive perimeter. To effectively make trade-offs between targets approaching your inner and outer defensive perimeter, you should study the material in your instruction manual on making trade-offs and practice this skill in the next section.
- In the last practice trial, you checked the speed of ~OTSPQ~ targets near your outer defensive perimeter. Hopefully you are using this information to make trade-offs between targets approaching your inner and outer defensive perimeters. You should concentrate now on other areas in which you need to improve your performance, but make sure you continue to make trade-offs.

APPENDIX E: EMOTION REGULATION MANIPULATION

In addition to the written manipulations in Table 4, participants received the manipulation through an audio/visual presentation prior to starting training on the first study day. The audio presentation was as follows:

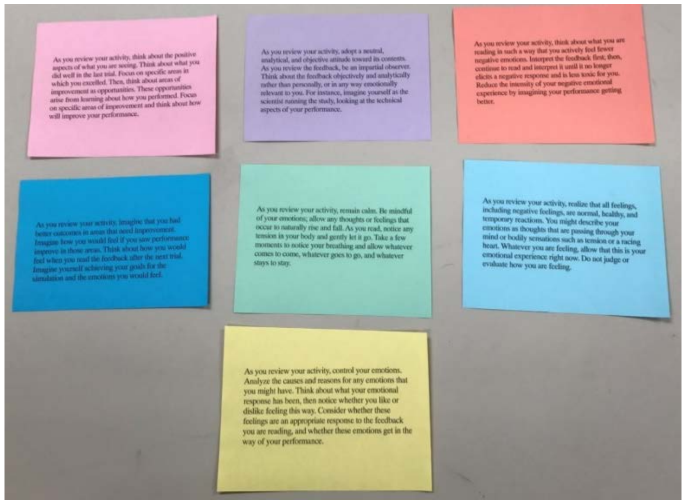
> *"As you learn the task today, you may experience negative emotions, such as anxiety, nervousness, anger, frustration, annoyance, boredom, disinterest, or disappointment. You may become frustrated when reading the instruction manual or hooking targets, you may become annoyed with the menus in the training trials, or you may become anxious when you don't perform as well as you had hoped you would. These emotions are normal, but they can negatively affect your learning and performance in the simulation today. When people become anxious or frustrated, they tend to focus on their emotions rather than the task at hand and use up valuable resources that should be used toward the task. As you learn about the simulation today, you will be given a number of strategies for how to deal with any negative emotions that you experience today. These strategies will be shown on the feedback pages with asterisks around them. Please read these strategies carefully and use the strategies that work best for you. In addition, you will also be asked to fill out surveys throughout the study. Please read these surveys carefully, and answer honestly. Thank you for your time and attention – please press next on your computer screen to continue with the study."*

The visuals below accompanied the audio to strengthen the manipulation.



During the resource investment trials, the manipulation was again presented to participants via colored cards that had the emotion regulation instructions printed on them.

Participants received the emotion regulation instructions that they had indicated they would definitely use, probably use, and/or may or may not use; these data were collected via a survey they responded to at the end of the first day of the study. These cards were placed on each participant's desk at the start of the second study day. The cards that participants received are shown below.



A small number of participants (*N* = 3) responded that they would definitely not or probably not use any of the emotion regulation strategies during the resource investment trials. Nevertheless, these participants were still subjected to the written manipulations in the feedback pages. They did not receive colored cards on their desks, but rather received a white card with the following text written on it:

"On your survey, you noted that you would "definitely not use" or "probably not use" the strategies to help you deal with negative emotions.

These strategies are still available to you throughout the study, should you find that you need them or would like to use them. You will find the strategies in between the asterisks (****) on the screen before your performance feedback."

On the second study day, participants also received reminders to review their colored cards. They received these reminders before the second trial, fifth trial, and eighth trial. The prompt used is shown below.

"*Are you using your strategies on the colored paper? When you experience negative emotion, remember to use the strategies found on your desk to help you. Take a moment to read through these again before continuing on in the study.*"

APPENDIX F: DEMOGRAPHIC MEASURE

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

Gender: Male, Female
Age: [open text box]
ACT score: [open text box]
SAT score (if no ACT score): [open text box]
Year in college: 1st, 2nd, 3rd, 4th, 5th year or more
Major: [open text box]
Race: [open text box]
Ethnicity: Hispanic or Latino, Not Hispanic or Latino

APPENDIX G: REGULATORY FOCUS MEASURES

Work Regulatory Focus Scale (Neubert et al., 2008)
Response scale (1 = strongly disagree; 5 = strongly agree); Modifications in brackets [ ]

