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MOTIVATED TO ADAPT: APPLYING GOAL-SETTING THEORY, PRIMED SUBCONSCIOUS GOAL, AND IMPLEMENTATION INTENTION

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by

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ABSTRACT

This study investigated the effects that several motivational interventions have on transition and reacquisition adaptability. Goal-setting, whether assigned or self-set, had no effect on either form of adaptability; however, the two goal-setting conditions differed from each other once goal commitment was taken into consideration. High commitment was negatively associated to transition adaptability for assigned goals, but positively related for self-set goals; this trend was marginally significant in reacquisition adaptability as well. Primed subconscious goals were found to have no effect on either form of adaptability. An implementation intention was found to negatively relate to transition adaptability and to have no effect on reacquisition adaptability. Additionally, sex was found to be related to both forms of adaptability in that women displayed greater transition adaptability, while men displayed greater reacquisition adaptability than women.

Keywords: Adaptability, motivation, goal-setting, subconscious goals, nonconscious goals, implementation intention

Motivated to Adapt: Goal-Setting Theory, Primed Subconscious Goal, and Implementation Intention

The modern work environment is often characterized as beset by change; consequently the psychological contract has evolved to where organizations expect employees to be flexible enough to handle change (Cascio, 2003, Pulakos, Arad, Donovan, & Plamondon, 2000). Although change may be due to a variety of factors (e.g., technology and globalization; Cascio, 2003) and demand different types of response (Pulakos et al., 2000), the majority of research has focused on identifying the individual differences related to adaptability (i.e., how individuals respond to a change in their task environment; Lang & Bliese, 2009; LePine, Colquitt, & Erez, 2000). Knowledge of these characteristics has informed training design and selection systems (e.g., Pulakos, Dorsey, & White, 2006; Smith, Ford, & Kozlowski, 1997), but there has been little investigation into the motivational components of adaptation. Given that (a) motivation plays a role in any job-related behavior and (b) practical interventions are possible (Mitchell & Daniels, 2003), this lack of research into the effects of motivational interventions on adaptability should be addressed.

As such, the purpose of this study was to investigate the individual and interactive effects that four different motivational interventions (i.e., *assigned goal-setting*, *self-set goal-setting*, *primed subconscious goal*, and *implementation intention*) may have on an individual's adaptation. Although the included interventions were chosen due to their effectiveness, ease of implementation for practitioners, and theoretical links to adaptability (Bargh et al., 2001; Gollwitzer, 1999; Locke & Latham, 2002), they were also chosen because they represent two distinct streams of research. Whereas goal-setting is viewed predominately as a conscious process, the remaining two interventions are based on nonconscious processes (Latham, Stajkovic, & Locke, 2010; Stajkovic, Locke, & Blair, 2006). Considering that conscious and nonconscious processes have been found to exert unique effects on performance (Bargh et al., 2001), and behavior is often a function of both processes (Bargh, 1994), investigating techniques grounded in both streams of research allows for a more comprehensive understanding of how motivation may affect adaptation. Although Latham and colleagues (e.g., Latham & Pinder, 2005; Locke & Latham, 2002) have long requested research into how nonconscious motivation and implementation intentions interact with goal-setting, the literature remains scarce (Latham et al., 2010). Therefore, this study informs both the adaptability and motivation literatures.

Conscious and Nonconscious Processes

As mentioned previously, the motivational interventions were chosen because they stem from two distinct forms of mental processes: conscious and nonconscious. Since several excellent reviews exist outlining the key differences between these processes (Bargh, 1990; Bargh, 1994; Bargh & Chartrand, 1999), the four characteristics that define the boundaries between conscious and nonconscious processes will be discussed only briefly.

The first characteristic is awareness of the mental process itself (Bargh, 1994). Although awareness can be broken down into three separate components (Gawronski, Hofmann, & Wilbur, 2006), the most important is whether or not individuals are aware of the effect a stimulus has on their behavior (Bargh, 1994). If the individual is unaware of this effect, then the process is considered nonconscious. The second characteristic is intentionality of behavior, which refers to whether or not the individual has control over the instigation of behavior. If the behavior is not instigated in a deliberate manner, then the process is considered nonconscious. The third characteristic is the efficiency of attentional resources. Specifically, nonconscious processing incurs very little demand on our limited cognitive resources, whereas conscious processing tends to consume an appreciable amount of cognitive resources. The final characteristic is controllability, which refers to whether or not the individual has the motivation and ability to mitigate, stop, or even override a process once it has started. In conscious processing, such control is expected to be present and the individual can alter the process easily; however, in nonconscious processing, this control may either be difficult or impossible to attain and exercise.

The traditional view was that a process was either conscious or nonconscious on all four of these characteristics. Bargh (1989; 1994) challenged this viewpoint and, by using the existing literature, argued that a process is often a combination of conscious and nonconscious characteristics. As such, Bargh (1994) extolled researchers to clarify which characteristic(s) of nonconscious processing they are investigating.

In this study, both the primed subconscious goal and implementation intention interventions act via nonconscious processes. For the former, the relevant characteristic is that of awareness. Individuals were primed supraliminally, which means that the stimulus is consciously processed but people are unaware of its intended effect on behavior and that it is tied to a subsequent task (Bargh & Chartrand, 2000; Stajkovic et al., 2006). For the implementation intention, the applicable characteristic is intentionality. An implementation intention creates an association between an expected situational cue and a specific behavioral response (Gollwitzer, 1999). When the cue occurs, the associated behavior is instigated immediately and without conscious thought.

Adaptability

In the literature, adaptability has been operationalized inconsistently (LePine et al., 2000; Ployhart & Bliese, 2006); therefore, it is important to address how the current study defined and assessed that concept.

Adaptability refers to a person's response to a change in his/her environment (e.g., LePine et al., 2000; Smith et al., 2006). Individuals who successfully adjust to the new environment are described as being high in adaptability, whereas those individuals who do not successfully adjust are characterized as being low in adaptability. Given the practical implications for employee behavior and performance, the majority of research has investigated adaptability by employing the task-change paradigm (Lang & Bliese, 2009). In this design, individuals perform a complex novel task for several trials and then a change is introduced that results in the task becoming more complex for the remaining trials. Changes that increase task complexity are studied as they place a greater demand on the individual to adapt and are likely to be a more frequent occurrence in the workplace (Lang & Bliese, 2009; LePine, 2005), though it is possible a change could make a task simpler.

Although the task-change paradigm is the dominant method, it is not without limitations. Lang and Bliese (2009) recently reviewed this paradigm and its application to adaptability research and identified two key issues. The first is the dynamic nature of adaptability. That is, the change in the task environment has both an immediate and a prolonged effect on performance. Lang and Bliese (2009) purport that these effects require two conceptually distinct forms of adaptability. First, a change is expected to produce immediate negative effects on one's performance. Strategies an individual used during the pre-change stage may no longer be appropriate for the changed environment, but it is often difficult to cease employing previously effective strategies and this leads to a decrease in performance (Bröder & Schiffer, 2006). Thus, transition adaptability refers to the individual's "flexible and immediate reaction that minimizes performance decrease" (Lang & Bliese, 2009, p. 415). Compared to individuals who are low in transition adaptability, highly adaptive individuals should experience a smaller performance decrease. In contrast, reacquisition adaptability is the individual's "process of recovering following the immediate performance loss after a change" (Lang & Bliese, 2009, p. 415). That is, across the entire post-change period, individuals should experience performance improvement due to their reevaluation of pre-change task strategies and systematic learning of the new task environment. Those individuals who are high in reacquisition adaptability should recover from the performance loss more quickly than those who are low in reacquisition adaptability.

The second issue identified by Lang and Bliese (2009) is that no clear procedure exists for parceling out adaptability from other types of performance data. That is, before the change occurs and adaptability becomes a component of performance, individuals already differ in both their rate of performance improvement (skill acquisition) and their mean level of performance (basal task performance). The existence of such differences have been well supported in the literature on complex skill acquisition (e.g., Ackerman, 1988; Kanfer & Ackerman, 1989), which is akin to the pre-change stage of the task-change paradigm. To assess adaptability successfully, Lang and Bliese (2009) proposed that <u>skill acquisition rate</u> (the slope of the pre-change line in Figure 1) and <u>basal task performance</u> (the intercept of the pre-change line in Figure 1) be treated as covariates in statistical analyses of adaptability. Lang and Bliese (2009) maintain that researchers will only be able to distinguish the unique performance associated with adaptability when these components are appropriately controlled.

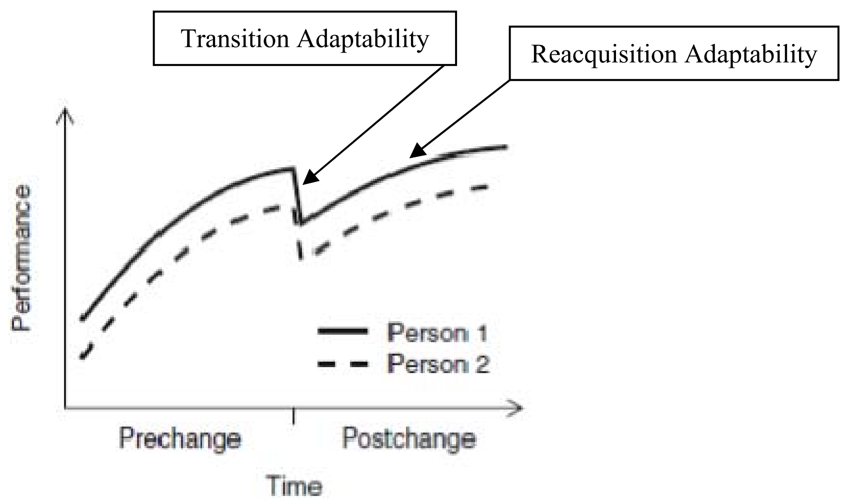

Figure 1. Example Lang & Bliese's (2009) Approach to Adaptability

Goal-setting

A goal is a standard that an individual would like to achieve (Locke & Latham, 2002). By developing a goal, a discrepancy between the present and future state of an individual is created and this difference arouses the individual to action (Carver & Sheier, 1982; Latham, 2007; Mitchell & Daniels, 2003). Specifically, it is thought to affect an individual's performance in four separate ways.

First, the goal serves as direction in that it guides the individual's attention and action to goal-relevant information/activities and away from irrelevant information/activities (Locke & Latham, 2002). Second, a goal leads individuals to exert more effort in the task (Mitchell & Daniels, 2003). Third, a goal affects how long individuals will sustain their effort (Locke & Latham, 2002). Goals, especially difficult ones, will prolong the effort a person commits to achieving the goal. Finally, the goal also affects the development and use of task-relevant knowledge and strategies. Specifically, individuals will seek out and implement a strategy that hopefully will lead to the completion of the goal.

The main findings of goal-setting research are that specific and difficult assigned or self-set goals lead individuals to perform at a higher level than individuals who have either a non-specific goal (i.e., "do your best") or a specific but easy goal (e.g., Stajkovic et al., 2006). The effect of goals on performance ranges from medium to large (Cohen's *d* of .52 to .82), with the relationship between formally set goals and performance being affected by several moderators, such as feedback on goal progress and goal commitment (Locke & Latham, 1990).

The current study investigated the effects of both assigned and self-set goals. Although they tend to have similar effects on performance (Hinsz, Kalnbach, & Lorentz, 1997; Locke & Latham, 2002), evidence exists to suggest that they might differ in their effects on adaptability. For example, across several studies, the positive relationship between goals and performance was stronger for self-set than for assigned goals (Locke, 2000). When the task was complex, though, only self-set goals were found to be related with performance. Given that the task-change paradigm is predicated on increasing complexity in an already complex task, differences may arise between how self-set and assigned goals operate in such an environment.

Role in Adaptability. Only one study (i.e., Audia, Locke, & Smith, 2000) has related goal-setting theory directly to the concept of adaptability. However, recent research in goal-setting has been concerned with the distinction between learning and performance goals (Locke & Latham, 2002). Although never related directly to adaptability, the findings from this research may also be relevant to understanding how goal-setting affects adaptability.

Audia et al. (2000) investigated if individuals would persist in using an outdated strategy following a radical change in the task environment. As expected of goal-setting, they found that past success on the task led to higher satisfaction, self-efficacy, and self-set goals. However, the higher satisfaction also led to a greater reliance on past strategies and a belief in the correctness of those strategies. Based upon this overreliance and presumed belief, individuals persisted in using past strategies that were no longer effective in the new environment. This notion of dysfunctional persistence was new to the goal-setting literature, but no subsequent research has investigated it further. Research from other domains, however, can be used to bolster the understanding of dysfunctional persistence.

In the decision-making literature, Bröder and Schiffer (2006) not only found evidence of dysfunctional persistence, but that neither a hint about the upcoming change nor monetary incentives for high performance were able to mitigate its effects. Additionally, they found that individuals automatically used the outdated strategy without close regard to its consequences in the new environment, which lends support to the notion that nonconscious processes may play a role in such persistence. Other researchers have found that a goal can become associated with a means or strategy to achieving it (Aarts & Dijksterhuis, 2000; Danner, Aarts, & de Vries, 2007; Lord & Kernan, 1987; Tubbs & Ekeberg, 1991). When that association occurs repeatedly, it becomes strong enough to form a habit (Danner et al., 2007).

The virtue of habit creation is that people are able to mentally retrieve and execute the strategy without much conscious thought, but a detrimental effect is that other relevant strategies may be suppressed. Across three separate studies, Danner et al. (2007) not only found that the development of a habit led to the inhibition of alternative task strategies, but that this inhibition occurred on the nonconscious level. Once a habit is formed, individuals may never become consciously aware of the availability of alternative strategies and will tend to select and execute the strategy they can access readily. Although this is efficient in a stable situation, such automaticity may lead to dysfunctional persistence in an unstable task environment.

Habits also seem closely related to the concept of scripts used in the goal-setting literature (Lord & Kernan, 1987; Tubbs & Ekeberg, 1991). A script is a knowledge structure that organizes information regarding a task, specifically the means and ends which assist in guiding a person's behavior (Lord & Kernan, 1987). Therefore, scripts represent behaviors that may assist in goal completion. Lord and Kernan (1987) thought that the most frequently used behaviors in a script would become associated with a certain goal and, as a result, be more readily accessible.

In sum, both the goal-setting (Audia et al., 2000) and decision-making (Bröder & Schiffer, 2006) literature provide discussion of dysfunctional strategy persistence. Although the persistence may be explained via habits and/or scripts, perhaps the most interesting conclusion has been that this problem appears to be exacerbated by the otherwise positive outcomes associated with goal-setting (i.e., higher satisfaction, self-efficacy, and goals; Audia et al., 2000). It also seems possible that a less specific goal would be less prone to such dysfunction. Given that Lang and Bliese's (2009) discussion of transition adaptability focused on the need to minimize the performance decrease associated with dysfunctional persistence, it is hypothesized that:

Hypothesis 1: Individuals told to "do your best" will display significantly greater transition adaptability than individuals who are assigned specific difficult goals.

Hypothesis 2: Individuals told to "do your best" will display significantly greater transition adaptability than individuals who set their own specific difficult goals.

In regards to reacquisition adaptability, it is useful to consider the research into learning versus performance goals. Kanfer and Ackerman (1989) were the first to observe that being assigned a difficult goal during the initial stages of learning a task led to significantly worse performance than did having no goal at all. They concluded that goal-setting is most appropriate for tasks where the requisite skills are already learned and automatized. Winters and Latham (1996) replicated these findings, but also discovered that this decrease in performance was moderated by the type of assigned goal and by task complexity. With complex tasks, they found that if the assigned goal was *performance-based* and individuals were still learning the task, performance was worse than if they were just told to "do your best." This observed decrease is potentially the result of individuals' apprehension about failing to achieve the assigned goal, which interferes with their learning the strategies needed for acceptable task performance. On the other hand, if the assigned goal was *learning-based*, then individuals performed better than they did when told to "do your best" because their goal encouraged them to learn the requisite skills and/or strategies for performing well in the task.

To summarize, reacquisition adaptability pertains to an individual's systematic and analytical learning of the post-change task environment (Lang & Bliese, 2009) and assigned *performance-based* goals have been found to be a detriment during such processes (Kanfer & Ackerman, 1989; Winters & Latham, 1996). As such, it is hypothesized that:

Hypothesis 3: Individuals told to "do your best" will display significantly greater reacquisition adaptability than individuals who are assigned specific difficult goals.

Hypothesis 4: Individuals told to "do your best" will display significantly greater reacquisition adaptability than individuals who set their own specific difficult goals.

Primed Subconscious Goals

Prior to Bargh et al. (2001), goal pursuit and nonconscious processing were discussed primarily in terms of well-learned procedures operating automatically. To activate these procedures, Bargh et al. hypothesized that goal pursuit could be activated nonconsciously and with the same results as conscious pursuit. That is, a nonconsciously activated goal could affect the same processes of direction, effort, persistence, and strategy development/usage as would a conscious goal. The only difference would be whether or not individuals were aware of how the goal became activated.

To achieve this, Bargh et al. (2001) used priming as a means to induce nonconscious goal pursuit. Priming is considered to be the subconscious activation of a mental representation, which then acts upon other psychological processes via the environment (Bargh & Chartrand, 2000). A priming stimulus can be either *subliminal* (below threshold level of awareness) or *supraliminal* (consciously accessible, but with no apparent link to later behavior). Bargh et al. (2001) and most others have used the latter approach (Latham et al., 2010). For example, Bargh et al. (2001) had individuals complete a word-search task laced with achievement-related words (e.g., win, compete, achieve) to nonconsciously activate the mental representation of achievement and, in turn, the psychological processes often associated with achievement. Despite being unaware of how the word-search had affected their behavior, the experimental group performed significantly better than the control group in a subsequent task.

Nonconscious goal pursuit has received much empirical support (Bargh et al., 2001; Gollwitzer & Bargh, 2005), but it remains relatively unstudied in organizational research (Latham et al., 2010). The three available studies (Shantz & Latham, 2009; Shantz & Latham, 2011; Stajkovic et al., 2006) found that supraliminal priming improved performance over that of a control group (Cohen's *d* of .56; Shantz & Latham, 2011).

Role in Adaptability. Conscious and nonconscious processes can differ in terms of awareness, intentionality, efficiency, and controllability (Bargh, 1994), though researchers have most often focused on controllability in differentiating the two processes (Hassin, Bargh, & Zimerman, 2009). Specifically, a conscious process tends to be viewed as fluid, whereas a nonconscious process is often viewed as fixed. As such, nonconscious processes have been viewed as inherently less flexible and adaptive to changing circumstances, though recently Hassin and colleagues (Eitam, Hassin, & Schul, 2008; Hassin, Aarts, Eitam, Custers, & Kleiman, 2007; Hassin, 2008; Hassin et al., 2009) have challenged this position.

Hassin et al. (2007) reasoned that if nonconscious goal pursuit was highly inflexible, then the dynamic nature of the world would render such pursuits ineffective and individuals would have to rely predominately on conscious goal pursuit. Because conscious processes are notably limited in terms of the mental resources available (Bargh & Chartrand, 1999), the conclusion that almost all goal pursuits were conscious is "psychologically improbable" (Hassin et al., 2007, p. 6). They concluded that for nonconscious goal pursuits to be effective, these nonconscious routines must adapt to the environment when necessary. Not only has subsequent research (Eitam et al., 2008; Hassin, 2008; Hassin et al., 2009) supported this proposition, two investigations tested it in a manner directly relevant to the present study.

First, Hassin et al. (2009) set out to investigate the above proposition in two studies using two traditional cognitive methods (Wisconsin Card Sorting Test and the Iowa Gambling Task) for assessing adaptability. In both studies, participants were supraliminally primed for an achievement goal via achievement-related words contained in a word-search puzzle. When compared to the neutral prime condition, a primed achievement goal led to more flexible goal-related behavior and better performance in both studies. In addition to these results, both studies found that the achievement-primed group committed less perseverative errors. As described by Hassin et al. (2009), "When a participant persists sorting according to a rule that is no longer valid his errors are scored as perseverative errors…The more we persevere using a strategy that is no longer working, the less flexible we are" (p. 24). This notion of perseverative errors is very similar to dysfunctional persistence in that both refer to using past strategies rendered ineffective due to change (Audia et al., 2000). By measuring the number of such errors, Hassin et al. (2009) had a dependent variable theoretically similar to *transition adaptability* (Lang & Bliese, 2009) and they concluded that the primed group was more successful than the control group in disengaging from ineffective past strategies. Therefore, it is hypothesized that:

Hypothesis 5: Individuals primed to achieve will display greater transition adaptability than individuals who receive a neutral prime.

Hassin et al. (2009) also produced a finding relevant to *reacquisition adaptability,* in that primed participants were significantly better at identifying the appropriate strategy in the post-change environment. To further support this link, Eitam et al. (2008) reasoned that subconscious goals could drive implicit learning of goal-relevant information. Across two studies, Eitam et al. found that priming participants with achievement-related words led to quicker learning of a novel task. Based upon these findings, it is hypothesized that:

Hypothesis 6: Individuals primed to achieve will display greater reacquisition adaptability than individuals who receive a neutral prime.

Implementation Intentions

Motivational research in both organizational (Tubbs & Ekeberg, 1991) and social psychology (Gollwitzer, 1993) has identified two major components to goal pursuit. The first component is the desired outcome or *goal intention*. The second is the action plan (Tubbs & Ekeberg, 1991) or *implementation intention* (Gollwitzer, 1993), which identifies the when, where, and how a person should behave in order to reach the goal.

Gollwitzer (1993) argued that this latter component is often not instituted effectively, so he developed an approach to bolster its proper execution. Although the structure of *implementation intentions* can differ, the standard method has been for individuals to make a comment similar to "If situation *x* occurs, then I will do *y*." Despite being a simple statement, a recent meta-analysis (Gollwitzer & Sheeran, 2006) of 63 diverse studies (e.g., goals for writing a curriculum vitae, exercising, dieting, combating stereotypes, selecting applicants, and New Year resolutions) found that stating such an intention has a medium to large effect on goal achievement (Cohen's $d = .65$).

These statements may be effective due to the creation of a mental link between a certain situation and a goal-directed behavior (Gollwitzer, 1999). This mental link makes the specified situation more accessible and, therefore, more likely to be noticed by an individual. If the specified situation is noticed, then the action that has become linked to it is more likely to be taken. Gollwitzer (1999) describes the usage of an implementation intention as "passing the control of one's behavior on to the environment" (p. 495), meaning that the individual no longer has to decide what to do and when to do it. As such, problems that can derail a more conscious goal pursuit are limited, because goal-directed behavior is now less reliant on the person's active involvement.

It is important to note that when an implementation intention is *assigned by an authority figure*, it could be construed as being an instruction. If so, the observed effect(s) of an implementation intention may not be due to the processes outlined by Gollwitzer (1999), but merely to the presence of additional task-relevant information. Although evidence exists to support Gollwitzer's notion (Aarts et al., 1999; Sheeran, Webb, & Gollwitzer, 2005; Webb & Sheeran, 2007, Webb & Sheeran, 2008), the current study investigated the underlying processes with a manipulation check. If the results support Gollwitzer's view, then it would suggest that the implementation intention contributed to performance beyond task-relevant information.

Despite demonstrated effectiveness, implementation intentions have received little attention in organizational literature (Latham et al., 2010). Only one study has manipulated an implementation intention and performance did improve (Diefendorff & Lord, 2003).

Role in Adaptability. Implementation intention research has focused almost exclusively on the use of very specific intentions (Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008); however, changes in the task environment are often unexpected and most adaptability studies do not inform individuals that a change is going to occur, let alone what that change is going to be (Lang & Bliese, 2009). Therefore, a very specific implementation intention might not be flexible enough for an unexpected change. To address this possibility, the current study will adopt the usage of a "broad" implementation intention. Only one study has used a broad implementation intention in a manner that is relevant to the current study.

Henderson, Gollwitzer, and Oettingen (2006) studied whether an assigned implementation intention could prompt individuals to disengage from a failing course of action. They assigned participants a broad implementation intention: "If I receive disappointing feedback, then I'll think about how things have been going with my strategy" (Henderson et al., 2006, p. 84). Individuals who were assigned this implementation intention were more likely to change a failing strategy than those who were not assigned the implementation intention. This result suggests that *transition adaptability* could be influenced by having a broad implementation intention.

Additional support can be found in a recent study by Holland, Aarts, and Langendam (2006), who found that implementation intentions were an effective tool for breaking down established recycling habits in the workplace. This study was the first empirical demonstration that a simple planning behavior, in essence an implementation intention, could override an ingrained habit and change a person's behavior. Given that habits can lead to dysfunctional persistence via inhibiting the consideration of alternative strategies (Danner et al., 2007), an implementation intention may improve transition adaptability by counteracting this inhibitory tendency. The following is hypothesized:

Hypothesis 7: Individuals who are assigned an implementation intention will display significantly greater transition adaptability than individuals who are not assigned an implementation intention.

No implementation intention research has investigated *reacquisition adaptability*, as the only purpose of an implementation intention is to *initiate* behavior (Gollwitzer, 1999). Reacquisition adaptability is not a simple behavior, but a collection of systematic and analytical learning processes (Lang & Bliese, 2009). Although an implementation intention may trigger this process sooner by improving transition adaptability, the learning process itself should be too complex to be shaped by a simple if-then statement.

Hypothesis 8: Individuals who are assigned an implementation intention will not significantly differ in reacquisition adaptability from individuals who are not assigned an implementation intention.

Research Question

Little research exists to suggest that any of the motivational approaches have interactive effects on adaptability. Of the extant research, only two studies have investigated the interaction of assigned goal-setting and a primed subconscious goal and both found no significant results (Shantz & Latham, 2009; Stajkovic et al., 2006). Although one may attempt to extend these findings into the domain of adaptability, the problem with so doing is that neither of these studies had dependent variables or designs relevant to adaptability. Given that, and because no research has investigated any of the other possible interactions in any way relevant to adaptability, the present study's investigation into interactions was exploratory in nature.

Research Question: Do any of the motivational interventions interact to affect either form of adaptability?

Method

Participants

A total of 281 adults were recruited from Amazon Mechanical Turks to participate in this study. Participation was voluntary; however, participants were awarded $10 upon completion of the study. The mean age of participants was 32.71 years (*SD* = 9.83), with 53% being male, 41% being female, and the remaining 6% unidentified. The racioethnic composition of the sample was 78% Caucasian, 10% African American, 7% Asian, and 5% Hispanic.