1. I concentrate on completing my [assignments] correctly to increase my [security as a student in good standing at my university].
2. At [school], I focus my attention on completing my assigned responsibilities.
3. Fulfilling my [school] duties is very important to me.
4. At [school], I strive to live up to the responsibilities and duties given to me by others.
5. At [school] I am often focused on accomplishing tasks that will support my need for security.
6. I do everything I can to avoid loss at [school].
7. I focus my attention on avoiding failure at [school].
8. I am very careful to avoid exposing myself to potential losses at [school].
9. I take chances at [school] to maximize my goals for advancement.
10. I tend to take risks at [school] in order to achieve success.
11. If I had an opportunity to participate on a high-risk, high-reward project, I would definitely take it.
12. If my [university] did not allow for advancement, I would likely find a new one.
13. A chance to grow is an important factor for me when looking for a [university].
14. I focus on accomplishing [school] tasks that will further my advancement.
15. I spend a great deal of time envisioning how to fulfill my aspirations.
16. My [school] priorities are impacted by a clear picture of what I aspire to be.
17. At [school], I am motivated by my hopes and aspirations.

State regulatory focus (Summerville & Roese, 2008); Response scale

1. Right now, I am focused on achieving positive outcomes. (gain)
2. I typically focus on the success I hoped to achieve in the future in the simulation.
3. I frequently imagine how I will achieve my hopes and aspirations for the simulation.
4. When good things happen to me in the simulation, it affects me strongly.
5. Right now, I am concerned about missing out on positive outcomes. (nongain)
6. I frequently worry that my future in the simulation will be less successful than I hope.
7. I frequently imagine how I might fall short of my hopes and aspirations for the simulation.
8. When good things fail to materialize in the simulation, it affects me strongly.
9. I frequently think about how I can prevent failures in the simulation. (loss)
10. I am anxious that I will fall short of my responsibilities and obligations in the simulation.
11. Right now, I am focused on avoiding negative outcomes.
12. I worry about making mistakes in the simulation.
13. I am generally sure that I can bypass negative events in the simulation. (nonloss)
14. I am confident that I can meet my responsibilities and obligations in the simulation.
15. Right now, I am focused on protecting myself against negative outcomes.
16. I am generally good at avoiding careless mistakes in the simulation.

APPENDIX H: CONSCIENTIOUSNESS MEASURE

NEO PI-R Conscientiousness Items (Costa & McCrae, 1992a)
(R) = Reverse-scored

<u>Dependability Facets</u>
Order = items 9 – 16
Dutifulness = items 17 – 24
Deliberation = items 41 – 48

<u>Achievement Facets</u>
Competence = items 1 – 8
Achievement Striving = items 25 – 32
Self-Discipline = 33 – 40

1. I'm known for my prudence and common sense.
2. I don't take civic duties like voting very seriously. (R)
3. I keep myself informed and usually make intelligent decision.
4. I often come into situations without being fully prepared. (R)
5. I pride myself on my sound judgment.
6. I don't seem to be completely successful at anything. (R)
7. I'm very competent person.
8. I am efficient and effective at my work.
9. I would rather keep my options open than plan everything in advance. (R)
10. I keep my belongings neat and clean.
11. I am not a very methodical person. (R)
12. I like to keep everything in its place so I know just where it is.
13. I never seem to be able to get organized. (R)
14. I tend to be somewhat fastidious or exacting.
15. I'm not compulsive about cleaning. (R)
16. I spend a lot of time looking for things I've misplaced. (R)
17. I try to perform all the tasks assigned to me conscientiously.
18. Sometimes I'm not as dependable or reliable as I should be. (R)
19. I pay my debts promptly and in full.
20. Sometimes I cheat when I play solitaire. (R)
21. When I make a commitment, I can always be counted on to follow through.
22. I adhere strictly to my ethical principles.
23. I try to do jobs carefully, so they won't have to be done again.
24. I'd really have to be sick before I'd miss a day of work.
25. I am easy-going and lackadaisical. (R)
26. I have a clear set of goals and work toward them in an orderly fashion.
27. When I start a self-improvement program, I usually let it slide after a few days. (R)
28. I work hard to accomplish my goals.

29. I don’t feel like I’m driven to get ahead. (R)
30. I strive to achieve all I can.
31. I strive for excellence in everything I do.
32. I’m something of a “workaholic.”
33. I’m pretty good about pacing myself so as to get things done on time.
34. I waste a lot of time before settling down to work. (R)
35. I am a productive person who always gets the job done.
36. I have trouble making myself do what I should. (R)
37. Once I start project, I almost always finish it.
38. When a project gets too difficult, I’m inclined to start a new one. (R)
39. There are so many little jobs that need to be done that I sometimes just ignore them all. (R)
40. I have a lot of self-discipline.
41. Over the years I’ve done some pretty stupid things. (R)
42. I think things through before coming to a decision.
43. Occasionally I act first and think later. (R)
44. I always consider the consequences before I take action.
45. I often do things on the spur of the moment. (R)
46. I rarely make hasty decisions.
47. I plan ahead carefully when I go on a trip.
48. I think twice before I answer a question.

APPENDIX I: PANAS

Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on the average.

Response scale (1 = very slightly or not at all; 2 = a little; 3 = moderately; 4 = quite a bit; 5 = extremely)

__ Interested
__ Distressed
__ Excited
__ Upset
__ Strong
__ Guilty
__ Scared
__ Hostile
__ Enthusiastic
__ Proud
__ Irritable
__ Alert
__ Ashamed
__ Inspired
__ Nervous
__ Determined
__ Attentive
__ Jittery
__ Active
__ Afraid

APPENDIX J: KNOWLEDGE ASSESSMENT

Declarative and strategic knowledge (Bell & Kozlowski, 2008)

The following is a knowledge test about the simulation.

1. If a Response is Given, what is the likely Intent of the target? (Declarative knowledge, or DK)
a. Military
b. Hostile
c. Civilian
d. Peaceful

2. A submarine may have which of the following characteristics? (DK)
a. Speed 30 knots, Altitude/Depth - 20, Communication time 85 seconds.
b. Speed 30 knots, Altitude/Depth 0, Communication time 30 seconds.
c. Speed 20 knots, Altitude/Depth 0, Communication time 80 seconds.
d. Speed 20 knots, Altitude/Depth -20, Communication time 90 seconds.

3. A Maneuvering Pattern of Code Delta indicates the target is which of the following? (DK)
a. Air
b. Military
c. Surface
d. Civilian

4. A Blue Lagoon Direction of Origin indicates the target is which of the following? (DK)
a. Unknown
b. Sub
c. Civilian
d. Military

5. If a target's Altitude/Depth is 10 feet, what is the Type of the target? (DK)
a. Air
b. Surface
c. Submarine
d. Unknown

6. If a target’s Intelligence is Unavailable, what Class does this suggest for the target? (DK)
a. Air
b. Civilian
c. Military
d. Unknown

7. If a target’s characteristics are Communication Time = 20 seconds and Speed = 50 knots, which of the following actions should you take? (Strategic knowledge, or SK)
a. Choose Intent is Peaceful
b. Choose Type is Surface
c. Get another piece of information
d. Choose Type is Air

8. A Communication Time of 52 seconds indicates that the target is likely: (DK)
a. Air
b. Surface
c. Submarine
d. Unknown

9. If a target’s characteristics are Intelligence is Private and Maneuvering Pattern is Code Foxtrot, which of the following actions should you take? (SK)
a. Choose Class is Military
b. Choose Intent is Peaceful
c. Choose Class is Civilian
d. Choose Intent is Unknown

10. If a target’s Maneuvering Pattern is Code Echo, this suggests that the target falls into which category? (DK)
a. Class is unknown
b. Class is Military
c. Class is Hostile
d. Class is Peaceful

11. If a target’s Speed is 40 knots, what does this suggest about the target? (DK)
a. The target is Air
b. The target is Surface
c. The target is Civilian
d. The target is Military

12. Your Outer Defensive Perimeter is located at: (DK)
a. 64 nm
b. 128 nm
c. 256 nm
d. 512 nm

13. If you’ve just noticed three targets near your inner perimeter, which of the following should you do next? (SK)
a. Engage the target nearest the inner perimeter.
b. Engage the fastest target near the inner perimeter.
c. Zoom-Out to check the outer perimeter.
d. Zoom-In to check how close targets are to the inner perimeter.

14. If you Zoom-Out to find three targets clustered around your Outer Perimeter, how would you determine which target is the marker target? (SK)
a. Check to see which target is closest to the outer perimeter
b. Check the speeds of the targets
c. Check to see which target is Civilian
d. Check to see which target is Hostile

15. What is the purpose of marker targets? (DK)
a. To determine which Targets are Hostile and which are Peaceful
b. To locate your Inner Defensive Perimeter
c. To quickly determine the speeds of targets near your perimeters
d. To locate your Outer Defensive Perimeter

16. Which of the following pieces of information is NOT useful for prioritizing targets? (SK)
a. The distance of targets from the outer defensive perimeter.
b. Whether the target is peaceful or hostile.
c. The distance of targets from the inner defensive perimeter.
d. The speed of targets near your inner and outer defensive perimeters.