Apparatus and Materials

Inquisit. Inquisit 3.0.6.0 (Millisecond, 2012) was used to program the experiment and record all the related data.

Task. The task developed for this study was based off of a multiple cue probability learning task called TIDE[2] (Hollenbeck, Sego, Ilgen, & Major, 1991). This task was chosen as it was previously modified for use with individuals and has been used in previous adaptability studies (LePine, Colquitt, & Erez, 2000; LePine, 2005).

In this task, participants played the role of a naval commander and must decide how to respond to multiple unidentified and potentially hostile aircraft around their location. They were provided three reports (designated Alpha, Bravo, and Charlie) which outlined different characteristics about each aircraft and offered an estimated threat level for each report (see Appendix A for an example).

Based upon these three estimated threat values, participants were informed that they have to additively combine these individual reports to determine the actual threat, which ranges from 0 (completely nonthreatening) to 20 (extremely threatening), posed by the aircraft. However, participants were also informed that not all reports were necessarily equally important in determining an aircraft's actual threat. For example, if all the reports were equally important, they would be weighted the same (i.e., a weighting of 1), while if report Charlie was twice as important as the other reports, it would be weighted as such (i.e., Charlie has a weighting of 2 and the other reports a weighting of 1). Participants were not told which report(s) were important, but were informed that they had to figure it out on their own.

Once participants determined how much threat the aircraft poses, they matched the level of threat with one of seven decisions that ranged from nonaggressive (i.e., ignore the aircraft) to extremely aggressive (i.e., immediately attack the aircraft). After the decision was made, participants received immediate feedback about (1) their accuracy, (2) what the correct answer was, and (3) how their score changed.

Practice trial. Participants completed one practice trial, which contained three aircraft. During this trial, the aircraft information was constructed so that each report was equally weighted (i.e., all of them were weighted as 1). By doing so, participants were able to be acquainted with the task and its interface, but not create an expectation that one report was more important than the others. After completing this trial, participants underwent their respective manipulations.

Experimental trials. All ten trials were composed of five airplanes each. The first five experimental trials (i.e., pre-change trials) had the same underlying weighting to the reports. That is, reports Alpha and Bravo were weighted by 1, while report Charlie was weighted by 2. The last five experimental trials (the post-change trials, with Trial 6 being the change trial) differed from the pre-change trials in that the underlying report weighting changed. Reports Alpha and Charlie were weighted by 1, while Bravo was weighted by 2.

Detection and Demographics. Participants were asked a single question to assess if the change was detected (Jundt, 2010): "After the first trial, did you notice a change in how important the reports were?" If participants indicated that they noticed a change, they were asked to identify on which trial the change occurred. Participants' age, sex, and racioethnic group were also be collected. See Appendix B for the detection and demographics sheet.

Self-efficacy. Adapted from past research (Audia et al., 2000; Hinsz et al., 1997; Tubbs, Boehne, & Dahl, 1993), participants were asked 10 questions to assess their confidence (0-100) that they could attain a certain level of performance. The sum of these 10 questions represents their self-efficacy. See Appendix C for the self-efficacy scale.

Goal Commitment. Goal commitment was assessed via the 5-item scale (α = .74) recommended by Klein et al. (2001). See Appendix C for this measure.

I-ADAPT. Thirteen items were used from Ployhart and Bliese's (2006) measure of individual adaptability. One scale assessed how individuals viewed their ability to deal with uncertainty and the other assessed how they handled learning new material. See Appendix D for these measures.

Task Performance. Task performance was measured as the score at the end of each trial.

Discontinuous Growth Model Variables. In the process of creating a Level-1 discontinuous growth model predicting performance as a function of time, it is possible to compute the empirical Bayes estimate of each Level-1 parameter for each individual (Chen, Ployhart, Thomas, Anderson, & Bliese, 2011). In turn, these estimates can be used in other statistical analyses (Lang & Bliese, 2009). The following variables were all collected by the results of the Level-1 model.

Intercept (Basal Task Performance). This was assessed as the intercept of the Level-1 model, which is a participant's performance at the first trial.

Skill Acquisition. Skill acquisition was measured as the slope over the entire pre-change period, which is the growth in performance between the first and the fifth trials. Based upon the Level-1 model, this measure can be linear, quadratic, and/or cubic.

Transition Adaptability. Transition adaptability was measured as the slope from the last pre-change trial to the first post-change trial, which is the decline in performance between the fifth and sixth trials.

Reacquisition Adaptability. Reacquisition adaptability was assessed as the slope across the entire post-change period, which is the growth in performance between the sixth and tenth trials. Based upon the Level-1 model, this measure can be linear, quadratic, and/or cubic.

Procedure

Design. This study was a 3 (Goal-setting: Assigned Goal, Self-set Goal, "Do your best" Goal) x 2 (Primed Subconscious Goal: Neutral, Prime) x 3 (Implementation Intention: Intention, Strong Control, Weak Control) fully crossed factorial design with 15-17 participants per condition, see Table 1 for more detail on sample sizes. The dependent variables investigated were transition and reacquisition adaptability. Additionally, a self-report measure of adaptability (I-ADAPT) and a measure of goal commitment were collected for exploratory analyses. The flow of the entire study is displayed in Figure 2.

Table 1

Condition Sample Sizes

Condition	*n*
GS	
Assigned	95
Self-set	91
Do your best	95
PSG	
Neutral	142
Prime	139
II	
Intention	95
Strong Control	96
Weak Control	90
GS x PSG	
Do your best, Neutral	48
Do your best, Prime	47
Assigned, Neutral	48
Assigned, Prime	47
Self-set, Neutral	46
Self-set, Prime	45
GS x II	
Do your best, Weak Control	30
Do your best, Strong Control	31
Do your best, Intention	34
Assigned, Weak Control	30
Assigned, Strong Control	34
Assigned, Intention	31
Self-set, Weak Control	30
Self-set, Strong Control	31
Self-set, Intention	30
PSG x II	
Neutral, Weak Control	30
Neutral, Strong Control	31
Neutral, Intention	34
Prime, Weak Control	30
Prime, Strong Control	34
Prime, Intention	31

Table 1 (cont.)

Condition Sample Sizes

Condition	*n*
GS x PSG x II	
Assigned, Neutral, Intention	16
Assigned, Neutral, Strong Control	17
Assigned, Neutral, Weak Control	15
Assigned, Prime, Intention	15
Assigned, Prime, Strong Control	17
Assigned, Prime, Weak Control	15
Self-set, Neutral, Intention	15
Self-set, Neutral, Strong Control	16
Self-set, Neutral, Weak Control	15
Self-set, Prime, Intention	15
Self-set, Prime, Strong Control	15
Self-set, Prime, Weak Control	15
Do your best, Neutral, Intention	17
Do your best, Neutral, Strong Control	16
Do your best, Neutral, Weak Control	15
Do your best, Prime, Intention	17
Do your best, Prime, Strong Control	15
Do your best, Prime, Weak Control	15

Note: GS = Goal-setting; PSG = Primed Subconscious Goal; II = Implementation Intention.

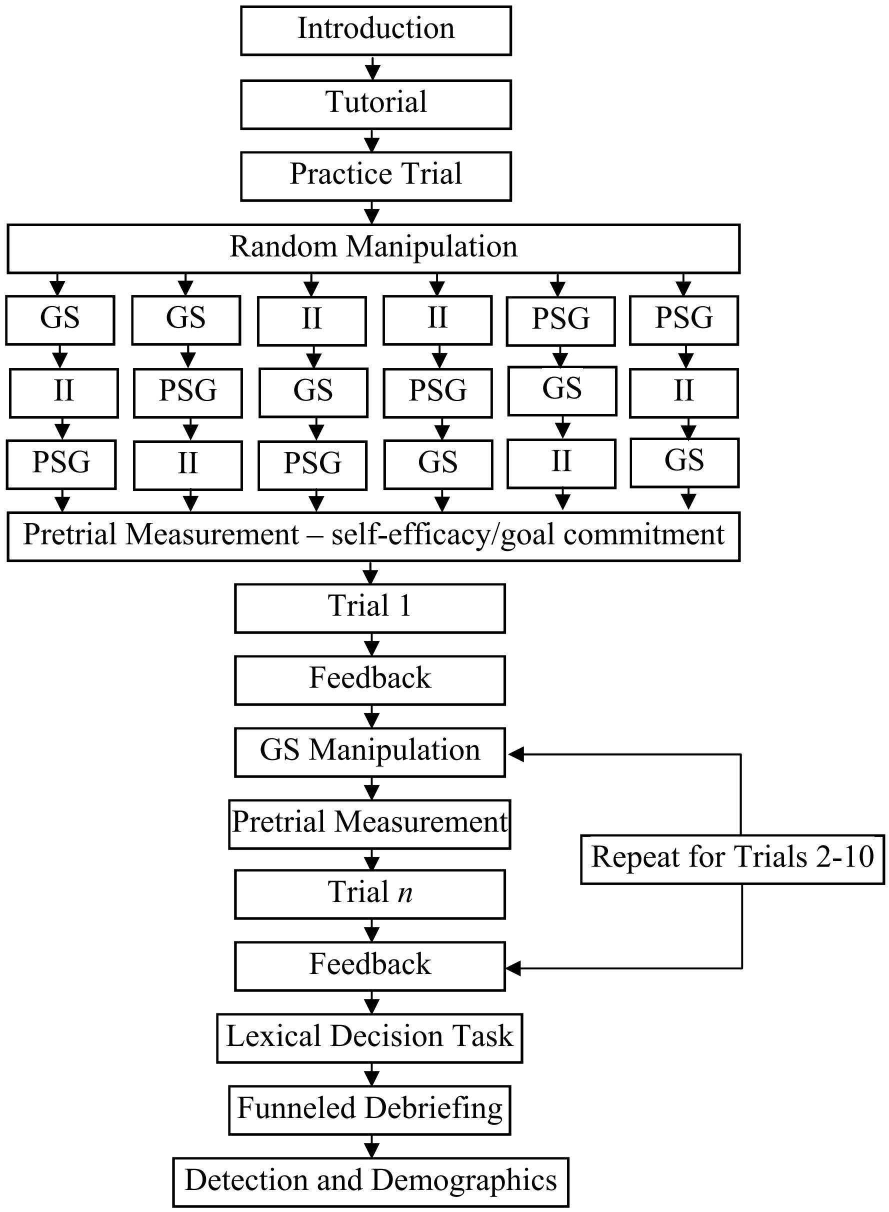

Figure 2. Progression of study.

Introduction and tutorial. On the Amazon website, participants saw a brief introduction to the study and, upon selecting the experiment, were taken to survey that walked participants through the remainder of the study. First, the informed consent was administered and then the I-ADAPT measures. After completing both, participants were directed to the Inquisit-based task, which assigned them to one of the 18 conditions. Given the complexity of the task, participants were given both a visual and audio introduction and tutorial to the task (Appendix E). Participants could not advance from a section of the introduction until the audio, which was the reading of that section, had fully played.

Manipulations. It is important to note that the goal-setting manipulation occurred before every trial, while the primed subconscious goal and implementation intention manipulations were conducted only before the first trial. This design decision was made as goal-setting has traditionally focused on individual trials and immediate effects, whereas primed subconscious goals and implementation intentions are traditionally single manipulations with theoretically longer-term effects. Additionally, by manipulating the primed subconscious goal and implementation intention before the first trial, a 25 minute delay existed between the manipulation and the critical change trial. Nonconscious techniques are often manipulated a few minutes before a task and such a short delay may bolster any observed effects (Latham et al., 2010). The 25 minute delay provided a more stringent test than if the manipulation had occurred right before the change trials.

Goal-setting manipulations. Goals were manipulated by presenting one of three types of information before every experimental trial and, throughout the experiment, the goal condition remained the same for participants.

Participants in the ‘do your best’ condition were told, “For the next trial of 5 aircraft, we ask that you do your best to score as high as possible.”

In the self-set goal condition, participants were instructed to set a difficult, but attainable, goal (Latham & Marshall, 1982) regarding their performance at the end of the trial. Specifically, they were asked, “"For the next trial of 5 aircraft, please set a difficult, but achievable, goal for what score you will achieve at the end of the trial -- for example, 9. Goals can range from -10 to 10, with 10 being perfect performance." To ensure that the self-set goal was of adequate difficulty, this study anchored the instruction with a high-performing goal (i.e., 9) to act as a frame of reference. Hinsz et al. (1997) reported that anchoring such instructions lead to significantly higher goals, self-efficacy, and task performance without reducing goal commitment.

For the assigned goal condition, participants were informed that a performance goal has been set for the upcoming trial. Specifically, they were told, “For the next trial of 5 aircraft, you have been assigned the following challenging goal as to what score you will achieve at the end of the trial. Goals can range from -10 to 10, with 10 being perfect performance. Your goal is: [insert trial goal].”

When comparing the findings of self-set and assigned goals, goal difficulty can vary between the conditions and become a confound (Hinsz et al., 1997). An assigned goal can be yoked as a means to hold goal difficulty constant (Latham, Steele, & Saari, 1982). Yoking is a procedure in which a previous sample’s observed performance can be used as determinants of the assigned goals used in another sample. By using the yoking procedure, any observed performance differences between self-set and assigned goal conditions can be attributed to the source of the goal, not its difficulty. A pilot study of 63 participants was conducted for the self-set goal conditions only. Given previous research's dictum that a truly difficult goal is one where only the top 10% achieve it (Locke, 1991; Winters & Latham, 1996), the goal for every trial, with the exception of the change trial, was set at the 90th percentile of performance. For the change trial, the goal was set at the 90% percentile of self-set goals so as to avoid informing participants that a change was going to happen. Therefore, Trial 1's goal was 7, Trial 2's goal was 8, and Trial 3 through 10's goals was 10. Note that the average and 90th percentile of self-set goals and performance may differ between the pilot study and the experimental sample. Although Hinsz et al. (1997) used this procedure and found conditions to not significantly differ, this study investigated if differences existed as their presence could mean that goal difficulty was not fully controlled.

Primed subconscious goal manipulations. A nonconscious achievement goal was primed supraliminally via an achievement-oriented word search matrix (e.g., Bargh et al., 2001; Eitam et al., 2008; Hassin et al., 2009; Stajkovic et al., 2006). Specifically, in both control and experimental conditions, participants located a total of 13 words embedded in a 10 x 10 matrix of letters. The conditions shared six neutral words: *book, desk, lamp, phone, picture,* and *sand*. The remaining seven words differed based on the condition (Bargh et al., 2001). For the control condition, participants located seven additional neutral words: *carpet, folder, hat, shampoo, stairs, stapler,* and *window* (see Appendix F). In the experimental condition, the seven additional words were related to the concept of high performance: *win, compete, succeed, strive, attain, achieve,* and *master* (see Appendix G).

Due to the structure of Inquisit, participants were exposed to their respective crossword with two words per page to find, with a total of seven pages shown. The words were presented in the same order as they are listed in the appendices. Additionally, since participants could not directly interact with the crossword, each letter of the crossword was assigned a numerical subscript and participants were asked to record the numbers associated with the beginning and ending letter of the word; see Appendices F and G for more detail.

Implementation intention manipulations. For the experimental condition, the majority of previous research has either allowed participants to develop their own intentions freely (Studies 1 and 2 in Gollwitzer & Brandstätter, 1997; Martijn et al., 2008) or provided one to them (Study 3 in Gollwitzer & Brandstätter, 1997; Henderson et al., 2006). Given that participants were neither informed that a change was going to happen nor what the change could entail, their ability to set broad intention capable of addressing any change was limited. As such, an implementation intention was provided to participants. Additionally, participants were asked to rehearse this intention to assist in retention (Henderson et al., 2006). Taken together, participants in the experimental condition (Appendix H) wrote down the following implementation intention five times: "If a change occurs, then I will reconsider how I approach the task." The 'if' and 'then' components of the intention were selected for specific reasons.

The wording of the 'if' component was selected due to recent adaptability research by Jundt (2010). Across three separate conditions, the average percentage of participants who recognized that a task-change had occurred was 92%. By using “If a change occurs” as the ‘if’ component, the statement capitalizes on a highly visible cue that is broad enough to encapsulate any change.

The ‘then’ component was chosen due to its simplicity and function. It does not ask participants to approach the changed task in a new manner necessarily, but only to stop and consider how they are approaching the task. It does not negate their previous task knowledge and/or strategies, but serves as a prompt that the observed changes may affect how the task is best addressed. As Gollwitzer (1999) intended, this component is merely meant to initiate this behavior.

For the control condition, past researchers have also used a variety of methods; see Table 2 for a list of examples.

Table 2

Example Control Conditions in Implementation Intention Research.

Article	Control Condition(s)	Comments
Achtziger, Gollwitzer, & Sheeran, 2008	Study 1: Nothing occurred Study 2: Goal intention	
Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009	Nothing occurred	
Brandstätter, Lengfelder, & Gollwitzer, 2001	Study 3 & 4: Received a similar instruction, familiarized with environmental cue, and given another method to speed up reaction time	Control was developed to control for experimenter demand associated with the then-component's behavior of reacting fast
Diefendorff & Lord, 2003	Solved simple math problems	
Gollwitzer & Brandstätter, 1997	Study 2: Nothing occurred Study 3: Control I: Received similar instructions; Control II: Received similar instructions and informed they would have to counter-argue	The experimental condition had Ps create an intention on when to counter-argue. Control II was developed to control for this foreknowledge of future behavior
Henderson, Gollwitzer, & Oettingen, 2007	Study 1: Nothing occurred	
Holland, Aarts, & Langendam, 2006	One condition received nothing; another received a questionnaire similar to that in the experimental condition	
Parks-Stamm, Gollwitzer, & Oettingen, 2007	Study 1 & 2: Similar familiarization of environmental cue and the then-component's behavior	
Sheeran, Webb, & Gollwitzer, 2005	Study 1: Nothing occurred	
Webb & Sheeran, 2007	Repeated the environmental cue under their breath for 30 seconds	
Wieber, Odenthal, & Gollwitzer, 2010	Wrote down goal intention	

Of particular note were the studies done by Brandstätter and colleagues (Brandstätter, Lengfelder, & Gollwitzer, 2001; Gollwitzer and Brandstätter, 1997) where they attempted to control for two potential confounds in implementation intention research. First, in Gollwitzer and Brandstätter (1997), they noted that the ‘if’ component of an implementation intention was a source of task-relevant information that is given before the task begins. Without providing similar information to the control condition, any difference between the experimental and control condition could have occurred due to the implementation intention containing a forewarning about the task. To address this concern, they created a second control condition which offered the same task-relevant information given in the implementation intention, but not in the form of such an intention. Second, in Study 3 of Brandstätter, Lengfelder, and Gollwitzer (2001), they noted that the effect associated with an implementation intention may also be due to experimenter demand in that participants could just be complying with the experimenter’s instruction located in the behavioral component of the intention statement. That is, the ‘then’ component operates as an instruction of what the participant should do given the environmental cue. To address this concern, they created a control condition that provided a similar instruction, but in a different format so as to not create an implementation intention.

By combining these two approaches, the most stringent design for the control condition is to receive both the information contained in the ‘if’ component and a ‘then’ component-instruction similar to that received in the experimental condition. Not only does this help to control for experimenter demand, but it provides another test of Gollwitzer’s (1999) explanation behind the implementation intention. If it is more than an instruction with task-relevant information and it works through nonconscious associations (Gollwitzer, 1999), then the performance of participants receiving the implementation intention should still significantly differ from those who do not. It is important to note that this control (hereafter, strong control) is more stringent than most control conditions in implementation intention research. Therefore, it is possible that this strong control may nullify the observed effect of the implementation intention, whereas the observed effect of the intention may be greater when compared to a weaker control (hereafter, weak control). To capture this possibility, the current study used both a weak and strong control.

The weak control received no information or instruction, but immediately continued onto another manipulation or the task itself. For the strong control (Appendix H), participants were instructed to write the following five times, "To help you deal with any possible change you may encounter, we suggest that you reconsider how you approach the task." Note that participants in the strong control received the same information that a change could happen and the same instruction on how they should deal with such change as the experimental condition, but not in the same form as an implementation intention.

Trial measurement and feedback. For the participants who were assigned to either of the goal-setting experimental conditions, they completed the goal commitment scale after receiving/setting their goal but before any of the experimental trials started. For all participants, once they finished a trial, their final scores were displayed for that trial. Additionally, if a participant was in either of the goal-setting experimental conditions, their assigned/set goal for that trial was displayed as well.

Manipulation checks. After the experimental trials were completed, participants completed two manipulation checks.

Implementation Intention: Lexical Decision Task. Implementation intentions are thought to affect performance by making an environmental cue, which is strongly associated with the intended behavioral response, more accessible (Gollwitzer, 1999). The critical cue (the if-component) is more likely to be noticed and the critical response (the then-component) is more likely to be executed. Previous research has investigated these effects via the sequential priming method (Webb & Sheeran, 2007; 2008) and this study will adopt that approach. Sequential priming uses response latencies to measure the accessibility of the cue and its relationship with the behavioral response. Experimental and control groups' latencies can be compared to assess whether or not the implementation intention produced the desired effect. See Appendix I for an outline of this assessment.

Primed Subconscious Goal: Funneled Debriefing. In adherence to Bargh and Chartrand's (2000) recommendation for supraliminal priming, participants completed a funneled debriefing procedure (Appendix J) to ascertain whether or not they identified the purpose of the priming task. Since participants can be aware of its purpose, it may affect how they consciously reacted to the manipulation (Bargh & Chartrand, 2000; Latham et al., 2010). In this study, all analyses were run with and without the aware participants.

Conclusion. After completing both manipulation checks, participants responded to the detection and demographic questionnaire. Upon completion, they were thanked for their participation and received their payment within one day.

Analytic Overview

Discontinuous growth modeling analyses were conducted using restricted maximum likelihood estimation in the nlme package (Pinheiro & Bates, 2000; Pinheiro, Bates, DebRoy, & Sarkar, 2005) of the open-source software R (R Development Core Team, 2014). In this study, all models were two-level multilevel mixed-effects models, with trials at Level-1 nested within individuals at Level-2.

Based upon the recommendations of previous research (Bliese & Ployhart, 2002), Level-1 models were created through a sequence of steps to identify the best fitting model. Following that process, Level-2 models were examined by adding all the dummy-coded variables representing each manipulation (Hox, 2002) as a Level-2 predictor of the Level-1 change parameters.

Results

Pilot Comparison

To ensure that goal difficulty was properly controlled, the pilot sample was compared to the experimental sample on both self-set goals and performance. As seen in Table 3, the pilot sample did not significantly differ from the experimental sample in terms of either self-set goals or performance across any of the trials. Additionally, an investigation of the 90th percentile of self-set goals and performance in the experimental sample would have led to similar goals (i.e., pilot: 7, 8, 10, 10, 10, 10, 10, 10, 10, 10; experiment: 7, 9, 9, 10, 10, 10, 9, 10, 10, 10) as were determined by the pilot sample. Based upon these findings, it was determined that goal difficulty was adequately controlled and that assigned and self-set goals could be directly compared in the experimental sample.

Table 3

Pilot Sample compared to Experimental Sample of Self-Set Goals and Performance

	Pilot			Experimental					
Measure	*M*	*SD*	*n*	*M*	*SD*	*n*	*df*	*t*	*d*
Trial 1									
Self-Set Goal	6.85	1.61	66	6.76	1.91	91	155	-.31	-.05
Performance	4.73	2.32	64	4.65	2.43	91	153	-.22	-.04
Trial 2									
Self-Set Goal	6.12	1.63	65	6.01	2.01	91	154	-.37	-.06
Performance	6.50	2.03	64	6.52	1.85	91	153	.05	.01
Trial 3									
Self-Set Goal	6.63	1.63	65	6.32	1.97	91	154	-1.05	-.17
Performance	6.41	2.43	63	6.29	2.01	91	152	-.35	-.06
Trial 4									
Self-Set Goal	6.58	2.30	66	6.79	1.87	91	155	.65	.10
Performance	6.59	2.62	63	6.86	2.07	91	152	.71	.12
Trial 5									
Self-Set Goal	7.05	2.00	64	7.05	2.05	91	137.74	.02	.00
Performance	6.02	3.14	63	5.87	2.50	91	152	-.32	-.05
Trial 6									
Self-Set Goal	7.06	2.24	64	6.90	2.04	91	153	-.47	-.08
Performance	5.11	2.27	63	4.93	2.36	91	152	-.47	-.08
Trial 7									
Self-Set Goal	6.61	1.55	64	6.63	1.91	91	153	.06	.01
Performance	5.00	3.69	63	5.30	2.85	91	110.57	.54	.09
Trial 8									
Self-Set Goal	6.39	2.09	64	6.63	2.03	91	153	.70	.11
Performance	5.71	3.20	63	5.99	2.42	91	108.75	.58	.10
Trial 9									
Self-Set Goal	6.59	2.41	63	6.78	2.05	91	152	.53	.09
Performance	5.78	3.10	63	5.81	2.39	91	110.66	.08	.01
Trial 10									
Self-Set Goal	6.70	2.46	63	7.12	2.22	91	152	1.11	.18
Performance	7.13	2.22	63	7.02	2.13	91	152	-.30	-.05

Manipulation Checks

Primed subconscious goal: funneled debriefing. In the primed condition, a total of 41 participants (29%) displayed an awareness of the achievement theme in the word search. Table 4 displays the number of aware participants within each condition. Since awareness of the prime could affect how participants responded to it (i.e., Bargh & Chartrand, 2000; Latham et al., 2010), all analyses were run with (hereby known as "Entire Sample") and without (hereby known as "Subset Sample") these participants included.

Table 4

Frequency of Achievement Prime Awareness

Condition	*n*
Assigned, Implementation Intention	5
Assigned, Strong Control	6
Assigned, Weak Control	4
Self-set, Implementation Intention	7
Self-set, Strong Control	3
Self-set, Weak Control	6
Do your best, Implementation Intention	4
Do your best, Strong Control	3
Do your best, Weak Control	3

Note: The order is goal-setting and implementation intention.

Implementation intention: lexical decision task. As per the recommendations of Bargh and Chartrand (2000), response latencies were trimmed for times below 300 milliseconds as well as times three standard deviations above the mean. Several One-Way ANOVAs were conducted to assess if the implementation intention conditions (i.e., manipulation, strong control, and weak control) differed in the response latency for the seven prime-target combinations outlined in Appendix I.

For all of the combinations, the conditions did not significantly differ on response latency; see Table 5 for detailed results. Of the combinations of interest, the manipulation neither led to the critical cue (i.e., "change") being more accessible, F (2, 1565) = .68, p = .51, nor the link between the critical cue and critical response (i.e., "reconsider") being stronger, F (2, 577) = 1.89, p = .15, than the control conditions.

Table 5

One-Way ANOVAs for Response Latency by Lexical Decision Task Combination

Combination	$df_{between}$	df_{within}	F	p	η^2
Neutral cue accessibility	2	626	.41	.67	.00
Critical cue accessibility	2	1565	.68	.51	.00
Critical response accessibility	2	1237	.92	.40	.00
Critical cue – neutral response link	2	607	1.04	.35	.00
Critical cue – critical response link	2	577	1.89	.15	.01
Critical response – critical cue link	2	585	.05	.95	.00
Filler pairings	2	5304	.51	.60	.00

Although these findings are inconsistent with the results from previous research (Webb & Sheeran, 2007; 2008), it should be noted that response times below 300 milliseconds were not trimmed in those studies. Since Bargh and Chartrand (2000) argue that such response times denote anticipations and not actual responses, this study had removed these responses. When the analyses were run including the times below 300 milliseconds, the link between the critical cue and critical response (i.e., "reconsider") was found to significantly differ by condition, F (2, 275) = 3.61, p = .03. Tukey's post hoc analyses found that participants receiving the implementation intention (M = 408.93, SD = 215.22) responded significantly faster than participants in the weak control condition (M = 560.65, SD = 1,107.36), p = .03.

Overall, the implementation intention manipulation did not affect individuals as expected by theory (Gollwitzer, 1999) and previous research (Webb & Sheeran, 2007; 2008). However, this analysis only assesses the mechanisms by which an implementation intention theoretically affects people, not if the implementation intention given affects their subsequent behavior. As such, the effects of the implementation intention were still investigated.

Scale Psychometrics

Goal commitment. The expected one-factor structure exhibited poor fit, $\chi^2(5) = 472.21$, $p < .001$, RMSEA = .23, CFI = .93, GFI = .91. Once the errors of several items were allowed to covary (i.e., “Quite frankly, I don't care if I achieve this goal or not” with “It wouldn't take much to make me abandon this goal” and “I am strongly committed to pursuing this goal” with “It's hard to take this goal seriously"), the model fit became excellent, $\chi^2(3) = 5.94$, $p = .11$, RMSEA = .02, CFI = 1.00, GFI = 1.00. Given that the average coefficient alpha was .88 and this measure has traditionally been used with the existing items (Klein et al., 2001), all future analyses using goal commitment contained all five items.

I-ADAPT. The expected two-factor structure did not exhibit adequate fit, $\chi^2(64) = 206.84$, $p < .001$, RMSEA = .10, CFI = .97, GFI = .89. Once the errors of several items were allowed to covary in the Uncertainty scale (i.e., all of the reverse-coded items together and “I can adapt to changing situations” with “I can adjust my plans to changing situations”), the model fit became good, $\chi^2(60)= 81.29$, $p < .05$, RMSEA = .04, CFI = 1.00, GFI = .96. Given that the coefficient alphas for the Uncertainty scale ($\alpha = .90$) and

Learning scale (α = .86) were acceptable and these measures have traditionally been used as is (Ployhart & Bliese, 2000), all future analyses included all items.

Descriptive Statistics

Descriptive statistics and intercorrelations for study variables are displayed in Table 6; self-efficacy was not included as only 37% of respondents responded correctly to the instructions for completing the measure. As seen in previous research (e.g., Broder & Schiffer, 2002; Lang & Bliese, 2009), performance tended to increase until the change trial (i.e., trial 6). A sharp drop in performance occurred during the change trial and performance tended to slowly increase across the post-change trials. However, it should be noted that a drop in performance also occurred in Trial 5, which was not expected.

Goal commitment tended to be high and stable across all trials; however, the standard deviation grew consistently from Trial 1 (*SD* = .72) to Trial 10 (*SD* = 1.33). Further investigation found that the goal-setting condition had a significant effect on goal commitment. Barring Trial 1, participants in the self-set goal condition had significantly higher goal commitment than participants in the assigned goal condition; see Table 7 for more detail. Additionally, compared to the self-set goal condition, the assigned goal condition displayed consistently larger increases in variance in commitment across the trials and, from Trial 4 onwards, the difference in variances was significant.

Table 7

Self-set Goal Condition compared to Assigned Goal Condition on Goal Commitment across Trials

	Self-set			Assigned					
Trial	*M*	*SD*	*n*	*M*	*SD*	*n*	*df*	*t*	*d*
Trial 1	6.30	.76	91	6.27	.68	95	184	.22	.03
Trial 2	6.32	.79	91	6.00	.83	95	184	2.68**	.39
Trial 3	6.27	.82	91	5.76	1.09	95	184	3.55***	.52
Trial 4	6.27	.86	91	5.73	1.28	95	165.46	3.44**	.50
Trial 5	6.30	.85	91	5.75	1.35	95	158.75	3.34**	.48
Trial 6	6.21	.96	91	5.73	1.44	95	164.12	2.68**	.39
Trial 7	6.25	.95	91	5.58	1.47	95	161.99	3.73***	.54
Trial 8	6.27	.90	91	5.66	1.54	95	152.87	3.32**	.48
Trial 9	6.29	.93	91	5.60	1.57	95	153.88	3.63***	.53
Trial 10	6.29	.88	91	5.66	1.61	95	147.28	3.30**	.48

*$p < .05$. **$p < .01$. ***$p < .001$

The average response latency was computed per trial for each participant and then each trial's response latency was compared to the previous trial's latency; see Table 8 for detailed results. Overall, response latency decreased across trials with Trial 1, on average, taking twelve seconds per decision, while Trial 10 took participants, on average, approximately six seconds per decision.

Table 8

Changes in Response Latency over Trials

Trial	*M*	*SD*	*df*	*t*	*p*
Trial 1 – Trial 2	2885.47	5433.32	280	8.90	< .001
Trial 2 – Trial 3	664.96	5587.74	280	2.00	.05
Trial 3 – Trial 4	539.81	4622.77	280	1.96	.05
Trial 4 – Trial 5	36.45	4037.18	280	.15	.88
Trial 5 – Trial 6	675.86	3964.80	280	2.86	< .01
Trial 6 – Trial 7	-298.56	3116.43	280	-1.61	.11
Trial 7 – Trial 8	790.00	3043.58	280	4.35	< .001
Trial 8 – Trial 9	-53.47	2589.08	280	-.35	.73
Trial 9 – Trial 10	177.45	3100.04	280	.96	.34

Lastly, participants were asked if a change occurred and, if they said yes, when it occurred. Only 52% of participants (*n* = 147) noted a change occurred and, of that number, 20% (*n* = 30) selected the correct trial (i.e., Trial 6). In fact, 73% of participants (*n* = 107) identified that the change occurred during Trials 2-5.

Discontinuous Growth Models

Level-1 analyses with all data. For step 1, the intraclass correlation coefficient (ICC1) was estimated to identify the strength of nonindependence in the data (Bliese & Ployhart, 2002). In this study, ICC1 indicates the amount of variability in performance, observed across the 10 trials, that is attributable to between-person differences. The ICC1 was found to be .39, which indicates that 39% of the variance in performance across time was due to individual differences. In the subset sample, ICC1 was .37 or 37% of the variance. Both findings suggest that considerable individual differences in performance across time exist (Bliese, 2000).

In step 2, Level-1 change parameters were added to the model in an iterative process to assess their effects on performance. Based on the suggestions of previous research (Bliese & Ployhart, 2002; Lang & Bliese, 2009; Singer & Willet, 2003), these parameters were coded as displayed in Table 9. Note that no cubic terms were reported here as longitudinal multilevel research (Holt, 2008; O'Connell et al., 2013; Singer & Willett, 2003) suggests against doing so for reasons of parsimony, interpretability, and generalizability. In Appendix K, the results for models including cubic terms are presented; only the cubic term for reacquisition adaptability existed, but it did not significantly differ between individuals.

Table 9

Trial Coding for Level-1 of the Discontinuous Growth Model

Parameter	Trial										Explanation
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
SA	0	1	2	3	4	5	6	7	8	9	Linear term in performance pre-trial 6
TA	0	0	0	0	0	1	1	1	1	1	Linear term in performance from trial 5 to trial 6
RA	0	0	0	0	0	0	1	2	3	4	Linear term (relative to SA) in performance following trial 6
QSA	0	1	4	9	16	16	16	16	16	16	Quadratic term in performance pre-trial 6
QRA	0	0	0	0	0	0	1	4	9	16	Quadratic term in performance following trial 6

Note. SA = linear term for skill acquisition; TA = linear term for transition adaptability; RA = linear term for reacquisition adaptability; QSA = quadratic term for skill acquisition; QRA = quadratic term for reacquisition adaptability.

For both samples, analyses indicated that all change parameters significantly explained variability in the change of performance across time; see Table 10 for both samples' results.

Table 10

Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Entire Sample					
Linear Level-1 model					
(Intercept)	5.45	.12	2526	44.68	< .001
SA	.27	.04	2526	7.89	< .001
TA	-2.03	.14	2526	-13.98	< .001
RA	.20	.05	2526	4.06	< .001
Quadratic Level-1 model					
(Intercept)	4.76	.13	2524	35.62	< .001
SA	1.66	.12	2524	13.83	< .001
TA	-2.52	.16	2524	-15.52	< .001
RA	-1.58	.17	2524	-9.27	< .001
QSA	-.35	.03	2524	-12.02	< .001
QRA	.10	.03	2524	3.40	< .001
Subset Sample					
Linear Level-1 model					
(Intercept)	5.39	.12	2157	44.79	< .001
SA	.25	.04	2157	6.52	< .001
TA	-1.87	.16	2157	-11.88	< .001
RA	.20	.05	2157	3.67	< .001
Quadratic Level-1 model					
(Intercept)	4.67	.14	2155	32.70	< .001
SA	1.69	.13	2155	12.88	< .001
TA	-2.34	.18	2155	-13.22	< .001
RA	-1.73	.19	2155	-9.32	< .001
QSA	-.36	.03	2155	-11.43	< .001
QRA	.12	.03	2155	3.90	< .001

Note. Entire sample: $N = 281$. $k = 2810$. Subset sample: $N = 240$. $k = 2400$. Coef. = coefficient; SA = linear term for skill acquisition; QSA = quadratic term for skill acquisition; TA = linear term for transition adaptability; RA = linear term for reacquisition adaptability; QRA = quadratic term for reacquisition adaptability.

In step 3, the Level-1 change parameters were tested to see if they significantly varied between individuals. Following the recommendations of the literature (Bliese &

Ployhart, 2002; Pinheiro & Bates, 2000; Snijders & Bosker, 1999), models were developed and, via log-likelihood ratio tests, compared in an iterative manner. In total, six models were tested with the only constant being that the intercept in each was allowed to randomly vary to account for individual differences in performance.

Model 1 is the final model from step 2 and serves as the baseline model where all change variables were forced to be equal across individuals. Model 2 allowed the linear skill acquisition slope to randomly vary across individuals. Model 3 allowed both linear skill acquisition and the transition adaptability slopes to randomly vary. Model 4 allowed linear skill acquisition, transition adaptability, and linear reacquisition adaptability slopes to randomly vary. Model 5 allowed variability in the linear skill acquisition, transition adaptability, linear reacquisition adaptability, and quadratic skill acquisition slopes. Model 6 allowed for all parameters to randomly vary.

As seen in Table 11, allowing most of the change parameters to vary significantly improved the model fit for both samples. Model 4's improvement (i.e., letting linear reacquisition adaptability in addition to linear skill acquisition and transition adaptability vary) did not lead to a significantly better fitting model. However, the log-likelihood test can be conservative (Snijders & Boskers, 1999) and it is recommended that cross-level effects still be investigated as long as a theoretically sound reason that the Level-1 parameter should be allowed to vary and could be affected by Level-2 variables (i.e., goal-setting, implementation intention, and/or primed subconscious goal condition). As such, linear reacquisition adaptability was allowed to vary and Model 6 chosen.

Table 11

Log-Likelihood Tests of Random Slope Model

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
Entire Sample							
1	8	11905.68	11953.19	-5944.84	--	--	--
2	10	11892.12	11951.51	-5936.06	1 vs. 2	17.55	< .001
3	13	11879.98	11957.19	-5926.99	2 vs. 3	18.14	< .001
4	17	11884.81	11985.77	-5925.40	3 vs. 4	3.18	.53
5	22	11872.73	12003.39	-5914.37	4 vs. 5	22.07	< .001
6	28	11686.25	11852.54	-5816.13	5 vs. 6	198.45	< .001
Subset Sample							
1	8	10191.42	10237.67	-5087.71	--	--	--
2	10	10180.76	10238.57	-5080.38	1 vs. 2	14.66	< .001
3	13	10174.75	10249.90	-5074.37	2 vs. 3	12.01	< .01
4	17	10178.74	10277.02	-5072.37	3 vs. 4	4.00	.41
5	22	10166.20	10293.38	-5061.10	4 vs. 5	22.54	< .001
6	28	10031.03	10192.89	-4987.52	5 vs. 6	147.17	< .001

In step 4, the final model from step 3 (i.e., Model 6) was tested for autocorrelation and heteroscedasticity in the model's error structure via log-likelihood tests. Results suggested the presence of autocorrelation, $\varphi = -.14$, $\chi^2_{diff}(1) = 13.38$, $p < .001$, but no heteroscedascity, $\chi^2_{diff}(1) = 1.30$, $p = .25$. As such, autocorrelation was corrected for in the final Level-1 model for the entire sample. In the subset sample, evidence existed for autocorrelation, $\varphi = -.15$, $\chi^2_{diff}(1) = 12.01$, $p < .001$, and no heteroscedascity, $\chi^2_{diff}(1) = 1.70$, $p = .19$. Therefore, the final model for the subset sample was only corrected for autocorrelation.

Lastly, for both samples' final model, growth parameters were examined to ensure that all remained significant after controlling for autocorrelation and all parameters remained significant. Therefore, the final Level-1 model was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}SA_{ti} + \pi_{2i}TA_{ti} + \pi_{3i}RA_{ti} + \pi_{4i}QSA_{ti} + \pi_{5i}QRA_{ti} + e_{ti}$$

Where Y_{ti} is performance, π_{0i} is the intercept (i.e., basal task performance), $\pi_{1i}SA_{ti}$ is the instantaneous rate of change for skill acquisition, $\pi_{2i}TA_{ti}$ is the slope of transition adaptability, $\pi_{3i}RA_{ti}$ is the instantaneous rate of change for reacquisition adaptability, $\pi_{4i}QSA_{ti}$ is the curvature for skill acquisition, $\pi_{5i}QRA_{ti}$ is the curvature for reacquisition adaptability, and e_{ti} is within-person error.

Tables 12 and 13 display the final Level-1 model for both the entire sample as well as the subset sample. Using the Level-1 model, performance was predicted across the ten trials and the overall change pattern of individuals was then graphed in Figure 3 with the grey line signifying the change trial.

Table 12

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Fixed Effects

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
(Intercept)	4.80	.14	2524	35.29	< .001
SA	1.62	.12	2524	13.10	< .001
QSA	-.34	.03	2524	-11.86	< .001
TA	-2.48	.21	2524	-12.08	< .001
RA	-1.52	.20	2524	-7.44	< .001
QRA	.09	.04	2524	2.47	.01
Subset Sample					
(Intercept)	4.71	.15	2155	31.72	< .001
SA	1.64	.14	2155	11.86	< .001
QSA	-.35	.03	2155	-11.03	< .001
TA	-2.31	.22	2155	-10.27	< .001
RA	-1.67	.22	2155	-7.68	< .001
QRA	.12	.04	2155	2.93	< .01

Note. Entire Sample: $N = 281$, $k = 2810$. Subset Sample: $N = 240$, $k = 2400$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 13

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.46	1.86	--					
2. SA	1.77	1.33	-.70	--				
3. TA	7.45	2.73	.18	-.60	--			
4. RA	6.50	2.55	.56	-.42	-.35	--		
5. QSA	.08	.29	.68	-.96	.47	.48	--	
6. QRA	.24	.49	-.24	-.05	.67	-.88	-.04	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.53	1.88	--					
2. SA	2.04	1.43	-.73	--				
3. TA	7.62	2.76	.28	-.68	--			
4. RA	5.95	2.44	.55	-.42	-.23	--		
5. QSA	.09	.30	.71	-.96	.56	.47	--	
6. QRA	.23	.48	-.16	-.12	.62	-.84	.04	--
Residual	2.13	1.46						

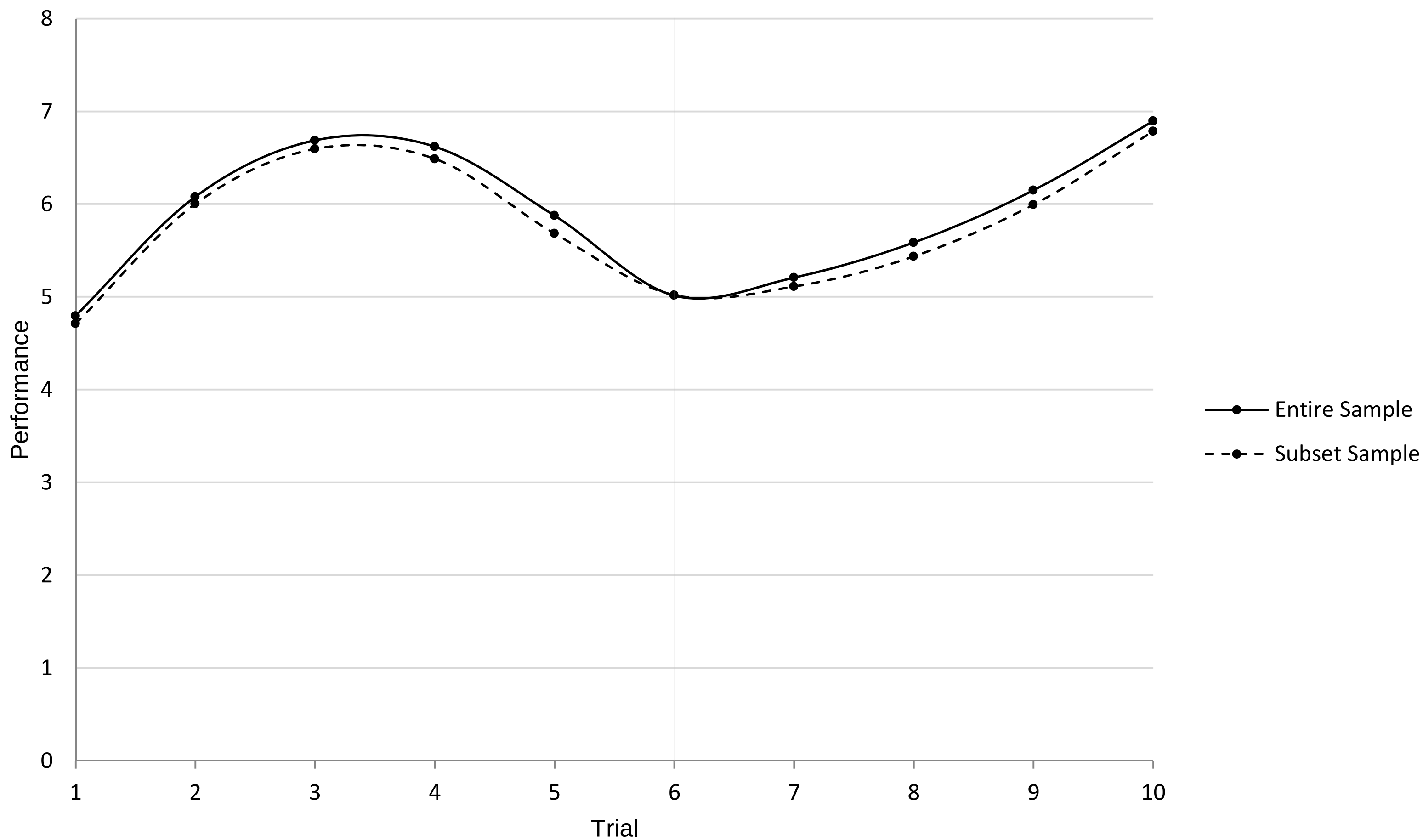

Figure 3. Predicted performance as a function of Level-1 change parameters.

Level-1 analyses with sex-identified data. Using the Level-1 model above, the empirical Bayes estimate of each change parameter was computed for each participant (Chen et al., 2011). These estimates were included in Table 6 (i.e., variables 45-57) and significant relationships were found between several of those estimates and the participant's sex. To test if sex had an effect on adaptability, it would be added as a Level-2 predictor of Level-1 change parameters; however, the previous Level-1 model was built based on the entire sample of 281 participants, while only 263 participants identified their sex. Given the importance of the Level-1 model's specification, the model building procedure was executed again using only the participants who identified their sex.

For step 1, the ICC1 was found to be .40 for the entire sample and .38 for the subset sample. Both findings suggest that considerable individual differences in performance across time exist (Bliese, 2000).

In step 2, Level-1 change parameters were added to the model to assess their effects on performance. Analyses indicated that for both samples, all change parameters significantly explained variability in the change of performance across time; see Table 14 for detailed results.

Table 14

Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
Linear Level-1 model					
(Intercept)	5.44	.13	2364	42.54	< .001
SA	.28	.04	2364	7.75	< .001
TA	-2.04	.15	2364	-13.53	< .001
RA	.19	.05	2364	3.76	< .001
Quadratic Level-1 model					
(Intercept)	4.74	.14	2362	33.92	< .001
SA	1.68	.12	2362	13.42	< .001
TA	-2.53	.17	2362	-15.00	< .001
RA	-1.60	.18	2362	-9.05	< .001
QSA	-.35	.03	2362	-11.63	< .001
QRA	.10	.03	2362	3.34	< .001
Subset Sample					
Linear Level-1 model					
(Intercept)	5.37	.14	1995	39.11	< .001
SA	.26	.04	1995	6.35	< .001
TA	-1.87	.17	1995	-11.28	< .001
RA	.19	.06	1995	3.32	< .001
Quadratic Level-1 model					
(Intercept)	4.64	.15	1993	30.84	< .001
SA	1.71	.14	1993	12.43	< .001
TA	-2.34	.19	1993	-12.63	< .001
RA	-1.77	.19	1993	-9.11	< .001
QSA	-.36	.03	1993	-11.02	< .001
QRA	.13	.03	1993	3.85	< .001

Note. Entire sample: N = 263. k = 2630. Subset sample: N = 220. k = 2220. Coef = coefficient; SA = linear term for skill acquisition; QSA = quadratic term for skill acquisition; TA = linear term for transition adaptability; RA = linear term for reacquisition adaptability; QRA = quadratic term for reacquisition adaptability.

In step 3, the Level-1 change parameters were tested to see if they significantly varied between individuals. As before, the same six models were tested with the only constant being that the intercept in each was allowed to randomly vary to account for individual differences in performance.

As seen in Table 15, allowing almost all of the change parameters to vary significantly improved the model fit in both samples. Model 4's improvement (i.e., letting linear reacquisition adaptability in addition to linear skill acquisition and transition adaptability vary) did not lead to a significantly better fitting model; however, it was allowed to vary in both samples based on theoretical reasons.

Table 15

Log-Likelihood Tests of Random Slope Model

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
Entire Sample							
1	8	11177.72	11224.70	-5580.86	--	--	--
2	10	11167.69	11226.41	-5573.84	1 vs. 2	14.03	< .001
3	13	11156.46	11232.80	-5565.23	2 vs. 3	17.23	< .001
4	17	11162.05	11261.88	-5564.03	3 vs. 4	2.41	.66
5	22	11154.72	11283.91	-5555.36	4 vs. 5	17.33	< .01
6	28	10967.01	11140.44	-5460.01	5 vs. 6	190.71	< .001
Subset Sample							
1	8	9463.25	9508.87	-4723.62	--	--	--
2	10	9455.80	9512.82	-4717.90	1 vs. 2	11.45	< .001
3	13	9449.02	9523.15	-4711.51	2 vs. 3	12.78	< .01
4	17	9455.98	9552.93	-4710.99	3 vs. 4	1.03	.90
5	22	9443.42	9568.88	-4669.71	4 vs. 5	22.56	< .001
6	28	9318.77	9478.44	-4631.38	5 vs. 6	136.65	< .001

In step 4, the final model from step 3 (i.e., Model 6) was tested for autocorrelation and heteroscedasticity in the model's error structure via log-likelihood tests. Results supported the presence of autocorrelation, $\varphi = -.14$, $\chi^2_{diff}(1) = 12.06$, $p < .001$, but no heteroscedasticity, $\chi^2_{diff}(1) = 1.29$, $p = .26$. Therefore, autocorrelation was corrected for in the final Level-1 model. In the subset sample, evidence existed for autocorrelation, $\varphi = -.15$, $\chi^2_{diff}(1) = 11.24$, $p < .001$, and no evidence of heteroscedasticity, $\chi^2_{diff}(1) = .85$, $p = .36$. As such, the final model was only corrected for autocorrelation.

Lastly, for both samples' final model, growth parameters were examined to ensure that all remained significant after controlling for autocorrelation and all parameters remained significant. Therefore, the final Level-1 model was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}SA_{ti} + \pi_{2i}TA_{ti} + \pi_{3i}RA_{ti} + \pi_{4i}QSA_{ti} + \pi_{5i}QRA_{ti} + e_{ti}$$

Where Y_{ti} is performance, π_{0i} is the intercept (i.e., basal task performance), $\pi_{1i}SA_{ti}$ is the instantaneous rate of change for skill acquisition, $\pi_{2i}TA_{ti}$ is the slope of transition adaptability, $\pi_{3i}RA_{ti}$ is the instantaneous rate of change for reacquisition adaptability, $\pi_{4i}QSA_{ti}$ is the curvature for skill acquisition, $\pi_{5i}QRA_{ti}$ is the curvature for reacquisition adaptability, and e_{ti} is within-person error.

Tables 16 and 17 display the final Level-1 model for both the entire sample as well as the subset sample. Using the Level-1 model, performance was predicted across the ten trials and the overall change pattern of individuals was then graphed in Figure 4.