17. Which of the following functions is most useful for identifying marker targets? (DK)
a. Zoom-in
b. Right-button feedback.
c. Engage Shoot or Clear
d. Zoom-out

18. If three Targets are about 10 miles outside your outer defensive perimeter, which of the following should you do to prioritize the Targets? (SK)
a. Engage the fastest Target
b. Engage the hostile Target
c. Engage the closest Target
d. It makes no difference in what order you engage the Targets.

19. On the average, approximately how many Targets pop-up during each practice trial? (DK)
a. 1
b. 3
c. 6
d. 9

20. Which of the following would be the most effective strategy for defending your outer defensive perimeter? (SK)
a. Zoom-out to 128 nm, locate the Marker Targets, and check the speed of targets near the outer perimeter.
b. Zoom-out to 256 nm, locate the Marker Targets, and check the speed of targets near the outer perimeter.
c. Zoom-out to 128 nm, locate a Hostile Air Target, and check the speed of targets near that target.
d. Zoom-out to 256 nm, locate a Hostile Air Target, and check the speed of targets near that target.

21. If all penalty intrusions cost -100 points, which would be the most effective strategy? (SK)
a. Do not allow any Targets to enter your Inner Defensive perimeter, even if it means allowing targets to cross your Outer Defensive perimeter.
b. Do not allow any Targets to enter your Outer Defensive perimeter, even if it means allowing targets to cross your Inner Defensive perimeter.
c. Defend both your Inner and Outer Defensive perimeters equally.
d. None of these are effective strategies.

22. It is important to make trade-offs between targets: (SK)
a. That are Hostile and those that are Peaceful.
b. Approaching your Inner and Outer perimeters.
c. That are Civilian and those that are Military.
d. That have already crossed your Inner Defensive perimeter, and those that are approaching your Outer Defensive perimeter.

APPENDIX K: GOAL STRIVING MEASURES

Goal orientation (Vandewalle, 1997)
For each of the following statements, please indicate how true it is for you on the scale provided below. Response scale = strongly disagree (1) to strongly agree (5)

Goal Orientation Learning
  I am willing to take on challenges that I can learn a lot from.
  I often look for opportunities to develop new skills and knowledge.
  I enjoy challenging and difficult activities where I'll learn new skills.
  For me, development of my abilities is important enough to take risks.

Goal Orientation Prove:
  I prefer to do things that require a high level of ability and talent.
  I'm concerned with showing that I can perform better than my peers.
  I try to figure out what it takes to prove my ability to others.
  I enjoy it when others are aware of how well I am doing.
  I prefer to participate in things where I can prove my ability to others.

Goal Orientation Avoidance:
  I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others.
  Avoiding a show of low ability is more important to me than learning a new skill.
  I'm concerned about taking on a task if my performance would reveal that I had low ability.
  I prefer to avoid situations where I might perform poorly

Goal choice
You will receive 4.5 credits for participating in this study. You are also eligible to receive cash prizes or your photo in the psychology building for performing well in this study.

Please indicate which goal you would like to strive towards over the two study days:
1. Cash prizes
2. Photo in the psychology building
3. Both: Cash prizes and photo in the psychology building
4. Neither, I just want to receive the 4.5 credits

Goal commitment (Hollenbeck, Williams, and Klein, 1989)
Response scale = strongly disagree (1) to strongly agree (5)

Thinking of the goal you chose on the previous page, please indicate how true each statement is for you on the scale provided below:
1. It's hard to take this goal seriously. (reverse-coded)
2. Quite frankly, I don't care if I achieve this goal or not. (reverse-coded)

3. I am strongly committed to pursuing this goal.
4. It wouldn’t take much to make me abandon this goal. (reverse-coded)
5. I think this is a good goal to shoot for.

On-task cognition (Bell, 1999)

Response scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = frequently, 5 = constantly
This set of questions asks you to describe your thought during the last three trials/last performance period/the last nine trials. Please use the scales shown below to make your ratings.

1. I paid close attention to the kind of errors I was making.
2. I focused my attention on learning a specific rule.
3. I thought about new strategies for improving my performance.
4. I thought ahead to what I would do next to improve my performance.
5. I took “mental breaks” during the task.
6. I daydreamed while doing the task.
7. I lost interest in the task for short periods.
8. I thought about other things that I have to do.

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