Table 16

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
(Intercept)	4.78	.14	2362	33.06	< .001
SA	1.63	.13	2362	12.65	< .001
QSA	-.34	.03	2362	-11.48	< .001
TA	-2.49	.21	2362	-11.71	< .001
RA	-1.54	.21	2362	-7.22	< .001
QRA	.09	.04	2362	2.41	.02
Subset Sample					
(Intercept)	4.68	.16	1993	29.45	< .001
SA	1.66	.15	1993	11.41	< .001
QSA	-.35	.03	1993	-10.64	< .001
TA	-2.30	.23	1993	-9.83	< .001
RA	-1.70	.23	1993	-7.49	< .001
QRA	.12	.04	1993	2.88	< .01

Note. Entire sample: $N = 263$, $k = 2630$. Subset sample: $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 17

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	1.85	1.36	-.72	--				
3. TA	7.45	2.73	.20	-.60	--			
4. RA	6.71	2.59	.57	-.43	-.33	--		
5. QSA	.08	.29	.71	-.97	.47	.49	--	
6. QRA	.25	.50	-.24	-.05	.65	-.87	-.04	--
Residual	2.13	1.46						
Subset Sample								
1. (Intercept)	3.88	1.97	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.67	2.77	.30	-.67	--			
4. RA	6.05	2.46	.56	-.43	-.22	--		
5. QSA	.10	.31	.74	-.96	.54	.47	--	
6. QRA	.24	.49	-.15	-.13	.61	-.84	.05	--
Residual	2.16	1.47						

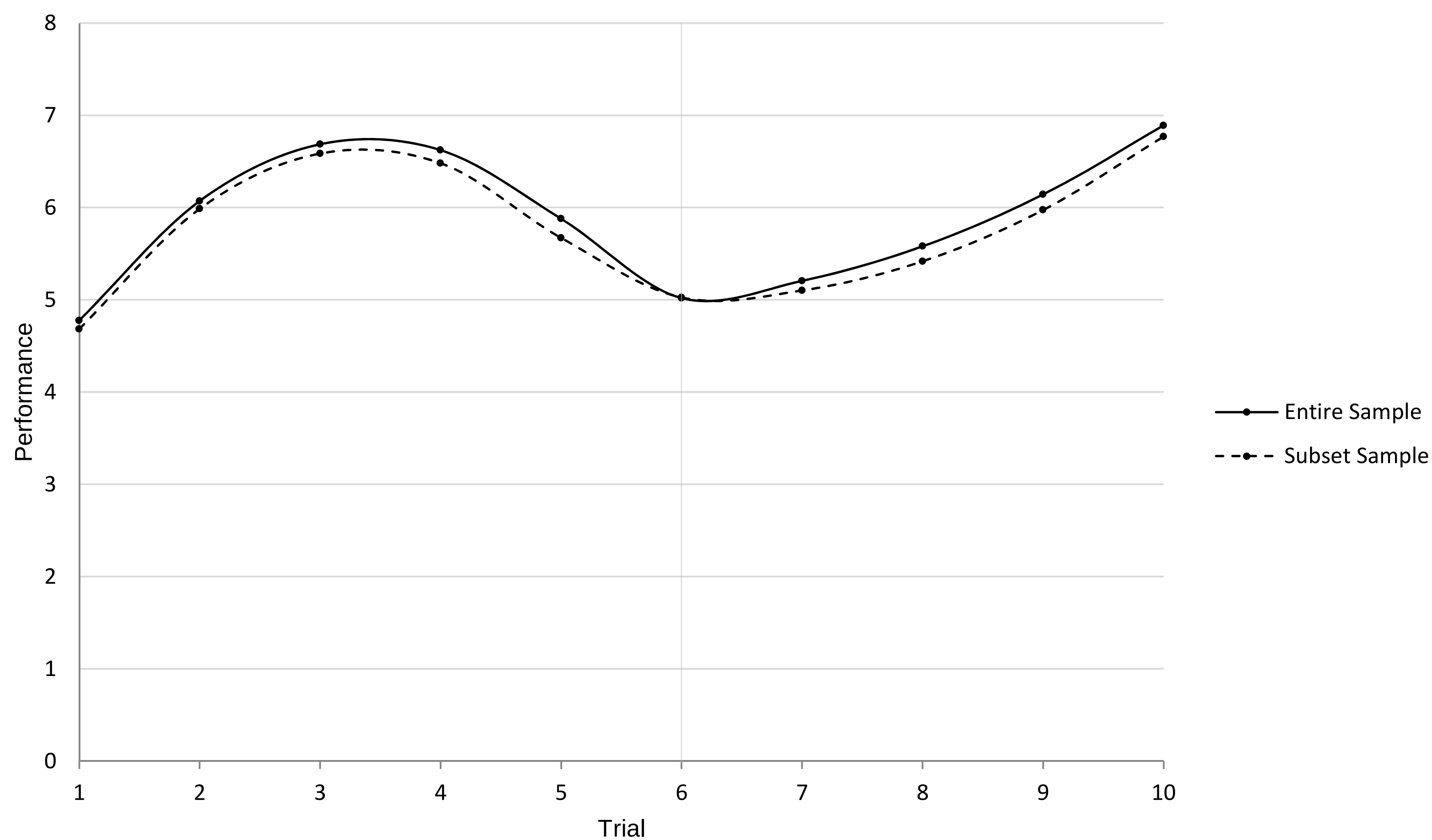

Figure 4. Predicted performance as a function of Level-1 change parameters.

Level-2 analyses with sex-identified Level-1 model. As seen in Table 6, correlational evidence exists for sex having an effect on both forms of adaptability. If sex does have an effect on any parameter, it should be controlled for in the subsequent analyses investigating the effects of the motivational interventions. Therefore, the first Level-2 model only assessed the effects of sex.

Sex. The dummy-coded variable for sex, female as the reference category, was added as a Level-2 predictor of the Level-1 parameters. As such, the Level-2 equation was:

$$\pi 0i = \beta_{00} + \beta_{01}\text{Sex} + r_{0i}$$

$$\pi 1i = \beta_{10} + \beta_{11}\text{Sex} + r_{1i}$$

$$\pi 2i = \beta_{20} + \beta_{21}\text{Sex} + r_{2i}$$

$$\pi 3i = \beta_{30} + \beta_{31}\text{Sex} + r_{3i}$$

$$\pi 4i = \beta_{40} + \beta_{41}\text{Sex} + r_{4i}$$

$$\pi 5i = \beta_{50} + \beta_{51}\text{Sex} + r_{5i}$$

Where β_{00}, β_{10},…,β_{50} represents the average of females in that parameter, β_{01}Sex, β_{11}Sex,…,β_{51}Sex is testing how males differ in those parameters, and r_{0i}, r_{1i},…, r_{5i} is between-person random effects.

The results are displayed in Tables 18-20 and Figures 5-6. Given the general unfamiliarity with this type of longitudinal analysis, Appendix L provides an example, using the entire sample's results, of how to interpret the model results.

First, sex was found to be significantly related to the intercept, $\beta = .75$, $SE = .29$, t (261) = 2.59, $p = .01$, such that males outperformed females during Trial 1.

For the entire sample, sex had a significant and negative relationship to transition adaptability, $\beta = -.92$, $SE = .43$, $t\ (2357) = -2.17$, $p = .03$. That is, males experienced a significantly larger drop in performance during the change trial than females. The subset sample showed the same trend, but was marginally significant, $\beta = -.78$, $SE = .47$, $t\ (1988) = -1.64$, $p = .10$.

Lastly, both the instantaneous rate of change, $\beta = 1.64$, $SE = .42$, $t\ (2357) = 3.93$, $p < .001$, and the quadratic curvature, $\beta = -.31$, $SE = .08$, $t\ (2357) = -4.08$, $p < .001$, of reacquisition adaptability were significant. Males experienced a higher rate of initial performance improvement in the post-change trials and a flatter quadratic curvature than females. Both of these led to an overall faster rate of performance improvement after the unforeseen change for males as compared to females.

Overall, these findings suggest that females were not as negatively affected as males when the change occurred, but males recovered from the change at a significantly higher rate than females. It should be noted that in Trial 10, there was no difference in performance between men ($M = 7.09$, $SD = 2.05$) and women ($M = 7.07$, $SD = 1.98$), $t(261) = -.10$, $p = .92$.

Table 18

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex- Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2357	20.16	< .001
SA	1.80	.20	2357	9.21	< .001
QSA	-.38	.04	2357	-8.59	< .001
TA	-1.97	.32	2357	-6.17	< .001
RA	-2.46	.31	2357	-7.85	< .001
QRA	.27	.06	2357	4.70	< .001
Level-2 Model					
Sex	.75	.29	261	2.59	.01
SA x Sex	-.29	.26	2357	-1.12	.26
QSA x Sex	.08	.06	2357	1.32	.19
TA x Sex	-.92	.43	2357	-2.17	.03
RA x Sex	1.64	.42	2357	3.93	< .001
QRA x Sex	-.31	.08	2357	-4.08	< .001

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 19

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex- Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.25	.24	1988	17.51	< .001
SA	1.89	.22	1988	8.45	< .001
QSA	-.41	.05	1988	-8.15	< .001
TA	-1.86	.36	1988	-5.18	< .001
RA	-2.67	.34	1988	-7.86	< .001
QRA	.29	.06	1988	4.66	< .001
Level-2 Model					
Sex	.75	.32	220	2.36	.02
SA x Sex	-.40	.29	1988	-1.37	.17
QSA x Sex	.11	.07	1988	1.59	.11
TA x Sex	-.78	.47	1988	-1.64	.10
RA x Sex	1.68	.45	1988	3.76	< .001
QRA x Sex	-.30	.08	1988	-3.60	< .001

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 20

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex – Random Effects

Random Effects	Variance	*SD*	Correlations					
			1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.85	1.36	-.71	--				
3. TA	7.34	2.71	.25	-.63	--			
4. RA	6.05	2.46	.54	-.42	-.30	--		
5. QSA	.08	.29	.70	-.96	.51	.47	--	
6. QRA	.23	.48	-.19	-.10	.64	-.86	.01	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.51	2.74	.34	-.71	--			
4. RA	5.43	2.33	.54	-.42	-.18	--		
5. QSA	.09	.30	.74	-.97	.59	.45	--	
6. QRA	.21	.46	-.10	-.17	.59	-.82	.10	--
Residual	2.16	1.47						

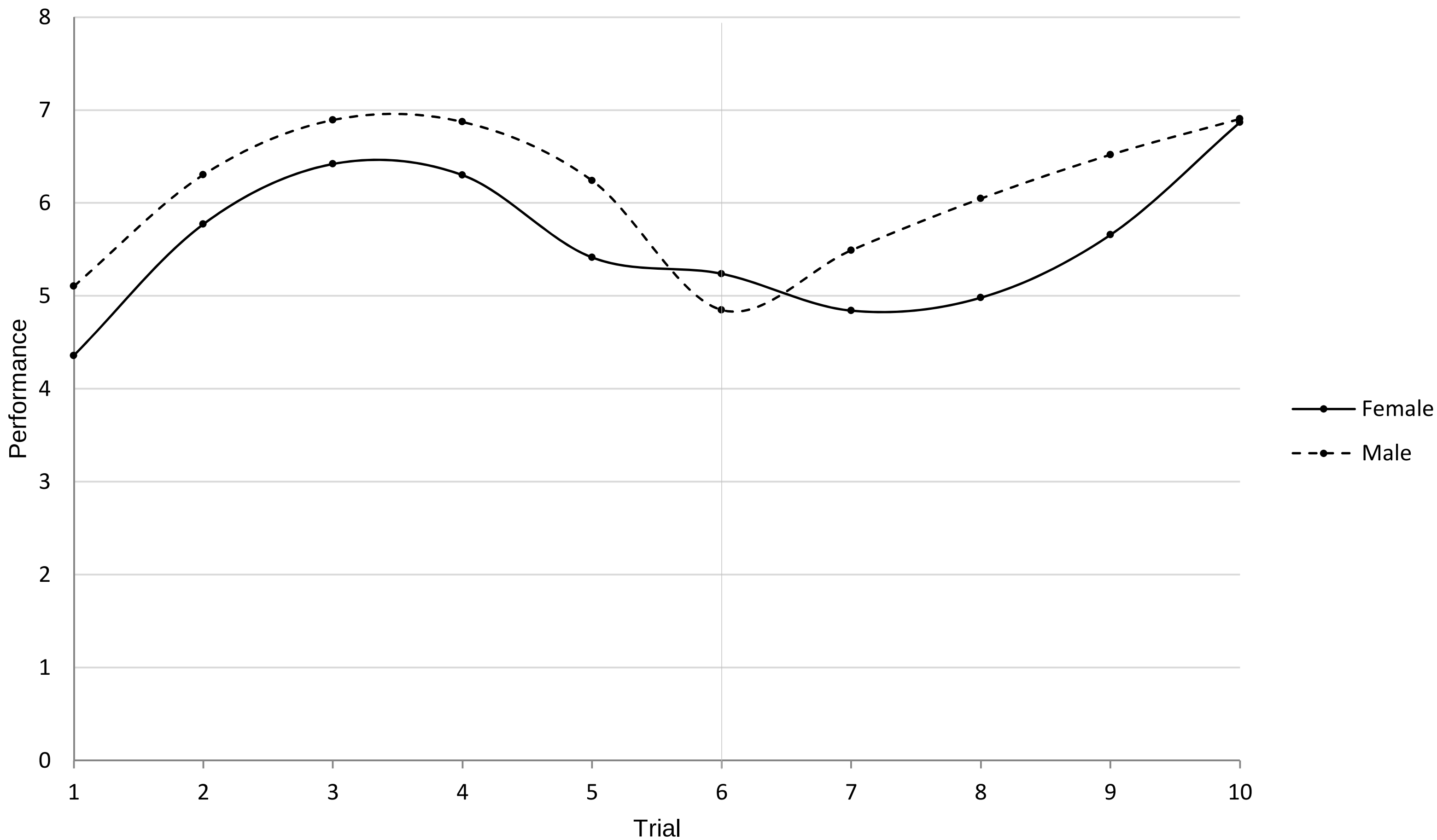

Figure 5. Predicted performance as a function of sex – entire sample.

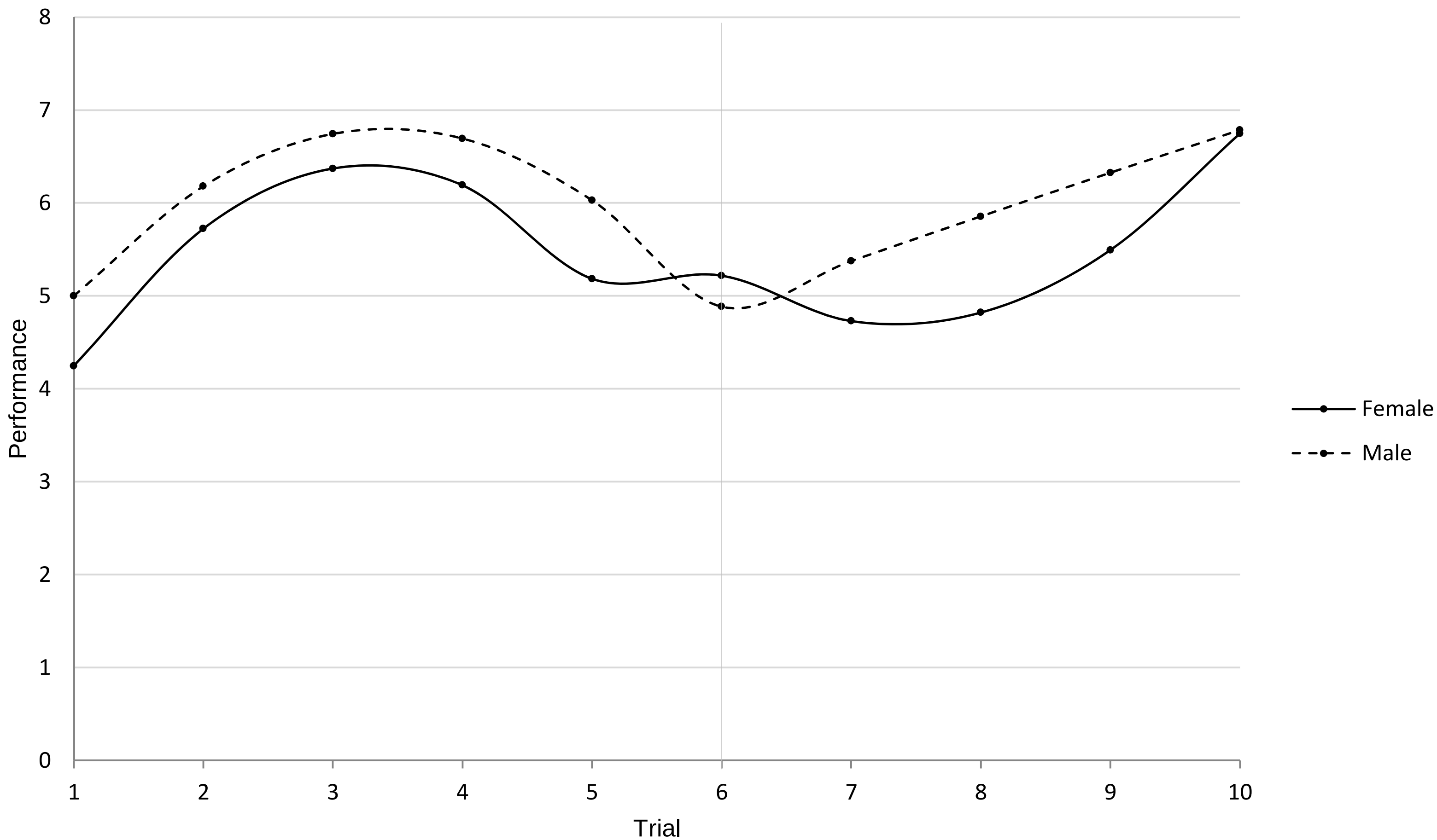

Figure 6. Predicted performance as a function of sex – subset sample.

Given these findings and that men (M = 10.22, SD = 9.25) and women (M = 5.24, SD = 6.82) significantly differed in the amount of time spent playing videogames, $t(205.17) = -4.48$, $p < .001$, an exploratory model was ran to see if videogame usage predicted any parameter either solely or in interaction with sex. For the sake of brevity, videogame usage did not predict any parameter.

For all the following models, sex was controlled for by including a dummy-coded variable, with female as the reference category, as a Level-2 predictor. To test for individual differences in change due to a motivational intervention, one or more dummy-coded variables were added as Level-2 predictors of Level-1 change parameters. Since no interaction terms between sex and the motivational interventions were added, the dummy-coded variables representing each are interpreted as overall main effects. Unless specifically noted, the subset sample did not differ in results from the entire sample.

Goal-setting condition. To test Hypotheses 1 through 4, the dummy-coded variables for goal-setting, 'do your best' as the reference category, were added as Level-2 predictors of the Level-1 parameters. As such, the Level-2 equation was:

$$\pi 0i = \beta_{00} + \beta_{01}Sex + \beta_{02}Assigned + \beta_{03}Self\text{-}set + r_{0i}$$

$$\pi 1i = \beta_{10} + \beta_{11}Sex + \beta_{12}Assigned + \beta_{13}Self\text{-}set + r_{1i}$$

$$\pi 2i = \beta_{20} + \beta_{21}Sex + \beta_{22}Assigned + \beta_{23}Self\text{-}set + r_{2i}$$

$$\pi 3i = \beta_{30} + \beta_{31}Sex + \beta_{32}Assigned + \beta_{33}Self\text{-}set + r_{3i}$$

$$\pi 4i = \beta_{40} + \beta_{41}Sex + \beta_{42}Assigned + \beta_{43}Self\text{-}set + r_{4i}$$

$$\pi 5i = \beta_{50} + \beta_{51}Sex + \beta_{52}Assigned + \beta_{53}Self\text{-}set + r_{5i}$$

Where $\beta_{00}, \beta_{10},\ldots,\beta_{50}$ represents the average parameter for females in the 'do your best' condition, $\beta_{01}Sex, \beta_{11}Sex,\ldots,\beta_{51}Sex$ is testing the overall effects of males,

β_{02}Assigned, β_{12}Assigned,…,β_{62}Assigned is testing the overall effects of assigned goals, β_{03}Self-set, β_{13}Self-set,…,β_{53}Self-set is testing the overall effects of self-set goals, and r_{0i}, r_{1i},…, r_{5i} is between-person random effects.

Results of these analyses are presented in Tables 21-23 and Figures 7-8. In both samples, Hypotheses 1 through 4 were not supported.

Hypotheses 1 and 2 were unsupported in that the 'do your best' goal did not significantly differ from, respectively, assigned goals, β = -.41, *SE* = .52, *t* (2347) = -.78, *p* = .43, or self-set goals, β = -.21, *SE* = .52, *t* (2347) = -.40, *p* = .69, in transition adaptability.

Hypothesis 3 was unsupported as the 'do your best' goal did not significantly differ from assigned goals in either the instantaneous rate of change, β = .75, *SE* = .51, *t* (2347) = 1.48, *p* = .14, or quadratic curvature, β = -.18, *SE* = .09, *t* (2347) = -1.92, *p* = .06, form of reacquisition adaptability. This latter finding is marginally significant, such that the assigned goal condition had slightly less pronounced quadratic curvature than the 'do your best' condition. That is, the performance of the assigned goal condition improved at a slightly faster rate than the 'do your best' condition after the change; refer to Figure 7 for more detail. This finding was not marginally significant in the subset sample, β = -.10, *SE* = .10, *t* (1978) = -1.03, *p* = .30.

Hypothesis 4 was unsupported as the 'do your best' goal did not significantly differ from self-set goals in either the instantaneous rate of change, β = .51, *SE* = .51, *t* (2347) = .99, *p* = .32, or quadratic curvature, β = -.14, *SE* = .09, *t* (2347) = -1.49, *p* = .14, form of reacquisition adaptability. However, in the subset sample, the finding for the quadratic curvature was marginally significant, β = -.18, *SE* = .10, *t* (1978) = -1.78, *p* =

.08. The self-set goal condition experienced slightly less pronounced curvature than the ‘do your best’ condition. That is, the performance of the self-set goal condition improved at a slightly faster rate than the ‘do your best’ condition; refer to Figure 8 for more detail.

Overall, these findings suggest that neither goal-setting condition led to significantly different adaptability than the ‘do your best’ condition.

Table 21

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.21	.29	2347	14.44	< .001
SA	1.78	.26	2347	6.67	< .001
QSA	-.38	.06	2347	-6.37	< .001
TA	-1.77	.43	2347	-4.10	< .001
RA	-2.88	.42	2347	-6.80	< .001
QRA	.37	.08	2347	4.83	< .001
Level-2 Model					
Sex	.74	.29	259	2.55	.01
Assigned	.28	.35	259	.81	.42
Self-set	.16	.35	259	.45	.66
SA x Sex	-.29	.26	2347	-1.13	.26
SA x Assigned	.02	.32	2347	.07	.94
SA x Self-set	.04	.32	2347	.12	.90
QSA x Sex	.08	.06	2347	1.31	.19
QSA x Assigned	.00	.07	2347	.01	.99
QSA x Self-set	-.00	.07	2347	-.02	.98
TA x Sex	-.91	.43	2347	-2.13	.03
TA x Assigned	-.41	.52	2347	-.78	.43
TA x Self-set	-.21	.52	2347	-.40	.69
RA x Sex	1.62	.42	2347	3.87	< .001
RA x Assigned	.75	.51	2347	1.48	.14
RA x Self-set	.51	.51	2347	.99	.32
QRA x Sex	-.31	.08	2347	-4.02	.00
QRA x Assigned	-.18	.09	2347	-1.92	.06
QRA x Self-set	-.14	.09	2347	-1.49	.14

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 22

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.21	.33	1978	12.85	< .001
SA	1.78	.30	1978	5.92	< .001
QSA	-.39	.07	1978	-5.69	< .001
TA	-1.73	.48	1978	-3.58	< .001
RA	-2.93	.46	1978	-6.41	< .001
QRA	.38	.08	1978	4.55	< .001
Level-2 Model					
Sex	.75	.32	218	2.35	.02
Assigned	.04	.38	218	.10	.92
Self-set	.08	.39	218	.21	.84
SA x Sex	-.40	.30	1978	-1.36	.18
SA x Assigned	.16	.35	1978	.46	.64
SA x Self-set	.16	.36	1978	.45	.65
QSA x Sex	.11	.07	1978	1.58	.11
QSA x Assigned	-.04	.08	1978	-.47	.64
QSA x Self-set	-.04	.08	1978	-.45	.65
TA x Sex	-.78	.47	1978	-1.64	.10
TA x Assigned	-.18	.57	1978	-.32	.75
TA x Self-set	-.19	.57	1978	-.33	.74
RA x Sex	1.68	.45	1978	3.75	< .001
RA x Assigned	.29	.54	1978	.54	.59
RA x Self-set	.52	.54	1978	.96	.34
QRA x Sex	-.30	.08	1978	-3.62	< .001
QRA x Assigned	-.10	.10	1978	-1.03	.30
QRA x Self-set	-.18	.10	1978	-1.78	.08

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 23

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.82	1.35	-.73	--				
3. TA	7.34	2.71	.25	-.62	--			
4. RA	6.00	2.45	.54	-.42	-.30	--		
5. QSA	.08	.29	.72	-.96	.49	.47	--	
6. QRA	.22	.47	-.18	-.09	.64	-.86	-.00	--
Residual	2.13	1.46						
Subset Sample								
1. (Intercept)	3.80	1.95	--					
2. SA	2.10	1.45	-.76	--				
3. TA	7.62	2.76	.34	-.71	--			
4. RA	5.48	2.34	.54	-.42	-.18	--		
5. QSA	.09	.30	.75	-.97	.59	.46	--	
6. QRA	.21	.46	-.10	-.16	.60	-.82	.09	--
Residual	2.16	1.47						

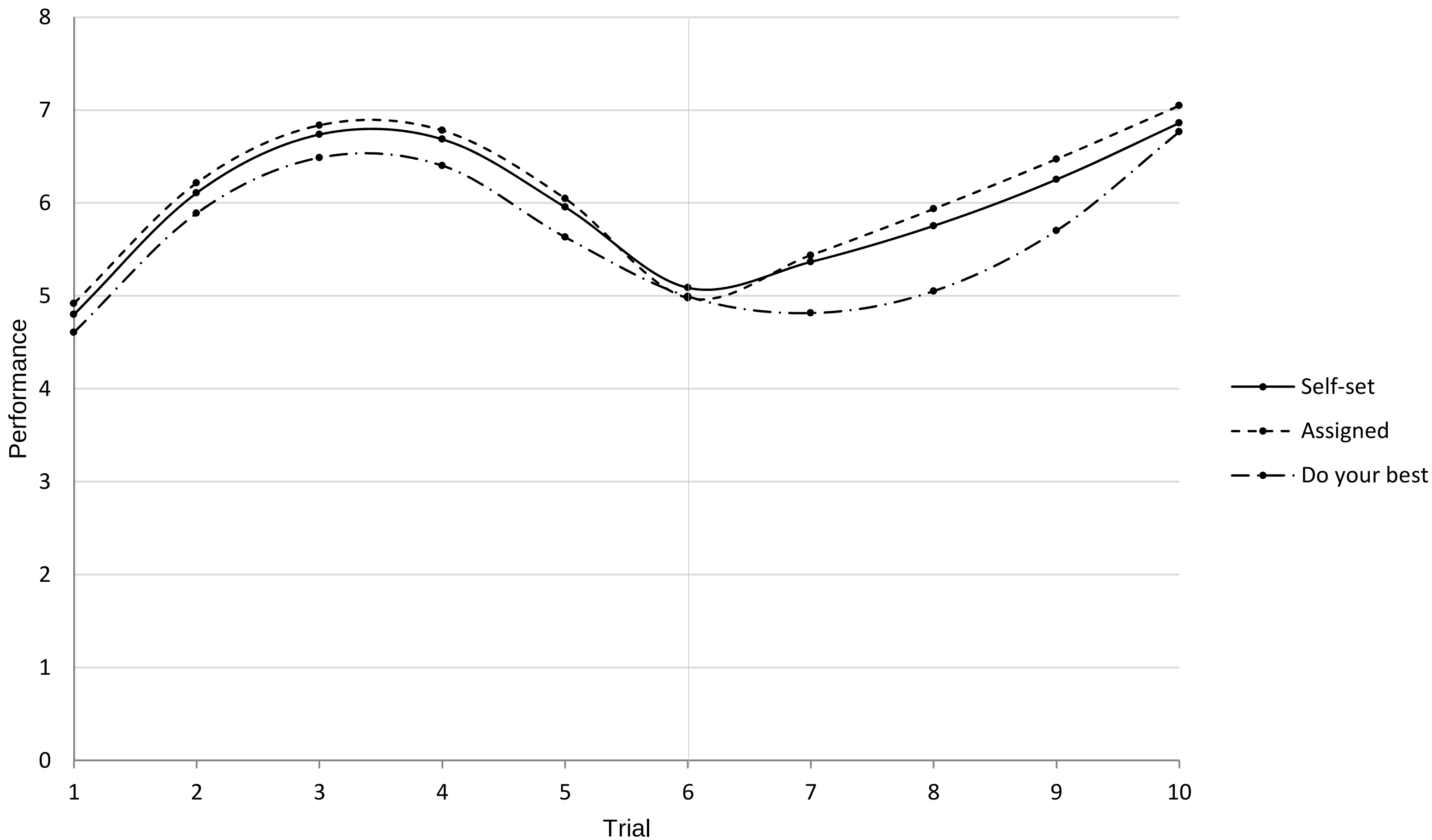

Figure 7. Predicted performance as a function of goal-setting – entire sample.

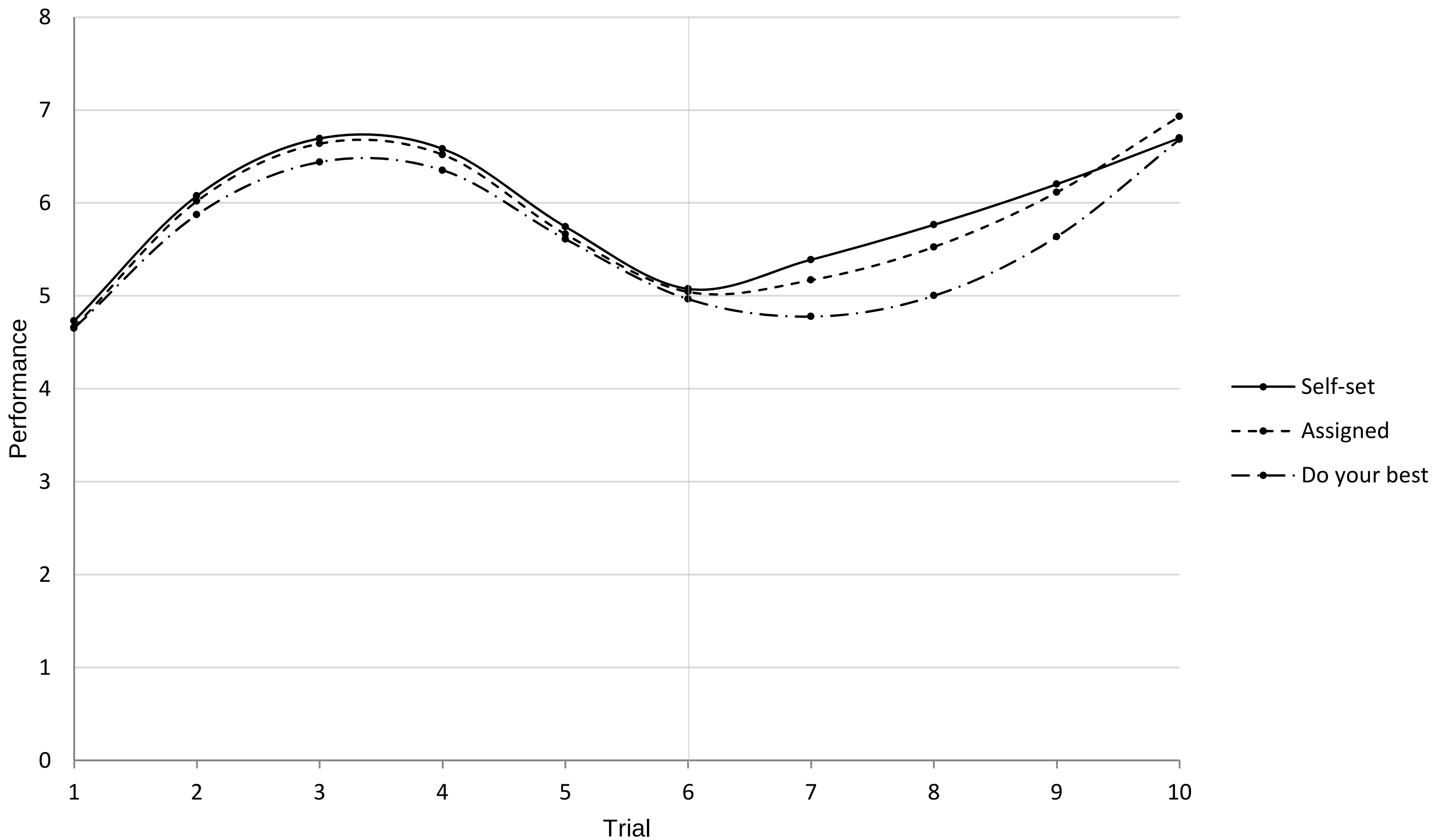

Figure 8. Predicted performance as a function of goal-setting – subset sample.

Primed Subconscious Goal. To test Hypotheses 5 and 6, the dummy-coded variable for the primed subconscious goal, the neutral condition as the reference category, was added as Level-2 predictor of the Level-1 parameters. As such, the Level-2 equation was:

$\pi 0i = \beta_{00} + \beta_{01}Sex + \beta_{02}Prime + r_{0i}$

$\pi 1i = \beta_{10} + \beta_{11}Sex + \beta_{12}Prime + r_{1i}$

$\pi 2i = \beta_{20} + \beta_{21}Sex + \beta_{22}Prime + r_{2i}$

$\pi 3i = \beta_{30} + \beta_{31}Sex + \beta_{32}Prime + r_{3i}$

$\pi 4i = \beta_{40} + \beta_{41}Sex + \beta_{42}Prime + r_{4i}$

$\pi 5i = \beta_{50} + \beta_{51}Sex + \beta_{52}Prime + r_{5i}$

Where β_{00}, β_{10},…,β_{50} represents the average parameter for females in the neutral condition, β_{01}Sex, β_{11}Sex,…,β_{51}Sex is testing the effects of males, β_{02}Prime, β_{12}Prime,…,β_{52}Prime is testing the effects of the primed goal, and r_{0i}, r_{1i},…, r_{5i} is between-person random effects.

Results of these analyses are presented in Tables 24-26 and Figures 9-10. In both samples, Hypotheses 5 and 6 were not supported. Hypothesis 5 was unsupported in that the primed condition did not significantly differ from the neutral condition in transition adaptability $\beta = -.09$, $SE = .42$, $t\ (2352) = -.21$, $p = .84$. Hypothesis 6 was unsupported as the primed condition did not significantly differ from the neutral condition in either the instantaneous rate of change, $\beta = .26$, $SE = .42$, $t\ (2352) = .63$, $p = .53$, or quadratic curvature, $\beta = .02$, $SE = .08$, $t\ (2352) = .32$, $p = .75$, form of reacquisition adaptability.

Overall, the achievement primed subconscious goal did not have any effect on either form of adaptability.

Table 24

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.09	.26	2352	15.73	< .001
SA	1.96	.24	2352	8.32	< .001
QSA	-.42	.05	2352	-7.82	< .001
TA	-1.93	.39	2352	-4.98	< .001
RA	-2.60	.38	2352	-6.83	< .001
QRA	.26	.07	2352	3.70	< .001
Level-2 Model					
Sex	.77	.29	260	2.68	.01
Prime	.52	.28	260	1.83	.07
SA x Sex	-.31	.26	2352	-1.18	.24
SA x Prime	-.32	.26	2352	-1.23	.22
QSA x Sex	.08	.06	2352	1.37	.17
QSA x Prime	.07	.06	2352	1.26	.21
TA x Sex	-.93	.43	2352	-2.17	.03
TA x Prime	-.09	.42	2352	-.21	.84
RA x Sex	1.65	.42	2352	3.94	< .001
RA x Prime	.26	.42	2352	.63	.53
QRA x Sex	-.31	.08	2352	-4.05	< .001
QRA x Prime	.02	.08	2352	.32	.75

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 25

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.10	.28	1983	14.88	< .001
SA	2.02	.25	1983	8.00	< .001
QSA	-.44	.06	1983	-7.62	< .001
TA	-2.02	.41	1983	-4.96	< .001
RA	-2.61	.39	1983	-6.77	< .001
QRA	.25	.07	1983	3.48	< .001
Level-2 Model					
Sex	.76	.32	219	2.39	.02
Prime	.37	.32	219	1.14	.26
SA x Sex	-.41	.29	1983	-1.40	.16
SA x Prime	-.32	.30	1983	-1.07	.28
QSA x Sex	.11	.07	1983	1.62	.10
QSA x Prime	.06	.07	1983	.82	.41
TA x Sex	-.77	.47	1983	-1.62	.10
TA x Prime	.41	.48	1983	.85	.39
RA x Sex	1.68	.45	1983	3.75	< .001
RA x Prime	-.15	.45	1983	-.34	.74
QRA x Sex	-.29	.08	1983	-3.57	< .001
QRA x Prime	.11	.08	1983	1.32	.19

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 26

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.57	1.89	--					
2. SA	1.82	1.35	-.71	--				
3. TA	7.34	2.71	.24	-.63	--			
4. RA	6.10	2.47	.54	-.42	-.30	--		
5. QSA	.08	.28	.70	-.97	.50	.47	--	
6. QRA	.23	.48	-.20	-.09	.64	-.86	.01	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.72	1.93	--					
2. SA	2.02	1.42	-.77	--				
3. TA	7.51	2.74	.33	-.71	--			
4. RA	5.43	2.33	.55	-.41	-.18	--		
5. QSA	.09	.30	.77	-.96	.60	.45	--	
6. QRA	.21	.46	-.10	-.16	.60	-.83	.08	--
Residual	2.19	1.48						

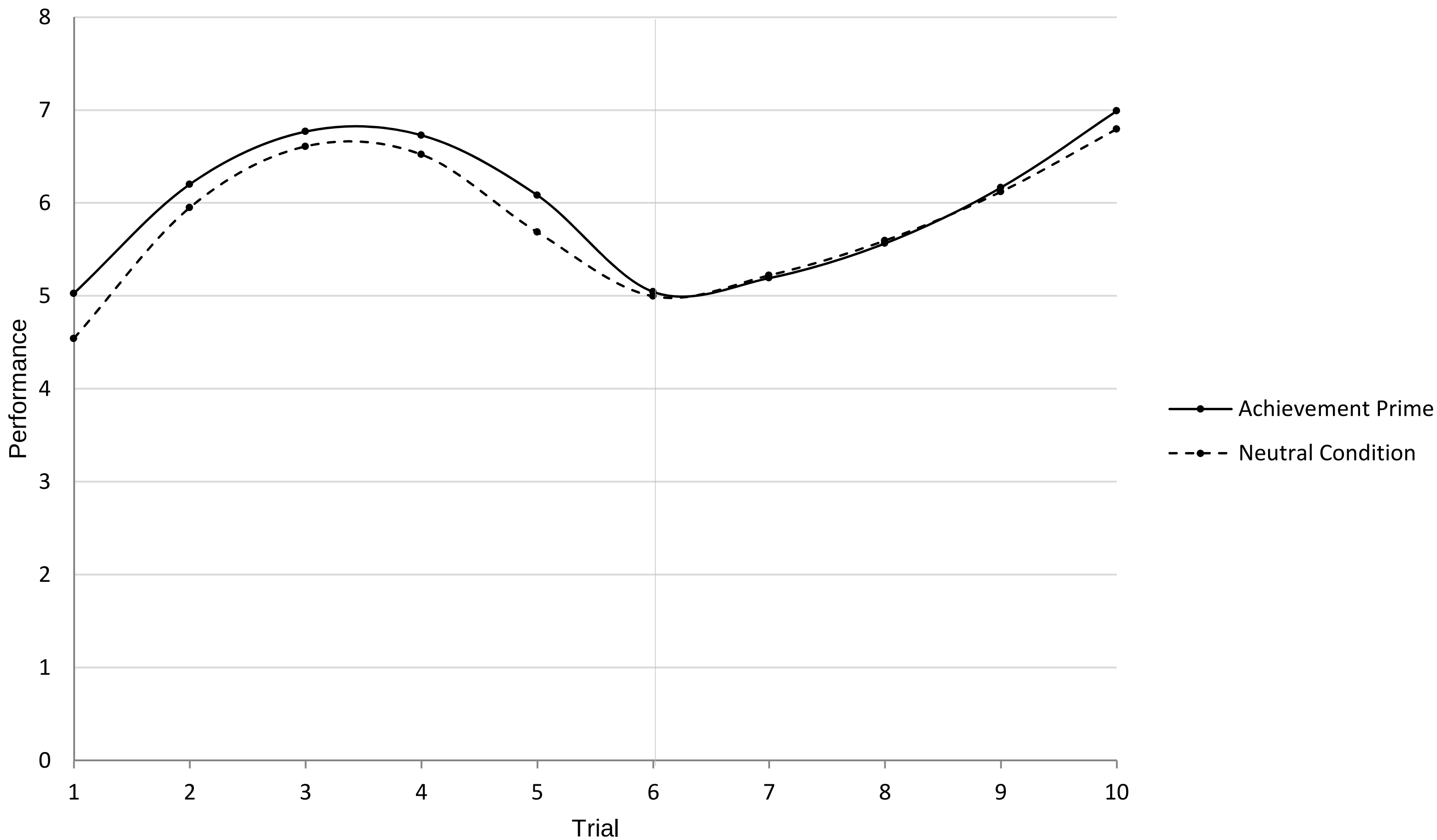

Figure 9. Predicted performance as a function of primed subconscious goal – entire sample.

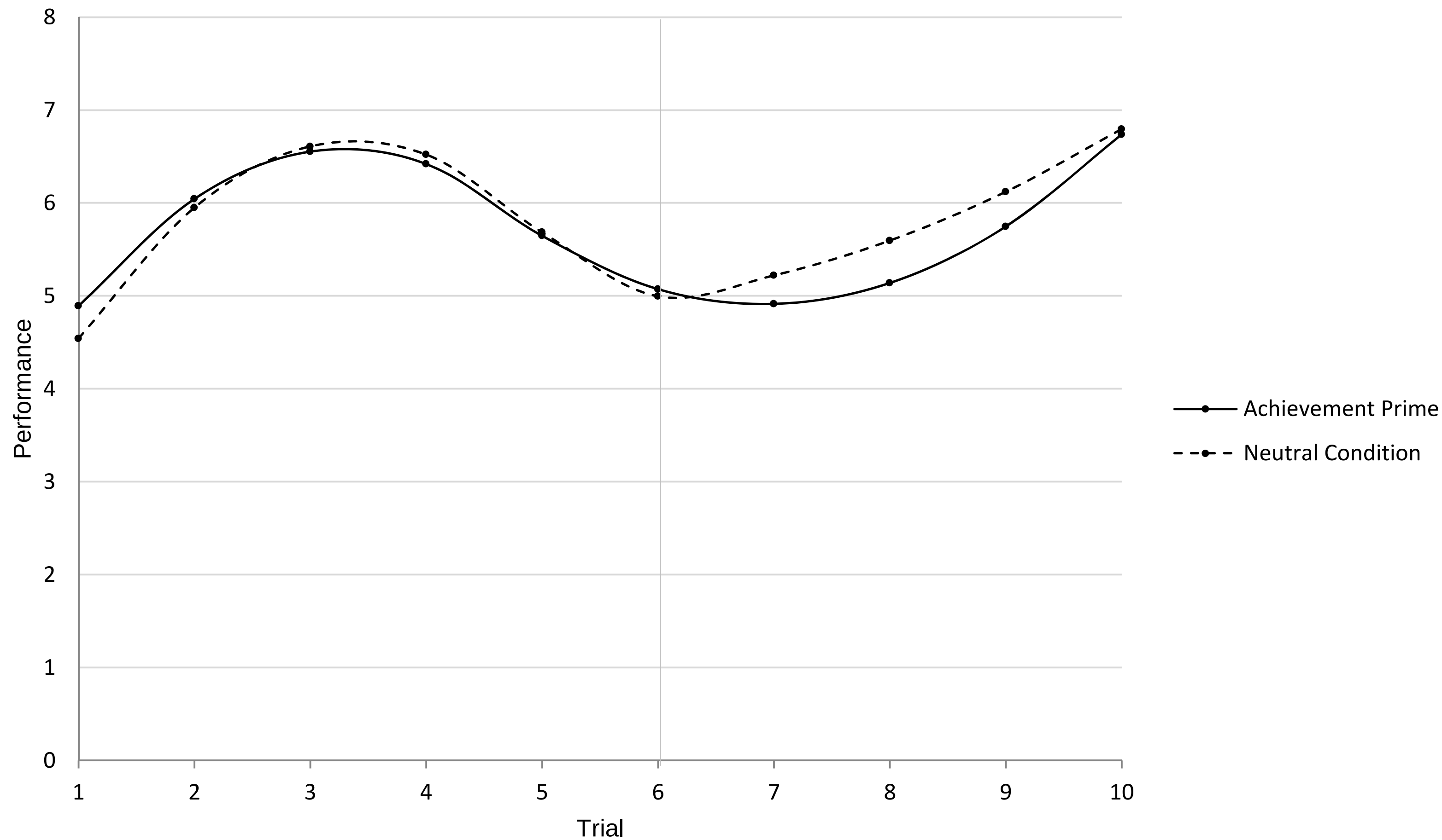

Figure 10. Predicted performance as a function of primed subconscious goal – subset sample.

Implementation Intention. To test Hypotheses 7 and 8, the dummy-coded variables for implementation intention, the manipulation as the reference category, were added as Level-2 predictors of the Level-1 parameters. As such, the Level-2 equation was:

$\pi 0i = \beta_{00} + \beta_{01}Sex + \beta_{02}Strong + \beta_{03}Weak + r_{0i}$

$\pi 1i = \beta_{10} + \beta_{11}Sex + \beta_{12}Strong + \beta_{13}Weak + r_{1i}$

$\pi 2i = \beta_{20} + \beta_{21}Sex + \beta_{22}Strong + \beta_{23}Weak + r_{2i}$

$\pi 3i = \beta_{30} + \beta_{31}Sex + \beta_{32}Strong + \beta_{33}Weak + r_{3i}$

$\pi 4i = \beta_{40} + \beta_{41}Sex + \beta_{42}Strong + \beta_{43}Weak + r_{4i}$

$\pi 5i = \beta_{50} + \beta_{51}Sex + \beta_{52}Strong + \beta_{53}Weak + r_{5i}$

Where β_{00}, β_{10},…,β_{50} represents the average parameter for females in the implementation intention condition, β_{01}Sex, β_{11}Sex,…,β_{51}Sex is testing the effects of males, β_{02}Strong, β_{12}Strong,…,β_{52}Strong is testing the effects of the strong control compared to the implementation intention condition, β_{03}Weak, β_{13}Weak,…,β_{53}Weak is testing the effects of the weak control condition to the implementation intention condition, and r_{0i}, r_{1i},…, r_{5i} is between-person random effects.

Results of these analyses are presented in Tables 27-29 and Figures 11-12. In both samples, Hypotheses 7 was unsupported in that the implementation intention condition did not significantly differ in transition adaptability than the strong control, β = -.56, *SE* = .51, *t* (2347) = -.11, *p* = .91. However, the hypothesis was also unsupported in that the weak control experienced a significant increase in transition adaptability compared to the implementation intention condition, β = 1.04, *SE* = .52, *t* (2347) = 1.99, *p* = .05. This latter finding was marginally significant in the subset sample as well, β =

1.05, *SE* = .58, *t* (1978) = 1.82, *p* = .07. Therefore, those in the weak control condition experienced a smaller decrease in performance during the change trial than those who set an implementation intention. When executing a model in which the coding allows for a comparison of the strong control condition to the weak control condition (i.e., coded as the reference category), the strong control condition's relationship to transition adaptability was significant and negative in the entire sample, β = -1.09, *SE* = .52, *t* (2347) = -2.10, *p* = .04, and subset sample, β = -1.31, *SE* = .57, *t* (1978) = -2.30, *p* = .02. This means that those who received the strong control experienced a larger decrease in performance during the change trial than those who received the weak control. Overall, the trend of these results suggests that those participants who received information about the task change, via the implementation intention or the strong control, experienced a larger drop in performance during the change trial than those participants who received no information at all.

Hypothesis 8 was supported in that the implementation intention condition did not significantly differ from either of the control conditions in either form of reacquisition adaptability.

In addition to these findings, the entire sample had another marginally significant finding. The weak control condition experienced a slightly lower instantaneous rate of change in skill acquisition than the implementation intention condition, β = -.56, *SE* = .32, *t* (2347) = -1.76, *p* = .08. That is, those who made an implementation intention experienced a slightly faster rate of performance improvement in the pre-change trials than those that received no information at all. When executing a model in which the coding allows for a comparison of the strong control condition to the weak control condition (i.e., coded as the reference category), the strong control condition's relationship to the instantaneous rate of change in skill acquisition was not significantly different from the weak control, $\beta = .48$, $SE = .36$, $t\,(1978) = 1.34$, $p = .18$. The trend of these results is that those receiving the implementation intention experienced a slightly larger rate of performance improvement in the pre-change trials than those who received no information. However, those that received similar task-related information in the strong control did not differ from either the implementation intention or the weak control condition.

Overall, these findings suggest that an implementation intention does not improve either form of adaptability. In fact, the findings suggest the extra information provided in the implementation intention and the strong control lead to worse transition adaptability than not receiving information.

Table 27

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.19	.30	2347	14.19	< .001
SA	2.07	.26	2347	7.83	< .001
QSA	-.43	.06	2347	-7.22	< .001
TA	-2.36	.43	2347	-5.42	< .001
RA	-2.47	.43	2347	-5.76	< .001
QRA	.22	.07	2347	2.83	< .01
Level-2 Model					
Sex	.79	.29	259	2.73	.01
Strong	-.02	.35	259	-.05	.96
Weak	.43	.35	259	1.23	.22
SA x Sex	-.33	.26	2347	-1.26	.21
SA x Strong	-.21	.31	2347	-.66	.51
SA x Weak	-.56	.32	2347	-1.77	.08
QSA x Sex	.09	.06	2347	1.44	.15
QSA x Strong	.04	.07	2347	.52	.60
QSA x Weak	.11	.07	2347	1.47	.14
TA x Sex	-.81	.43	2347	-1.89	.06
TA x Strong	-.05	.51	2347	-.11	.91
TA x Weak	1.04	.52	2347	1.99	.05
RA x Sex	1.60	.42	2347	3.79	< .001
RA x Strong	.25	.51	2347	.50	.62
RA x Weak	-.19	.51	2347	-.38	.71
QRA x Sex	-.30	.08	2347	-3.86	< .001
QRA x Strong	-.01	.09	2347	-.09	.93
QRA x Weak	.13	.09	2347	1.43	.15

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 28

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.07	.34	1978	12.06	< .001
SA	2.14	.31	1978	6.91	< .001
QSA	-.45	.07	1978	-6.43	< .001
TA	-2.21	.50	1978	-4.46	< .001
RA	-2.73	.47	1978	-5.76	< .001
QRA	.26	.09	1978	2.94	< .01
Level-2 Model					
Sex	.82	.32	218	2.54	.01
Strong	-.04	.38	218	-.10	.92
Weak	.46	.39	218	1.17	.25
SA x Sex	-.47	.30	1978	-1.59	.11
SA x Strong	-.09	.35	1978	-.24	.81
SA x Weak	-.56	.36	1978	-1.55	.12
QSA x Sex	.12	.07	1978	1.76	.08
QSA x Strong	.01	.08	1978	.07	.94
QSA x Weak	.09	.08	1978	1.15	.25
TA x Sex	-.60	.47	1978	-1.27	.20
TA x Strong	-.26	.56	1978	-.46	.65
TA x Weak	1.05	.58	1978	1.82	.07
RA x Sex	1.64	.45	1978	3.62	< .001
RA x Strong	.28	.54	1978	.52	.60
RA x Weak	-.05	.55	1978	-.09	.93
QRA x Sex	-.28	.08	1978	-3.34	< .001
QRA x Strong	-.03	.10	1978	-.29	.77
QRA x Weak	.11	.10	1978	1.07	.29

Note. N = 222, k = 2220. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 29

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.72	1.31	-.73	--				
3. TA	7.08	2.66	.22	-.63	--			
4. RA	5.95	2.44	.57	-.42	-.30	--		
5. QSA	.07	.27	.76	-.97	.51	.46	--	
6. QRA	.22	.47	-.21	-.09	.63	-.86	.02	--
Residual	2.13	1.46						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.04	1.43	-.75	--				
3. TA	7.29	2.70	.32	-.70	--			
4. RA	5.48	2.34	.55	-.43	-.17	--		
5. QSA	.09	.30	.74	-.97	.58	.46	--	
6. QRA	.21	.46	-.12	-.15	.59	-.82	.08	--
Residual	2.16	1.47						

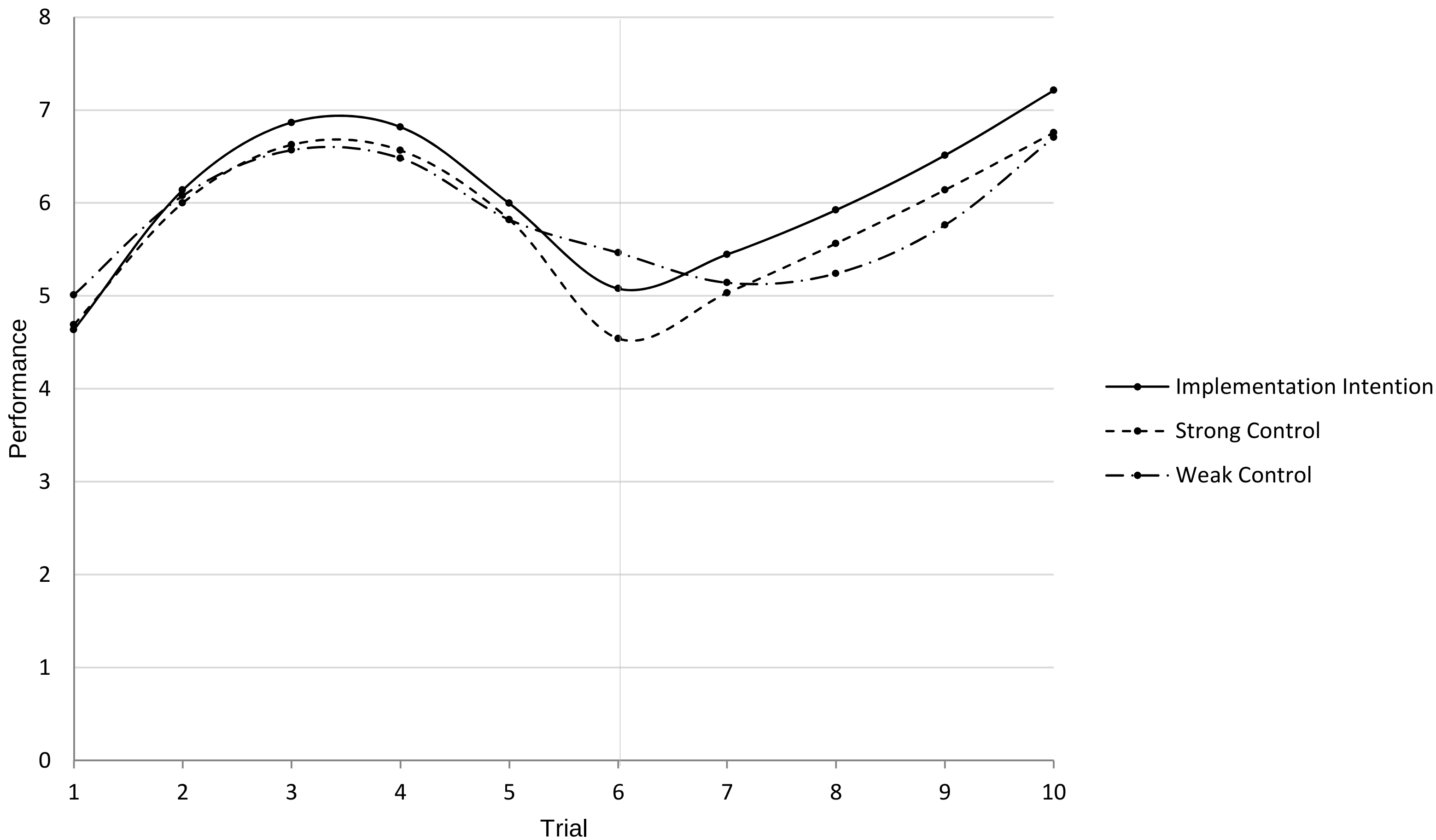

Figure 11. Predicted performance as a function of implementation intention condition – entire sample.

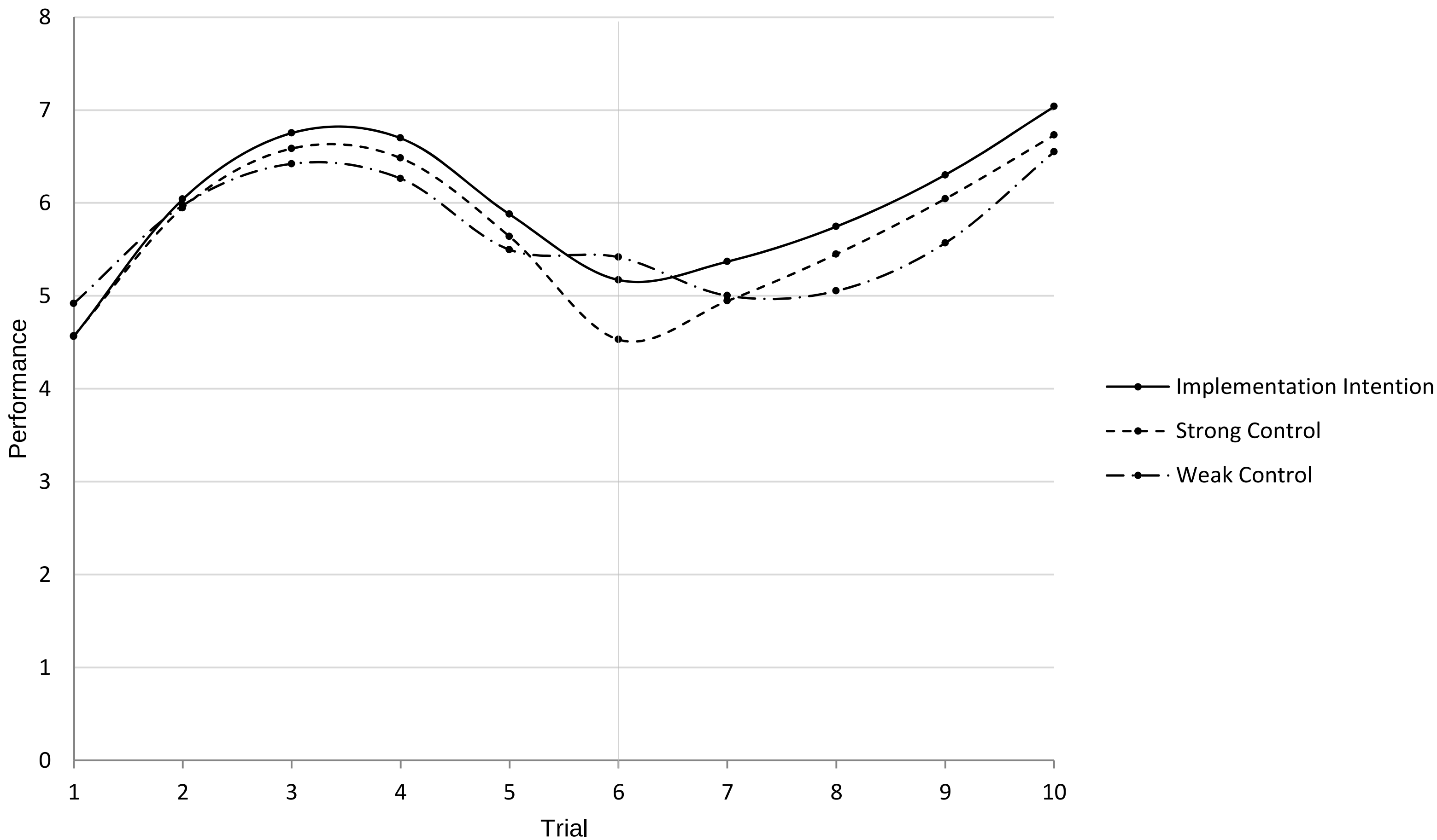

Figure 12. Predicted performance as a function of implementation intention condition – subset sample.

Exploratory Analyses

I-ADAPT. Two models were run to assess if either of the I-ADAPT measures related to either form of adaptability. For both models, the I-ADAPT measure was grand-mean centered (Lang & Bliese, 2009). As such, the Level-2 equation was:

$\pi 0i = \beta_{00} + \beta_{01}\text{Sex} + \beta_{02}\text{I-ADAPT} + r_{0\text{i}}$

$\pi 1i = \beta_{10} + \beta_{11}\text{Sex} + \beta_{12}\text{I-ADAPT} + r_{1\text{i}}$

$\pi 2i = \beta_{20} + \beta_{21}\text{Sex} + \beta_{22}\text{I-ADAPT} + r_{2\text{i}}$

$\pi 3i = \beta_{30} + \beta_{31}\text{Sex} + \beta_{32}\text{I-ADAPT} + r_{3\text{i}}$

$\pi 4i = \beta_{40} + \beta_{41}\text{Sex} + \beta_{42}\text{I-ADAPT} + r_{4\text{i}}$

$\pi 5i = \beta_{50} + \beta_{51}\text{Sex} + \beta_{52}\text{I-ADAPT} + r_{5\text{i}}$

Where β_{00}, β_{10}, β_{20},…,β_{50} represents the intercept/slope for females scoring average in terms of the I-ADAPT measure, β_{01}Sex, β_{11}Sex, β_{21}Sex,…,β_{51}Sex is testing the effects of sex, β_{02}I-ADAPT, β_{12}I-ADAPT, β_{22}I-ADAPT,…,β_{52}I-ADAPT is testing the effects of the I-ADAPT measure under investigation, and $r_{0\text{i}}$, $r_{1\text{i}}$, $r_{2\text{i}}$,…, $r_{5\text{i}}$ is between-person random effects.

The results for the Uncertainty scale can be seen in Tables 30-32 and the results for the Learning scale can be seen in Tables 33-35. Neither scale was significantly related to any form of adaptability.

Table 30

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2352	19.95	< .001
SA	1.79	.20	2352	9.06	< .001
QSA	-.38	.05	2352	-8.40	< .001
TA	-1.99	.33	2352	-6.15	< .001
RA	-2.41	.32	2352	-7.61	< .001
QRA	.26	.06	2352	4.48	< .001
Level-2 Model					
Sex	.74	.29	260	2.53	.01
Uncertain	.00	.19	260	.02	.99
SA x Sex	-.28	.27	2352	-1.06	.29
SA x Uncertain	-.04	.17	2352	-.22	.83
QSA x Sex	.07	.06	2352	1.19	.23
QSA x Uncertain	.02	.04	2352	.49	.63
TA x Sex	-.89	.43	2352	-2.05	.04
TA x Uncertain	-.11	.28	2352	-.39	.69
RA x Sex	1.56	.43	2352	3.66	< .001
RA x Uncertain	.27	.28	2352	.96	.34
QRA x Sex	-.29	.08	2352	-3.80	< .001
QRA x Uncertain	-.05	.05	2352	-1.09	.28

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 31

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.24	.24	1983	17.32	< .001
SA	1.89	.22	1983	8.41	< .001
QSA	-.41	.05	1983	-8.08	< .001
TA	-1.87	.36	1983	-5.17	< .001
RA	-2.64	.34	1983	-7.72	< .001
QRA	.28	.06	1983	4.50	< .001
Level-2 Model					
Sex	.77	.32	219	2.37	.02
Uncertain	-.06	.21	219	-.30	.76
SA x Sex	-.39	.30	1983	-1.32	.19
SA x Uncertain	-.05	.19	1983	-.27	.79
QSA x Sex	.10	.07	1983	1.48	.14
QSA x Uncertain	.03	.04	1983	.70	.48
TA x Sex	-.75	.48	1983	-1.56	.12
TA x Uncertain	-.11	.31	1983	-.35	.72
RA x Sex	1.62	.45	1983	3.57	< .001
RA x Uncertain	.26	.29	1983	.88	.38
QRA x Sex	-.28	.08	1983	-3.39	< .001
QRA x Uncertain	-.05	.05	1983	-.10	.32

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 32

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.69	1.92	--					
2. SA	1.88	1.37	-.71	--				
3. TA	7.40	2.72	.25	-.62	--			
4. RA	6.15	2.48	.54	-.43	-.29	--		
5. QSA	.08	.29	.70	-.96	.49	.47	--	
6. QRA	.23	.48	-.19	-.09	.63	-.86	.01	--
Residual	2.07	1.44						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.02	1.42	-.77	--				
3. TA	7.51	2.74	.33	-.71	--			
4. RA	5.38	2.32	.55	-.41	-.19	--		
5. QSA	.08	.29	.78	-.97	.60	.44	--	
6. QRA	.22	.47	-.09	-.17	.60	-.83	.10	--
Residual	2.19	1.48						

Table 33

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2352	20.01	< .001
SA	1.79	.20	2352	9.11	< .001
QSA	-.38	.05	2352	-8.44	< .001
TA	-1.98	.32	2352	-6.13	< .001
RA	-2.43	.32	2352	-7.68	< .001
QRA	.26	.05	2352	4.54	< .001
Level-2 Model					
Sex	.75	.29	260	2.58	.01
Learning	-.03	.24	260	-.14	.89
SA x Sex	-.29	.26	2352	-1.08	.28
SA x Learning	-.04	.21	2352	-.17	.87
QSA x Sex	.07	.06	2352	1.22	.22
QSA x Learning	.02	.05	2352	.47	.64
TA x Sex	-.92	.43	2352	-2.13	.03
TA x Learning	-.03	.35	2352	-.08	.94
RA x Sex	1.59	.42	2352	3.75	< .001
RA x Learning	.28	.34	2352	.81	.42
QRA x Sex	-.30	.08	2352	-3.87	< .001
QRA x Learning	-.07	.06	2352	-1.06	.29

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 34

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.23	.25	1983	17.24	< .001
SA	1.89	.22	1983	8.42	< .001
QSA	-.41	.05	1983	-8.13	< .001
TA	-1.85	.36	1983	-5.13	< .001
RA	-2.66	.34	1983	-7.80	< .001
QRA	.29	.06	1983	4.58	< .001
Level-2 Model					
Sex	.78	.32	219	2.40	.02
Learning	-.16	.27	219	-.62	.54
SA x Sex	-.40	.30	1983	-1.35	.18
SA x Learning	-.03	.24	1983	-.11	.91
QSA x Sex	.10	.07	1983	1.53	.13
QSA x Learning	.03	.05	1983	.55	.58
TA x Sex	-.78	.48	1983	-1.64	.10
TA x Learning	.04	.39	1983	.10	.92
RA x Sex	1.66	.45	1983	3.68	< .001
RA x Learning	.16	.37	1983	.42	.67
QRA x Sex	-.29	.08	1983	-3.49	< .001
QRA x Learning	-.05	.07	1983	-.68	.50

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.

Table 35

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.69	1.92	--					
2. SA	1.88	1.37	-.71	--				
3. TA	7.40	2.72	.24	-.62	--			
4. RA	6.15	2.48	.54	-.42	-.30	--		
5. QSA	.08	.29	.69	-.96	.49	.47	--	
6. QRA	.23	.48	-.19	-.09	.63	-.86	.01	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.80	1.95	--					
2. SA	2.04	1.43	-.76	--				
3. TA	7.56	2.75	.34	-.72	--			
4. RA	5.38	2.32	.55	-.41	-.18	--		
5. QSA	.08	.29	.77	-.97	.62	.44	--	
6. QRA	.21	.46	-.11	-.18	.60	-.82	.12	--
Residual	2.19	1.48						

Goal commitment moderating goal-setting. Although goal commitment was assessed at the within-level of analysis, it displayed relatively low standard deviations throughout the ten trials (ranges from .72 to 1.34). Further investigation revealed that the within-person standard deviations of goal commitment tended to be very small (*M* = .42, *SD* = .40). Based on this analysis, ICC(1) and ICC(2) were computed to assess if there was enough within-person agreement and reliability across the 10 goal commitment ratings to aggregate each participants' responses to a single goal commitment value (Bliese, 2000; Ostroff & Schmitt, 1993). ICC(1) was found to be .75 and ICC(2) was .98, which indicates that the within-person agreement and reliability were high enough to aggregate the goal commitment measures (Ostroff & Schmitt, 1993). Goal commitment was aggregated to the individual level by taking the mean of each participant's 10 measures of goal commitment.

Given goal commitment's historical moderating relationship with goal-setting and that there were observed differences between the assigned goal and self-set goal conditions in terms of goal commitment, a model was executed which investigated the effects that the interaction of goal-setting condition and goal commitment had on the Level-1 model change parameters. However, only individuals who were in the assigned or self-set goal conditions (entire sample: n = 175; subset sample: n = 144) completed the goal commitment measures. As such, the Level-1 model was rebuilt using only this sample.

Level-1 analyses with sex-identified and goal commitment data. For step 1, the ICC1 was found to be .42 for the entire sample and .41 for the subset sample. Both findings suggest that considerable individual differences in performance across time exist (Bliese, 2000).

In step 2, Level-1 change parameters were added to the model to assess their effects on performance. Analyses indicated that only the linear change parameters and quadratic skill acquisition significantly explained variability in the change of performance across time; see Table 36 for detailed results. In the subset sample, the results supported the significance of the same parameters. It should be noted that the quadratic reacquisition adaptability parameter was marginally significant. It was not included in the model for the sake of parsimony and model consistency between samples.

Table 36

Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Entire Sample					
Linear Level-1 model					
(Intercept)	5.52	.16	1572	33.95	< .001
SA	.29	.05	1572	6.42	< .001
TA	-2.04	.19	1572	-10.90	< .001
RA	.20	.06	1572	3.10	< .01
Quadratic Level-1 model					
(Intercept)	4.83	.18	1570	27.21	< .001
SA	1.68	.16	1570	10.78	< .001
TA	-2.65	.21	1570	-12.57	< .001
RA	-1.36	.22	1570	-6.17	< .001
QSA	-.35	.04	1570	-9.29	< .001
QRA	.04	.04	1570	1.14	.26
Subset sample					
Linear Level-1 model					
(Intercept)	5.41	.18	1293	30.22	< .001
SA	.26	.05	1293	5.07	< .001
TA	-1.80	.21	1293	-8.61	< .001
RA	.19	.07	1293	2.64	< .01
Quadratic Level-1 model					
(Intercept)	4.66	.20	1291	23.84	< .001
SA	1.76	.17	1291	10.17	< .001
TA	-2.39	.23	1291	-10.21	< .001
RA	-1.64	.24	1291	-6.68	< .001
QSA	-.38	.04	1291	-9.05	< .001
QRA	.08	.04	1291	1.93	> .05

Note. Entire sample: N = 175. k =1750. Subset sample: N = 144. k = 1440. Coef. = coefficient; SA = linear term for skill acquisition; QSA = quadratic term for skill acquisition; TA = linear term for transition adaptability; RA = linear term for reacquisition adaptability; QRA = quadratic term for reacquisition adaptability.

In step 3, the Level-1 change parameters were tested to see if they significantly varied between individuals. Six models were tested with the only constant being that the intercept in each was allowed to randomly vary to account for individual differences in performance.

Model 1 is the final model from step 2 and serves as the baseline model where all change variables were forced to be equal across individuals. Model 2 allowed the linear skill acquisition slope to randomly vary across individuals. Model 3 allowed both linear skill acquisition and the transition adaptability slopes to randomly vary. Model 4 allowed linear skill acquisition, transition adaptability, and linear reacquisition adaptability slopes to randomly vary. Model 5 allowed variability in the linear skill acquisition, transition adaptability, linear reacquisition adaptability, and quadratic skill acquisition slopes.

As seen in Table 37, allowing almost all of the change parameters to vary significantly improved the model fit in both samples. Model 4's improvement (i.e., letting linear reacquisition adaptability in addition to linear skill acquisition and transition adaptability vary) did not lead to a significantly better fitting model; however, it was allowed to vary based on theoretical reasons. In the subset sample, allowing linear skill acquisition to vary was a marginally significant improvement, $\chi^2_{diff}(2) = 5.54$, $p = .06$. Given the sensitivity of this test (Snijders & Boskers, 1999), it was allowed to vary.

Table 37

Log-Likelihood Tests of Random Slope Models – Entire Sample

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
Entire Sample							
1	7	7514.97	7553.22	-3750.49	--	--	--
2	9	7509.54	7558.72	-3745.77	1 vs. 2	9.43	< .001
3	12	7497.98	7563.56	-3736.99	2 vs. 3	17.56	< .001
4	16	7505.73	7593.16	-3736.86	3 vs. 4	.26	.99
5	21	7496.66	7611.41	-3727.33	4 vs. 5	19.07	< .01
Subset Sample							
1	7	6212.60	6249.48	-3099.30	--	--	--
2	9	6211.05	6258.47	-3096.53	1 vs. 2	5.54	.06
3	12	6206.63	6269.86	-3091.32	2 vs. 3	10.42	.02
4	16	6213.39	6297.69	-3090.70	3 vs. 4	1.24	.87
5	21	6194.40	6305.05	-3076.20	4 vs. 5	28.99	< .001

In step 4, the final model from step 3 (i.e., Model 5) was tested for autocorrelation and heteroscedasticity in the model's error structure via log-likelihood tests. Results indicated no existence for autocorrelation, $\chi^2_{diff}(1) = .68$, $p = .41$, or heteroscedasticity, $\chi^2_{diff}(1) = 1.06$, $p = .30$. As such, no corrections were applied in the final Level-1 model. In the subset sample, no evidence existed for autocorrelation, $\chi^2_{diff}(1) = 1.12$, $p = .29$, or heteroscedasticity, $\chi^2_{diff}(1) = .01$, $p = .92$. As such, the final model was not corrected for autocorrelation or heteroscedasticity.

Lastly, for both samples' final model, growth parameters were examined to ensure that all remained significant after controlling for autocorrelation and all parameters remained significant. Therefore, the final Level-1 model was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}SA_{ti} + \pi_{2i}TA_{ti} + \pi_{3i}RA_{ti} + \pi_{4i}QSA_{ti} + e_{ti}$$

Where Y_{ti} is performance, π_{0i} is the intercept (i.e., basal task performance), $\pi_{1i}SA_{ti}$ is the instantaneous rate of change for skill acquisition, $\pi_{2i}TA_{ti}$ is linear transition adaptability, $\pi_{3i}RA_{ti}$ is linear reacquisition adaptability, $\pi_{4i}QSA_{ti}$ is the quadratic curvature of skill acquisition, and e_{ti} is within-person error.

Tables 38 and 39 displays the final Level-1 model for both the entire sample as well as the subset sample. Using the Level-1 model, performance was predicted across the ten trials and the overall change pattern of individuals was then graphed in Figure 13.

Table 38

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
(Intercept)	4.83	.18	1571	26.26	< .001
SA	1.68	.17	1571	9.99	< .001
QSA	-.35	.04	1571	-8.83	< .001
TA	-2.73	.24	1571	-11.57	< .001
RA	-1.19	.17	1571	-7.02	< .001
Subset Sample					
(Intercept)	4.66	.22	1292	21.24	< .001
SA	1.76	.20	1292	8.89	< .001
QSA	-.38	.05	1292	-8.28	< .001
TA	-2.56	.27	1292	-9.52	< .001
RA	-1.32	.20	1292	-6.62	< .001

Note. Entire sample: $N = 175$, $k = 1750$. Subset sample: $N = 144$, $k = 1440$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic curvature for skill acquisition.

Table 39

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Random Effects

			Correlations				
Random Effects	Variance	*SD*	1	2	3	4	5
Entire Sample							
1. (Intercept)	3.17	1.78	--				
2. SA	1.08	1.04	-.81	--			
3. TA	3.57	1.89	.37	-.83	--		
4. RA	.85	.92	.93	-.96	.66	--	
5. QSA	.05	.22	.91	-.97	.68	.99	--
Residual	3.10	1.76					
Subset Sample							
1. (Intercept)	4.20	2.05	--				
2. SA	1.82	1.35	-.87	--			
3. TA	4.20	2.05	.52	-.87	--		
4. RA	1.54	1.24	.94	-.98	.77	--	
5. QSA	.08	.28	.93	-.98	.76	.99	--
Residual	3.10	1.76					

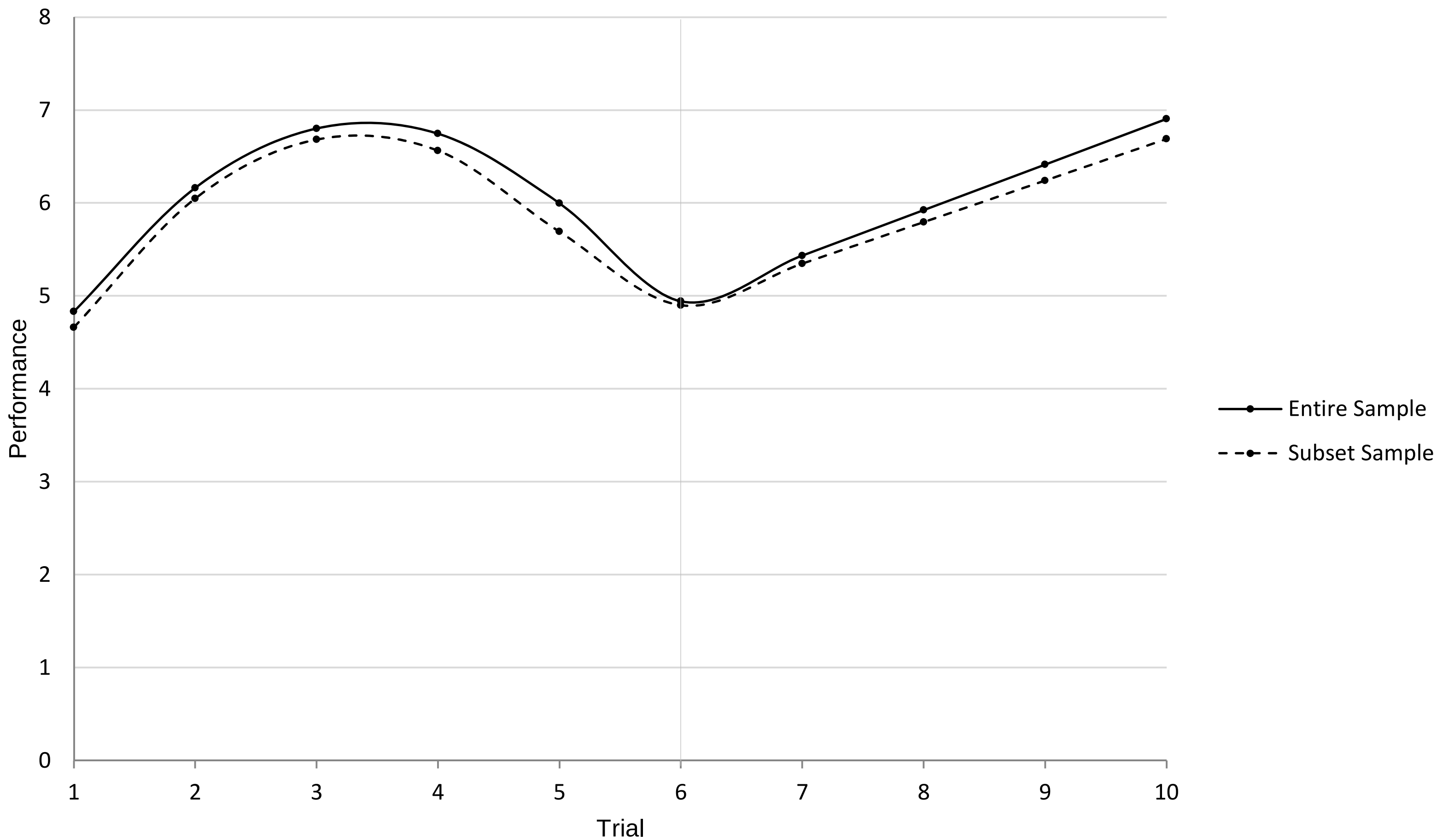

Figure 13. Predicted performance as a function of Level-1 change parameters.

Level-2 analyses with sex-identified and goal commitment data. The Level-2 variables were grand-mean centered goal commitment, and a dummy-coded variable, with the self-set goal condition being the reference category, representing goal-setting. Note that because an interaction exists between the goal-setting and goal commitment variables, the main effects are considered conditional for those variables. As such, the Level-2 equation was:

$\pi 0i = \beta_{00} + \beta_{01}Sex + \beta_{02}Assigned + \beta_{03}GC + \beta_{04}Assigned{*}GC + r_{0i}$

$\pi 1i = \beta_{10} + \beta_{11}Sex + \beta_{12}Assigned + \beta_{13}GC + \beta_{14}Assigned{*}GC + r_{1i}$

$\pi 2i = \beta_{20} + \beta_{21}Sex + \beta_{22}Assigned + \beta_{23}GC + \beta_{24}Assigned{*}GC + r_{2i}$

$\pi 3i = \beta_{30} + \beta_{31}Sex + \beta_{32}Assigned + \beta_{33}GC + \beta_{34}Assigned{*}GC + r_{3i}$

$\pi 4i = \beta_{40} + \beta_{41}Sex + \beta_{42}Assigned + \beta_{43}GC + \beta_{44}Assigned{*}GC + r_{4i}$

Where β_{00}, β_{10},…,β_{40} represents the parameters for females in the self-set goal condition and scoring average in terms of goal commitment, β_{01}Sex, β_{11}Sex,…,β_{41} Sex is testing the overall effects of males, β_{02}Assigned, β_{12}Assigned,…,β_{42}Assigned is testing the effects of the assigned goal condition compared to the self-set goal condition when goal commitment is average, β_{03}GC, β_{13}GC,…,β_{43}GC is testing the effects of goal commitment in the self-set goal condition, β_{04}Assigned*GC, β_{14}Assigned*GC,…,β_{44}Assigned*GC is testing the interactive effects of assigned goal condition and goal commitment, and r_{0i}, r_{1i}, r_{2i},…, r_{6i} is between-person random effects.

The results are displayed in Tables 40-42 and Figures 14-15. Goal commitment had a significant conditional positive effect on the intercept, $\beta = .82$, $SE = .33$, $t\ (170) = 2.49$, $p = .01$. This means that for individuals in the self-set goal condition, when their goal commitment is higher, their basal task performance is also higher.

The interaction of the assigned goal condition and goal commitment had a significant conditional negative effect on the intercept, $\beta = -1.06$, $SE = .41$, $t\ (170) = -2.60$, $p = .01$. That is, compared to the self-set goal condition, those in the assigned goal condition experienced a lower basal task performance the higher their goal commitment.

The relationship between goal commitment and instantaneous rate of change for skill acquisition had a marginally significant and negative relationship in the entire sample, $\beta = -.54$, $SE = .31$, $t\ (1555) = -1.75$, $p = .08$. For individuals in the self-set goal condition, the higher their goal commitment, the slightly slower their rate of performance improvement across the pre-change trials.

A significant and positive interaction occurred between the assigned goal condition and goal commitment in terms of the instantaneous rate of change for skill acquisition, $\beta = .78$, $SE = .38$, $t\ (1555) = 2.07$, $p = .04$. Compared to the self-set goal condition, those in the assigned goal condition experienced a higher rate of improvement in performance during the pre-change trials when their goal commitment was higher.

The relationship between goal commitment and transition adaptability was significant and positive, $\beta = .97$, $SE = .43$, $t\ (1555) = 2.27$, $p = .02$. This means that for individuals in the self-set goal condition, the higher their goal commitment, the less severe their drop in performance during the change trial.

A significant and negative interaction occurred between the assigned goal condition and goal commitment in terms of transition adaptability, $\beta = -1.60$, $SE = .53$, $t\ (1555) = -3.03$, $p < .01$. That is, compared to the self-set goal condition, those in the assigned goal condition experienced a larger decrease in performance during the change trial when their goal commitment was higher.

A marginally significant and negative interaction occurred between the assigned goal condition and goal commitment in terms of linear reacquisition adaptability, $\beta = -.70$, $SE = .38$, $t\,(1555) = -1.84$, $p = .07$. Compared to the self-set goal condition, those in the assigned goal condition experienced a slightly diminished rate of performance improvement during the post-change trials when their goal commitment was higher.

Overall, the findings suggest a complex effect for goal-setting when goal commitment is taken into account. The greater goal commitment for self-set goals led to worse performance across the pre-change trials, while greater commitment improved the performance of assigned goals. In contrast to these findings, greater commitment improved how the self-set goal condition immediately handled the change, while it had a deleterious effect on the transition adaptability of those in the assigned goal condition. Finally, in the post-change trials, the greater commitment continued to improve the performance of those in the self-set goal condition, while having a negative effect on those in the assigned goal condition.

Table 45

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting and Goal Commitment – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	3.77	.34	1555	11.06	< .001
SA	2.03	.32	1555	6.39	< .001
QSA	-.42	.07	1555	-5.59	< .001
TA	-2.86	.45	1555	-6.42	< .001
RA	-1.64	.32	1555	-5.15	< .001
Level-2 Model					
Sex	1.39	.36	170	3.83	< .001
Assigned	.27	.37	170	.74	.46
GC	.82	.33	170	2.49	.01
Assigned x GC	-1.06	.41	1555	-2.60	.01
SA x Sex	-.38	.34	1555	-1.11	.27
SA x Assigned	-.09	.34	1555	-.27	.79
SA x GC	-.54	.31	1555	-1.75	.08
SA x Assigned x GC	.78	.38	1555	2.07	.04
QSA x Sex	.08	.08	1555	1.01	.31
QSA x Assigned	.02	.08	1555	.22	.82
QSA x GC	.09	.07	1555	1.28	.20
QSA x Assigned x GC	-.13	.09	1555	-1.41	.16
TA x Sex	-.05	.47	1555	-.10	.92
TA x Assigned	-.04	.48	1555	-.09	.93
TA x GC	.97	.43	1555	2.27	.02
TA x Assigned x GC	-1.60	.53	1555	-3.03	< .01
RA x Sex	.49	.34	1555	1.45	.15
RA x Assigned	.19	.34	1555	.55	.58
RA x GC	.53	.31	1555	1.72	.09
RA x Assigned x GC	-.70	.38	1555	-1.84	.07

Note. $N = 175$, $k = 1750$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic curvature for skill acquisition.

Table 46

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting and Goal Commitment – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	3.69	.40	1276	9.21	< .001
SA	2.12	.38	1276	5.64	< .001
QSA	-.45	.09	1276	-5.15	< .001
TA	-2.78	.50	1276	-5.52	< .001
RA	-1.76	.38	1276	-4.67	< .001
Level-2 Model					
Sex	1.34	.42	139	3.16	< .01
Assigned	.13	.43	139	.30	.76
GC	.88	.37	139	2.41	.02
Assigned x GC	-1.13	.45	139	-2.50	.01
SA x Sex	-.42	.40	1276	-1.07	.29
SA x Assigned	-.04	.41	1276	-.09	.93
SA x GC	-.49	.34	1276	-1.44	.15
SA x Assigned x GC	.81	.42	1276	1.91	.06
QSA x Sex	.10	.09	1276	1.05	.29
QSA x Assigned	.00	.09	1276	.00	1.00
QSA x GC	.07	.08	1276	.94	.35
QSA x Assigned x GC	-.13	.10	1276	-1.35	.18
TA x Sex	.04	.53	1276	.08	.94
TA x Assigned	.02	.55	1276	.03	.97
TA x GC	1.11	.46	1276	2.41	.02
TA x Assigned x GC	-1.65	.57	1276	-2.89	< .001
RA x Sex	.51	.40	1276	1.28	.20
RA x Assigned	.11	.41	1276	.28	.78
RA x GC	.49	.34	1276	1.43	.15
RA x Assigned x GC	-.78	.42	1276	-1.82	.07

Note. $N = 144$, $k = 1440$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic curvature for skill acquisition.

Table 44

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Random Effects

			Correlations				
Random Effects	Variance	*SD*	1	2	3	4	5
Entire Sample							
1. (Intercept)	2.79	1.67	--				
2. SA	.96	.98	-.80	--			
3. TA	3.31	1.82	.35	-.83	--		
4. RA	.71	.84	.93	-.95	.64	--	
5. QSA	.04	.21	.91	-.96	.67	.98	--
Residual	3.10	1.76					
Subset Sample							
1. (Intercept)	3.57	1.89	--				
2. SA	1.69	1.30	-.87	--			
3. TA	3.84	1.96	.48	-.85	--		
4. RA	1.39	1.18	.94	-.98	.74	--	
5. QSA	.07	.27	.94	-.97	.73	.99	--
Residual	3.13	1.77					

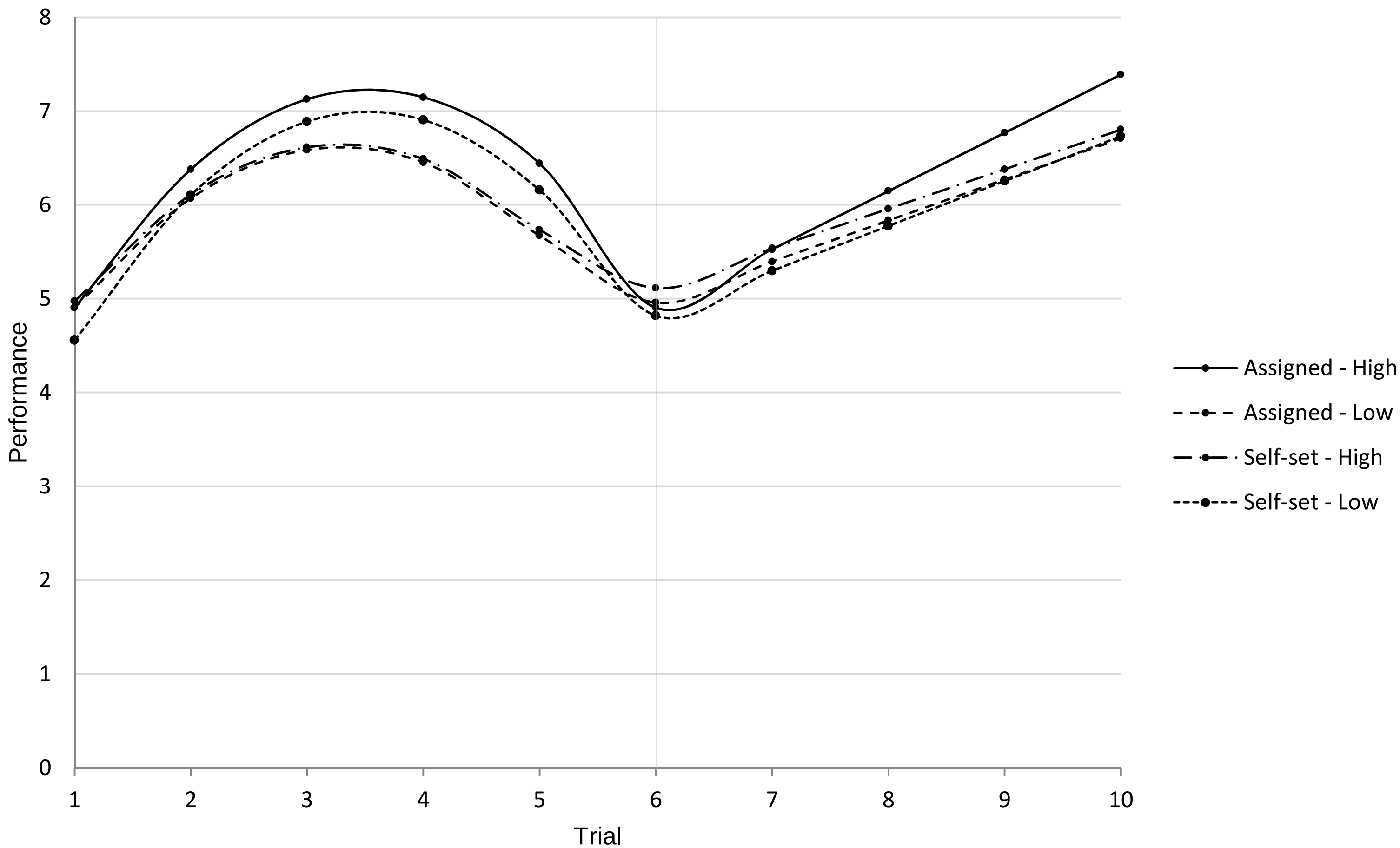

Figure 15. Predicted performance as a function of goal-setting and goal commitment – entire sample.

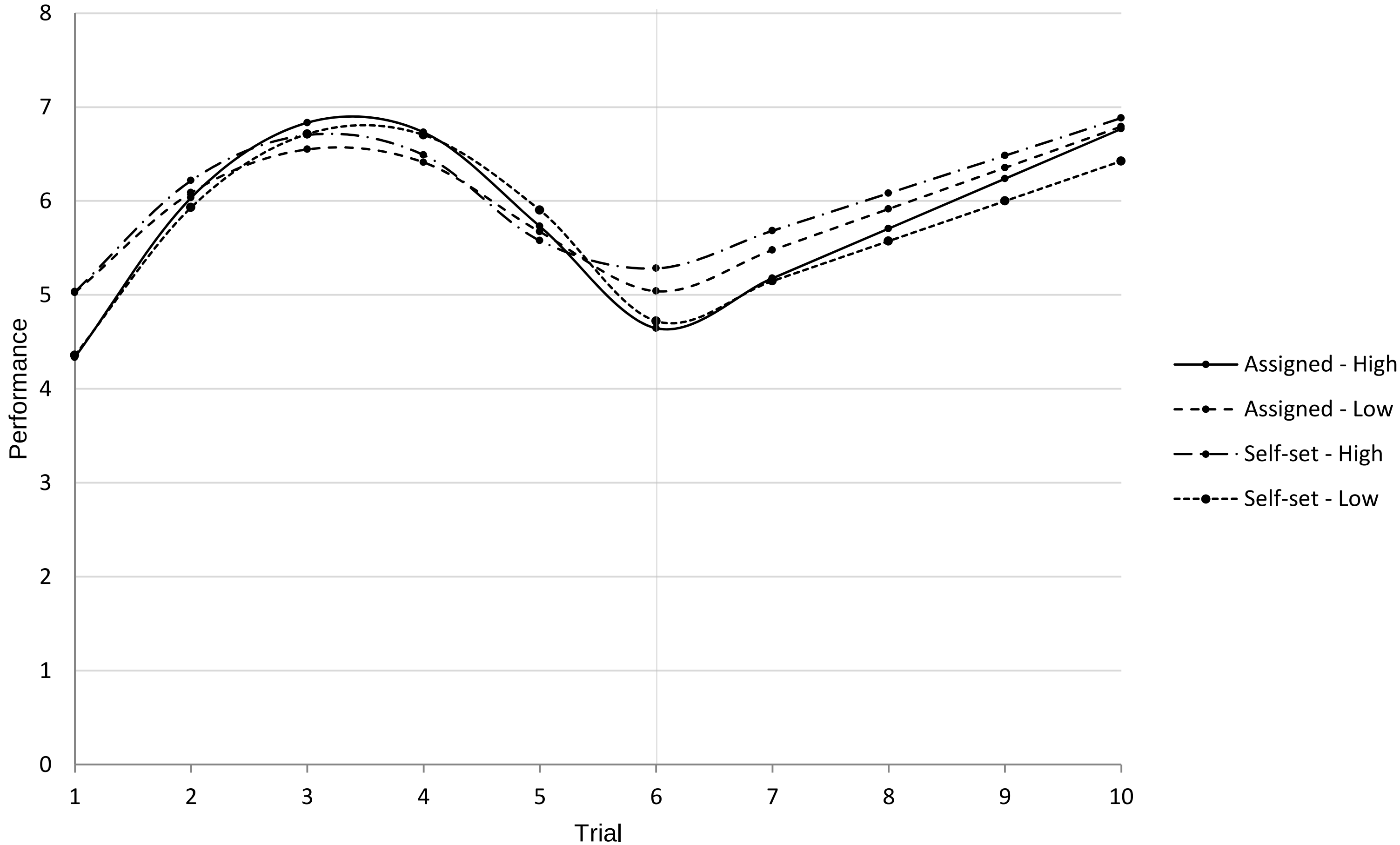

Figure 16. Predicted performance as a function of goal-setting and goal commitment – subset sample.

Interactions between interventions. Using the final Level-1 model, the coefficients for all the change parameters were computed for each individual. To test for interactions, several Three-Way ANOVAs were conducted. Results indicated that no significant interactions occurred between the interventions in regards to either transition adaptability or any form of reacquisition adaptability. See Table 29 for the results of the entire sample and Table 30 for the results of the subset sample.

Table 29

Factorial ANOVA for Intervention Interactions on Adaptability – Entire Sample

	$df_{between}$	df_{within}	F	p	η^2
Transition Adaptability					
GS*II	4	263	.57	.69	.01
GS*SG	2	263	.67	.51	.01
II*SG	2	263	1.81	.17	.01
GS*II*SG	4	263	.47	.76	.01
Linear Reacquisition Adaptability					
GS	2	263	1.84	.16	.01
II	2	263	1.23	.30	.01
SG	1	263	.35	.56	.00
GS*II	4	263	.92	.45	.01
GS*SG	2	263	.29	.75	.00
II*SG	2	263	.69	.50	.01
GS*II*SG	4	263	.73	.57	.01
Quadratic Reacquisition Adaptability					
GS	2	263	2.14	.12	.02
II	2	263	3.30	.04	.02
SG	1	263	.03	.86	.00
GS*II	4	263	1.00	.41	.02
GS*SG	2	263	.06	.94	.00
II*SG	2	263	.13	.88	.00
GS*II*SG	4	263	.71	.59	.01

Note: GS = goal setting; II = implementation intention; SG = subconscious goal.

Table 30

Factorial ANOVA for Intervention Interactions on Adaptability – Subset Sample

	$df_{between}$	df_{within}	F	p	η^2
Transition Adaptability					
GS	2	222	.26	.77	.00
II	2	222	2.24	.11	.02
SG	1	222	.11	.74	.00
GS*II	4	222	.27	.90	.01
GS*SG	2	222	.24	.79	.00
II*SG	2	222	1.50	.23	.01
GS*II*SG	4	222	1.05	.38	.02
Linear Reacquisition Adaptability					
GS	2	222	.60	.55	.01
II	2	222	1.15	.32	.01
SG	1	222	.27	.61	.00
GS*II	4	222	.46	.77	.01
GS*SG	2	222	1.91	.15	.02
II*SG	2	222	1.13	.33	.01
GS*II*SG	4	222	1.05	.38	.02
Quadratic Reacquisition Adaptability					
GS	2	222	.95	.39	.01
II	2	222	3.10	.05	.03
SG	1	222	.95	.33	.00
GS*II	4	222	.72	.58	.01
GS*SG	2	222	.62	.54	.01
II*SG	2	222	.10	.90	.00
GS*II*SG	4	222	1.47	.21	.03

Note: GS = goal setting; II = implementation intention; SG = subconscious goal.

Discussion

The present study made several empirical contributions to both the adaptability and motivation research in that it sought to test the effects that several motivational interventions, both conscious and nonconscious, had on the multiple forms of adaptability observed in the changing task environment (Lang & Bliese, 2009). In the following sections, these contributions are discussed in greater detail and compared to previous research. Additionally, limitations and directions for future research are discussed.

Sex. Unexpectedly, one of the most interesting contributions was finding that sex played a significant role in both forms of adaptability; females performed better at transition adaptability and males performed better at reacquisition adaptability. No previous study in organizational adaptability research (e.g., Kozlowski et al., 2001; Lang & Bliese, 2009; LePine et al., 2000; LePine, 2005; see Ployhart & Bliese, 2007 for a summary of the existing research) reported such results. However, the judgment and decision making research offers a potential explanation behind the observed findings.

In Brandner (2007), participants were exposed to a novel task and their exploratory behavior in searching for successful strategies was assessed. When faced with uncertainty, women adopted a strategy that minimized risk, whereas men displayed a significantly greater amount of risk-taking in their strategy search. In the task-change paradigm, uncertainty is inherent as the task environment has been altered. In turn, the new task environment requires individuals to alter and/or discover new strategies to perform. Since women were likely to adopt a risk minimization strategy, it could provide a buffer to the expected decline in performance during the change trial. So it would follow that women experience better transition adaptability than men.

On the other hand, the more risky strategy that men exhibit, a potential detriment during a change, can be viewed as an advantage after the change has happened. By nature of their search strategy, men are experiencing a wider variety of failures very quickly and, in turn, they are learning the foundations of the new environment at a faster rate. As such, they are more likely to identify the correct post-change strategy sooner and, as found here, display greater reacquisition adaptability.

Despite this potential explanation, it is possible that these finding were spurious or task-specific as this study was not developed to assess sex differences. Future research should seek to replicate these findings using a different task and investigate the effects of sex on adaptability in greater detail. For example, given the work of Brandner (2007), it would be informative to measure how men and women differ in every aspect of strategy development and selection (Lovett & Schunn, 1999).

Goal-setting. Although neither assigned nor self-goals were found to significantly affect either form of adaptability when compared to the "do your best" condition, it is important to note that goal commitment was found to be a significant moderator when comparing assigned goals to self-set goals. High commitment led to lower transition adaptability for assigned goals, but higher transition adaptability for self-set goals; this trend was marginally significant in reacquisition adaptability as well. However, one of the limitations of this study was that the goal commitment measure was not administered to the "do your best" condition. As such, a direct comparison cannot be made between it and the interaction of the experimental goal-setting condition and goal commitment.

A secondary limitation that hinders a full understanding of how goal-setting affects adaptability is that this study lacked learning goals, which perform better than performance goals when individuals are learning a complex task (Winters & Latham, 1995; Kozlowski et al., 2001). Given that both forms of adaptability require learning within a complex task, such goals would be poised to improve adaptability. Kozlowski et al. (2001) did find evidence that suggests learning goals could lead to better adaptation than performance goals; however, the difference in operationalizations is notable. Additionally, Seijts and Latham (2012) suggested that learning goals excel in environments undergoing change and could assist in adaptability.

To test the effects of goal-setting on adaptability comprehensively, future research should manipulate all goal types (i.e., “do your best”, assigned performance, assigned learning, self-set performance, and self-set learning) and measure goal commitment for all conditions. Additionally, future research should also investigate shifting between goal types. For example, participants could receive performance goals until the change and then receive a learning goal immediately after the change. Researchers may find that certain combinations of goal type produce different results. If such combinations exist, a particularly rich area of research would exist as researchers could investigate the optimal timing of the goal shift, how to communicate it, and individual differences in how people react to the shift (e.g., goal commitment, self-efficacy, and perceptions of the goal giver).

An additional finding of note was how the experimental goal conditions differed in goal commitment. Both goal conditions exhibited the same level of commitment in the first trial, but participants in the self-set goal condition were significantly more committed to their goal than those in the assigned goal condition for the remaining nine trials. Although the difference in commitment is consistent with previous research (e.g., Locke & Latham, 2002), a unique finding is how the variance differed between the conditions across time. While the variance in commitment tended to slightly increase across the trials in the self-set goal condition, the assigned goal condition experienced consistent and, relatively, larger increases. Based on this study, it cannot be determined if this observation is a function of goal-setting across time, the task change paradigm itself, or a combination of the two. Given the moderating effect of goal commitment and that goal-setting tends to occur across time, future research should investigate how goal commitment operates longitudinally.

Primed subconscious goal. The third contribution was the preliminary finding of how a primed subconscious achievement goal did not relate to either form of adaptability. This is contrary to Hassin et al. (2009), but there were several methodological differences between these studies.

First, an important distinction is that adaptability was operationalized differently. Hassin et al. (2009) observed performance and errors and this study focused on the slope(s) of performance and that could be the cause of the discrepant findings.

Second, despite having the same method of priming, Hassin et al. (2009) experienced two to three percent of their samples showing awareness of the manipulation, whereas this study experienced 29% awareness. Note that at the rate of awareness exhibited in this study, Bargh and Chartrand (2000) would argue that the remaining primed sample likely has some awareness of the prime. This difference in awareness could be due to the sample in that the Amazon Turk population, which tends to skew older and more demographically representative (Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013, Paolacci, Chandler, & Ipeirots, 2010), might have a different reaction than younger college students when exposed to a supraliminal prime. Alternatively, this study made a few alterations to how the crossword was presented and answered. It is possible that these changes made the achievement-focused words more noticeable; however, participants were still shown the same achievement-oriented words in the same order as Hassin et al. (2009).

Lastly, the most distinct difference between this study and Hassin et al. (2009) was the nature of the tasks. In this study's task, a correct answer existed for every trial, but several mathematical weightings could have led to near perfect performance. In Hassin et al. (2009), both tasks (i.e., the Wisconsin Card Sorting Test and the Iowa Gambling Task) had one correct strategy and good performance was always associated with finding that one strategy. Given the greater complexity and ambiguity associated with this study's task, priming achievement may not be effective in such an environment. Future research needs to take the level of task complexity and ambiguity into consideration when investigating adaptability as individual differences exist in performance on ambiguous tasks (Ebeling & Spear, 1980). Alternatively, given the increased attention that has been directed towards nonconscious processes, it is possible that participants are becoming more aware of priming.

These differences may have influenced this study's results, but the findings of this study are consistent with recent research. In Chen and Latham (2014), participants were performing a novel, complex task over multiple time periods and subconscious goals were manipulated to either stress performance (i.e., achievement) or learning. Only participants primed to learn experienced an improvement in performance over a control group. Given the findings of Chen and Latham (2014) and this study, it appears that priming achievement has no effect when individuals are performing a novel, complex task.

One avenue for future research would be to remove the novelty of the task to attain a pure assessment of achievement priming on adaptability. That is, participants would perform the task until mastery is achieved (i.e., performance reaches asymptotic levels) and then the change is executed. In this design, when the need to adapt is introduced, task novelty is no longer a potential confound. Given the findings of Chen and Latham (2014), a secondary stream of research should investigate if priming other constructs has an effect on either form of adaptability. Priming learning is a logical choice, but the concepts of adaptability, flexibility, and change may have an effect on either form of adaptability.

Implementation intention. The next contribution was the application of an implementation intention to adaptability research. Prior to discussing this study's results in depth, it should be noted that comparing this study's results to those of Henderson et al. (2006) is unsuitable. Although Henderson et al. was the closest previous application of implementation intentions to adaptability, it cannot be compared directly to this study based on the dissimilarity of tasks. In Henderson et al., participants selected one of three researcher-proposed strategies and received fake negative feedback about their performance. In this study, participants developed their own strategies and received accurate feedback about their performance.

As such, the findings of this study seem to be unique as it tested how an implementation intention affects participants' behavior in the task-change paradigm.

Contrary to the hypothesized effect, an implementation intention did not improve transition adaptability. In fact, it led to a significant decrease in performance during the change trial when compared to the weak control condition (i.e., those who received no information). However, those in the strong control, which received the same information as the implementation intention, also experienced significantly worse transition adaptability than those in the weak control condition. The trend of these results is that those individuals who received information about the task via an instruction of how to best react to a change handled the change worse.

Without further qualitative research, it is impossible to identify why this occurred; however, one potential explanation behind the observed findings has to do with the instruction given in the implementation intention and strong control conditions. Participants were advised to 'reconsider' how they 'approached the task.' Given that their original approach led to adequate performance improvement across the first few trials, it is possible that the result of reconsidering their approach was to find their current strategy not lacking, as it had a history of working in more trials than it failed. In turn, having reconsidered and found it acceptable, participants might have become more committed to the strategy, which would have led to the decreased transition adaptability observed.

Overall, contrary to the hypothesis, an implementation intention was found to worsen individuals' transition adaptability. This finding, however, is particular to the wording of this study's implementation intention. It is possible that a different wording would produce a different result and this is where future research should focus. For example, Henderson et al. (2006) found that an action-oriented intention led to different behavior than a reflective intention, which was the style of intention this study used.

Interactions of motivational interventions. No evidence existed for a significant interaction between the motivational interventions for any form of adaptability. This may be due to low power as the observed sample sizes were low (ranging from 30 to 48); however, the lack of interactions is not unexpected.

For the interaction of goal-setting condition and primed subconscious goal, previous research (Stajkovic et al., 2006; Shantz & Latham, 2009) has found no interaction between traditional goal-setting groups (i.e., do your best and assigned) and a primed achievement goal. Bargh and colleagues (Bargh et al., 2001; Bargh & Ferguson, 2000) have theorized that nonconscious goals have the same behavioral effect as conscious goals. If that is the case and both methods are affecting the same psychological mechanisms, then it may be the case that the incremental effect gained from experiencing both types of motivation is minimal.

As for the remaining interactions, no theoretical expectation exists for why an implementation intention would interact with either goal-setting or a primed nonconscious goal. If goal-setting and a primed nonconscious goal are working through the same psychological mechanisms, strategy development would be an inherent part of what the goal sources affect. Therefore, the incremental effect associated with an implementation intention, which is just a means of initiating a specific behavior, would likely be small as individuals are already involved in strategy development.

However, it is important to note that all these interactive effects are specific to this study. Changing the concept primed or implementation intention may produce different results. As other researchers (McClelland, 1989; Meyer, 1996) have argued, conscious and nonconscious motivation is not necessarily related. It may be the case that the current approaches (e.g., priming achievement or the chosen implementation intention) were too broad or stressed the wrong concepts (e.g., Chen & Latham, 2014) to be effective.

Limitations and directions for future research. Several specific limitations and directions for future research have already been mentioned in terms of the motivational interventions, but there are several global limitations that should be discussed and directions offered for future research.

One of the key limitations of this study was the lack of assessing the strategy development individuals executed. All the motivational interventions would have theoretically affected behavior via the individual's strategy, yet their direct effects on strategy development and usage were unmeasured. The RCCL model (Lovett & Schunn, 1999) provides a comprehensive framework for how to advance adaptability and motivational research into this area of research. Full integration of the RCCL model would be informative as it endeavors to understand how individuals conceptualize a task, develop strategies, select strategies, and learn strategy effectiveness. Since adaptability is dependent on strategy and motivation operates via strategy development, it would be prudent to investigate it in more detail.

As previously mentioned, characteristics of the task used in the task-change paradigm could be an important moderator. Previous research has predominately used complex tasks (Lang & Bliese, 2009); however, there has not been a discussion of what constitutes complexity. Neither has there been any research on how novelty and task ambiguity might affect individuals. Both the task content (e.g., military-based, business-based, etc.) and clarity of the underlying mechanisms of the task may have an effect on how people adapt. Future adaptability research should consider such topics closely when selecting or developing a task.

One methodological issue of this study stems from the observed drop in performance from Trial 4 to Trial 5. Traditionally, this drop does not occur in adaptability research and could be a potential confound. A potential explanation for why this occurred has to do with the nature of the task. The decisions that participants had to make were not exact, as each decision had a range of possible values. In turn, it is possible that another equation might have closely replicated the true equation in Trials 1-4, but failed to replicate it in Trial 5. The concern is that this drop in performance might have affected how people approached the change trial (i.e., Trial 6). It is unclear how it would bias behavior in the change trial, but it remains a possibility.

Another limitation of this study, as well as adaptability research in general, is the lack of qualitative research into understanding how individuals adapt to a change task. Research tends to be focused on the correlates of adaptability, but it may be informative to understand how aware individuals are of the need for adaptation, how they are reacting, and what they think about it. Since individuals are the agent in adaptation, interviewing them about adapting may glean valuable insight into the process.

Lastly, this study, as did Lang and Bliese (2009), made implicit assumptions regarding the conceptualization of the two forms of adaptability. First, the two forms are theoretically approached as being unrelated, which leads to the second assumption that low transition adaptability is undesirable. As suggested by this study's finding that transition and reacquisition adaptability were negatively related and the above discussions about the effectiveness of learning goals (i.e., conscious and nonconscious), low transition adaptability could lead to more effective reacquisition adaptability. For some individuals low in transition adaptability, they may suffer a larger immediate drop in performance, but they could also be learning what strategies definitively do not work in the new task environment. In turn, they are potentially poised to perform better after the change as the number of strategies has been diminished. However, low transition adaptability is not necessarily monolithic. Some individuals may display low transition adaptability as they are trying and failing at new strategies, while other individuals may be low on transition adaptability because of dysfunctional persistence. Qualitative interviews might offer clarity on this issue, but future research should endeavor to better understand the distinction and potential interrelationship between transition and reacquisition adaptability.

Conclusion. Overall, the current study did not find support for almost all of the hypotheses about how the motivational interventions affect adaptability; however, this does not mean that motivation plays little to no role in adaptability. For conscious motivation, goal-setting certainly had an effect once the ubiquitous moderating effect of goal commitment was included. For nonconscious motivation, several methodological decisions were made that could have altered the findings (e.g., the concept primed and implementation intention made).

Ultimately, more research is needed to tease apart where and how motivation plays a role in adaptability. Although the complexities of motivation and adaptability are challenging when integrated into one study, discovering how they relate to one another would inform organizations on how to shape motivation to ensure optimal performance during times of change. And given that adaptability has become part of the psychological contract and expected of employees (Pulakos et al., 2000; Cascio, 2003), organizations should be acutely aware of how they are affecting this behavior in their employees.

References

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Table 6

Descriptives and Intercorrelations

	M	SD	1	2	3	4	5
1. Sex	--	--	--				
2. Age	37.21	9.68	-.12	--			
3. Uncertainty	3.62	.78	.19**	-.03	(.90)		
4. Learning	3.84	.63	.15*	-.09	.92***	(.86)	
5. Videogame	8.21	8.68	.28***	-.25***	.15*	.18*	--
Trial 1							
6. SSG	6.76	1.91	.09	-.01	.32**	.32**	.06
7. GC	6.28	.72	-.09	.09	.16*	.18*	-.09
8. Latency	11656.42	8801.74	.06	.13*	.01	.01	-.10
9. Performance	4.63	2.46	.16*	-.06	.05	.04	.07
Trial 2							
10. SSG	6.01	2.01	.11	.03	.26*	.27**	.01
11. GC	6.16	.82	-.06	-.01	.12	.15*	-.07
12. Latency	8770.95	6662.42	-.02	.20**	.01	.02	-.08.
13. Performance	6.49	1.87	.12	-.14*	-.02	-.02	-.01
Trial 3							
14. SSG	6.32	1.97	.16	-.03	.19	.23*	.10
15. GC	6.01	1.00	.04	.05	.21**	.25***	-.06
16. Latency	8105.99	5481.26	-.06	.21***	.02	.02	-.05
17. Performance	6.27	2.11	.10	-.05	.02	.01	-.04
Trial 4							
18. SSG	6.79	1.87	.14	-.05	.22*	.24*	-.05
19. GC	5.99	1.13	.01	.06	.14	.20**	-.15
20. Latency	7566.18	4783.90	-.08	.12	-.02	.02	-.10
21. Performance	6.80	2.00	.17**	-.11	.08	.09	.14
Trial 5							
22. SSG	7.05	2.05	.17	-.02	.26*	.25*	-.06
23. GC	6.02	1.16	.01	.06	.21**	.23**	-.11
24. Latency	7529.73	5346.87	-.06	.12*	.05	.05	-.11
25. Performance	5.86	2.41	.16*	-.14*	.05	.05	.08
Trial 6							
26. SSG	6.90	2.04	.09	-.02	.19	.26*	-.01
27. GC	5.96	1.25	.07	.02	.23**	.26***	-.07
28. Latency	6853.86	4786.42	-.05	.24***	.03	.04	-.10
29. Performance	4.93	2.46	-.10	-.04	.00	.02	-.08
Trial 7							
30. SSG	6.63	1.91	.08	-.03	.16	.18	-.07
31. GC	5.91	1.28	.03	.04	.22**	.27***	-.04
32. Latency	7152.42	4451.89	-.07	.20**	.04	.06	-.03
33. Performance	5.29	2.75	.17**	-.03	.05	.07	.04

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	6	7	8	9	10
1. Sex	--	--					
2. Age	37.21	9.68					
3. Uncertainty	3.62	.78					
4. Learning	3.84	.63					
5. Videogame	8.21	8.68					
Trial 1							
6. SSG	6.76	1.91	--				
7. GC	6.28	.72	.24*	(.78)			
8. Latency	11656.42	8801.74	-.05	.03	--		
9. Performance	4.63	2.46	.36***	.04	-.01	--	
Trial 2							
10. SSG	6.01	2.01	.67***	.28**	.03	.67***	--
11. GC	6.16	.82	.25*	.77***	.00	.08	.26*
12. Latency	8770.95	6662.42	.08	.09	.79***	.05	.21*
13. Performance	6.49	1.87	.04	.01	.05	.33***	.20
Trial 3							
14. SSG	6.32	1.97	.60***	.17	.09	.65***	.84***
15. GC	6.01	1.00	.27***	.63***	-.01	.03	.29**
16. Latency	8105.99	5481.26	.02	.08	.47***	.01	.18
17. Performance	6.27	2.11	-.26*	-.10	.11	.30***	.02
Trial 4							
18. SSG	6.79	1.87	.46***	.24*	.09	.49***	.74***
19. GC	5.99	1.13	.18	.65***	.04	.00	.19
20. Latency	7566.18	4783.90	.00	.01	.51***	-.01	.02
21. Performance	6.80	2.00	.04	.04	.01	.42***	.28**
Trial 5							
22. SSG	7.05	2.05	.47***	.21*	-.02	.60***	.74***
23. GC	6.02	1.16	.26*	.64***	.06	.01	.26*
24. Latency	7529.73	5346.87	-.01	.09	.41***	.05	.15
25. Performance	5.86	2.41	-.06	-.05	-.03	.40***	.17
Trial 6							
26. SSG	6.90	2.04	.34***	.19	.12	.49***	.65***
27. GC	5.96	1.25	.34***	.52***	.06	.07	.28**
28. Latency	6853.86	4786.42	.08	.11	.47***	.02	.21*
29. Performance	4.93	2.46	.31**	-.04	-.09	.21***	.23*
Trial 7							
30. SSG	6.63	1.91	.52***	.22*	.00	.53***	.73***
31. GC	5.91	1.28	.33**	.53***	-.02	.03	.25*
32. Latency	7152.42	4451.89	.11	.17*	.45***	.06	.23*
33. Performance	5.29	2.75	.18	.02	.02	.44***	.43***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	11	12	13	14	15
1. Sex	--	--					
2. Age	37.21	9.68					
3. Uncertainty	3.62	.78					
4. Learning	3.84	.63					
5. Videogame	8.21	8.68					
Trial 1							
6. SSG	6.76	1.91					
7. GC	6.28	.72					
8. Latency	11656.42	8801.74					
9. Performance	4.63	2.46					
Trial 2							
10. SSG	6.01	2.01					
11. GC	6.16	.82	(.77)				
12. Latency	8770.95	6662.42	.07	--			
13. Performance	6.49	1.87	.08	.03	--		
Trial 3							
14. SSG	6.32	1.97	.24*	.27**	.48***	--	
15. GC	6.01	1.00	.70***	.00	.10	.34**	(.81)
16. Latency	8105.99	5481.26	.05	.59***	.01	.15	.03
17. Performance	6.27	2.11	-.13	.06	.42***	.09	-.12
Trial 4							
18. SSG	6.79	1.87	.24*	.19	.41***	.84***	.29**
19. GC	5.99	1.13	.75***	.04	.15*	.28**	.85***
20. Latency	7566.18	4783.90	.04	.62***	.12	.10	.02
21. Performance	6.80	2.00	.04	.04	.38***	.28**	.06
Trial 5							
22. SSG	7.05	2.05	.23*	.10	.38***	.79***	.36***
23. GC	6.02	1.16	.72***	.03	.09	.24*	.83***
24. Latency	7529.73	5346.87	.08	.51***	.11	.17	.07
25. Performance	5.86	2.41	-.04	-.02	.37***	.19	-.08
Trial 6							
26. SSG	6.90	2.04	.27*	.17	.39***	.72***	.27**
27. GC	5.96	1.25	.66**	.05	.17*	.36***	.72***
28. Latency	6853.86	4786.42	.07	.63***	.06	.20	-.03
29. Performance	4.93	2.46	.05	-.02	.17**	.23*	-.05
Trial 7							
30. SSG	6.63	1.91	.27**	.14	.34**	.78***	.34***
31. GC	5.91	1.28	.63***	-.02	.13	.31**	.75***
32. Latency	7152.42	4451.89	.13	.59***	.03	.22*	.02
33. Performance	5.29	2.75	.02	.07	.34***	.41***	-.02

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	16	17	18	19	20
1. Sex	--	--					
2. Age	37.21	9.68					
3. Uncertainty	3.62	.78					
4. Learning	3.84	.63					
5. Videogame	8.21	8.68					
Trial 1							
6. SSG	6.76	1.91					
7. GC	6.28	.72					
8. Latency	11656.42	8801.74					
9. Performance	4.63	2.46					
Trial 2							
10. SSG	6.01	2.01					
11. GC	6.16	.82					
12. Latency	8770.95	6662.42					
13. Performance	6.49	1.87					
Trial 3							
14. SSG	6.32	1.97					
15. GC	6.01	1.00					
16. Latency	8105.99	5481.26	--				
17. Performance	6.27	2.11	.09	--			
Trial 4							
18. SSG	6.79	1.87	.14	.33**	--		
19. GC	5.99	1.13	.06	.01	.28**	(.87)	
20. Latency	7566.18	4783.90	.60***	.09	.03	.07	--
21. Performance	6.80	2.00	.08	.51***	.20**	.12	-.01
Trial 5							
22. SSG	7.05	2.05	.11	.30**	.87***	.33**	-.06
23. GC	6.02	1.16	.06	.04	.27*	.91***	.04
24. Latency	7529.73	5346.87	.74***	.13*	.16	.11	.69***
25. Performance	5.86	2.41	-.05	.54***	.25*	.00	-.01
Trial 6							
26. SSG	6.90	2.04	.19	.38***	.79***	.29**	.00
27. GC	5.96	1.25	.07	.07	.35***	.86***	.03
28. Latency	6853.86	4786.42	.64***	.10	.14	.05	.70***
29. Performance	4.93	2.46	-.05	.08	.15	-.06	-.03
Trial 7							
30. SSG	6.63	1.91	.18	.19	.81***	.33**	.01
31. GC	5.91	1.28	.04	.03	.29**	.84***	.00
32. Latency	7152.42	4451.89	.71***	.11	.17	.08	.65***
33. Performance	5.29	2.75	.03	.49***	.45***	.02	.07

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.

**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	21	22	23	24	25
1. Sex	--	--					
2. Age	37.21	9.68					
3. Uncertainty	3.62	.78					
4. Learning	3.84	.63					
5. Videogame	8.21	8.68					
Trial 1							
6. SSG	6.76	1.91					
7. GC	6.28	.72					
8. Latency	11656.42	8801.74					
9. Performance	4.63	2.46					
Trial 2							
10. SSG	6.01	2.01					
11. GC	6.16	.82					
12. Latency	8770.95	6662.42					
13. Performance	6.49	1.87					
Trial 3							
14. SSG	6.32	1.97					
15. GC	6.01	1.00					
16. Latency	8105.99	5481.26					
17. Performance	6.27	2.11					
Trial 4							
18. SSG	6.79	1.87					
19. GC	5.99	1.13					
20. Latency	7566.18	4783.90					
21. Performance	6.80	2.00	--				
Trial 5							
22. SSG	7.05	2.05	.52***	--			
23. GC	6.02	1.16	.16*	.31**	(.89)		
24. Latency	7529.73	5346.87	.10	.15	.10	--	
25. Performance	5.86	2.41	.54***	.38***	.04	.03	--
Trial 6							
26. SSG	6.90	2.04	.52***	.83***	.27**	.18	.53***
27. GC	5.96	1.25	.20**	.40***	.87***	.10	.11
28. Latency	6853.86	4786.42	.06	.12	.04	.70***	.04
29. Performance	4.93	2.46	.07	.20	-.04	.01	.14*
Trial 7							
30. SSG	6.63	1.91	.37***	.86***	.31**	.19	.32**
31. GC	5.91	1.28	.14	.36***	.86***	.09	.06
32. Latency	7152.42	4451.89	.04	.10	.09	.65***	-.03
33. Performance	5.29	2.75	.47***	.57***	.04	.05	.55***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.

**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	26	27	28	29	30
1. Sex	--	--					
2. Age	37.21	9.68					
3. Uncertainty	3.62	.78					
4. Learning	3.84	.63					
5. Videogame	8.21	8.68					
Trial 1							
6. SSG	6.76	1.91					
7. GC	6.28	.72					
8. Latency	11656.42	8801.74					
9. Performance	4.63	2.46					
Trial 2							
10. SSG	6.01	2.01					
11. GC	6.16	.82					
12. Latency	8770.95	6662.42					
13. Performance	6.49	1.87					
Trial 3							
14. SSG	6.32	1.97					
15. GC	6.01	1.00					
16. Latency	8105.99	5481.26					
17. Performance	6.27	2.11					
Trial 4							
18. SSG	6.79	1.87					
19. GC	5.99	1.13					
20. Latency	7566.18	4783.90					
21. Performance	6.80	2.00					
Trial 5							
22. SSG	7.05	2.05					
23. GC	6.02	1.16					
24. Latency	7529.73	5346.87					
25. Performance	5.86	2.41					
Trial 6							
26. SSG	6.90	2.04	--				
27. GC	5.96	1.25	.39***	(.89)			
28. Latency	6853.86	4786.42	.19	.07	--		
29. Performance	4.93	2.46	.13	-.01	-.08	--	
Trial 7							
30. SSG	6.63	1.91	.83***	.42***	.17	.32**	--
31. GC	5.91	1.28	.33**	.92***	.03	.04	.39***
32. Latency	7152.42	4451.89	.22*	.09	.78***	-.05	.21*
33. Performance	5.29	2.75	.54***	.08	.13*	.14*	.45***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	31	32	33
1. Sex	--	--			
2. Age	37.21	9.68			
3. Uncertainty	3.62	.78			
4. Learning	3.84	.63			
5. Videogame	8.21	8.68			
Trial 1					
6. SSG	6.76	1.91			
7. GC	6.28	.72			
8. Latency	11656.42	8801.74			
9. Performance	4.63	2.46			
Trial 2					
10. SSG	6.01	2.01			
11. GC	6.16	.82			
12. Latency	8770.95	6662.42			
13. Performance	6.49	1.87			
Trial 3					
14. SSG	6.32	1.97			
15. GC	6.01	1.00			
16. Latency	8105.99	5481.26			
17. Performance	6.27	2.11			
Trial 4					
18. SSG	6.79	1.87			
19. GC	5.99	1.13			
20. Latency	7566.18	4783.90			
21. Performance	6.80	2.00			
Trial 5					
22. SSG	7.05	2.05			
23. GC	6.02	1.16			
24. Latency	7529.73	5346.87			
25. Performance	5.86	2.41			
Trial 6					
26. SSG	6.90	2.04			
27. GC	5.96	1.25			
28. Latency	6853.86	4786.42			
29. Performance	4.93	2.46			
Trial 7					
30. SSG	6.63	1.91			
31. GC	5.91	1.28	(.90)		
32. Latency	7152.42	4451.89	.07	--	
33. Performance	5.29	2.75	.03	.10	--

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	1	2	3	4	5
Trial 8							
34. SSG	6.63	2.03	.20	.02	.27**	.30**	.02
35. GC	5.96	1.30	.04	.04	.19**	.25***	-.08
36. Latency	6362.42	3962.84	-.05	.20**	.02	.04	-.11
37. Performance	5.80	2.44	.15*	-.08	.10	.10	.05
Trial 9							
38. SSG	6.78	2.05	.19	-.04	.20	.26*	.02
39. GC	5.94	1.33	.02	.01	.13	.20**	-.06
40. Latency	6415.90	4309.11	-.09	.22***	.03	.05	-.08
41. Performance	5.77	2.46	.20**	-.05	.13*	.12	.03
Trial 10							
42. SSG	7.12	2.22	.21	.04	.24*	.29**	.06
43. GC	5.97	1.34	.08	.02	.19*	.23**	-.04
44. Latency	6238.45	4282.44	-.01	.21***	.02	.05	-.09
45. Performance	7.09	1.99	.01	-.08	-.03	-.03	-.11
Model - Entire							
46. Intercept	4.80	1.61	.17**	-.11	.05	.04	.05
47. SA	1.62	.93	-.07	.04	-.04	-.02	-.05
48. QSA	-.34	.20	.11	-.06	.05	.05	.08
49. TA	-2.48	2.20	-.15*	.05	-.05	-.04	-.09
50. RA	-1.52	2.06	.25***	-.05	.11	.09	.11
51. QRA	.09	.42	-.23***	.04	-.11	-.09	-.09
Model - Subset							
52. Intercept	4.71	1.62	.16*	-.07	.03	.01	-.03
53. SA	1.64	1.03	-.08	.01	-.03	-.01	-.01
54. QSA	-.35	.22	.11	-.04	.05	.04	.03
55. TA	-2.31	2.21	-.12	.05	-.04	-.01	-.09
56. RA	-1.67	1.95	.24***	-.03	.10	.06	.08
57. QRA	.12	.41	-.22***	.03	-.10	-.07	-.08

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	6	7	8	9	10
Trial 8							
34. SSG	6.63	2.03	.48***	.22*	-.01	.55***	.74***
35. GC	5.96	1.30	.22*	.58***	.04	.00	.21*
36. Latency	6362.42	3962.84	.05	.06	.43***	.06	.17
37. Performance	5.80	2.44	.13	-.03	-.02	.46***	.40**
Trial 9							
38. SSG	6.78	2.05	.45***	.21*	.01	.56***	.73***
39. GC	5.94	1.33	.23*	.52***	.02	.01	.21*
40. Latency	6415.90	4309.11	-.02	.08	.46***	.05	.22*
41. Performance	5.77	2.46	.07	-.01	.05	.35***	.27*
Trial 10							
42. SSG	7.12	2.22	.42***	.26*	.11	.50***	.66***
43. GC	5.97	1.34	.30**	.48***	.01	.07	.32**
44. Latency	6238.45	4282.44	.08	.04	.44***	.06	.21*
45. Performance	7.09	1.99	.14	-.01	-.01	.40***	.35***
Model - Entire							
46. Intercept	4.80	1.61	.30**	.02	.00	.92***	.61***
47. SA	1.62	.93	-.47***	-.05	.08	-.79***	-.59***
48. QSA	-.34	.20	.44***	.04	-.09	.80***	.60***
49. TA	-2.48	2.20	.40***	.03	-.09	.16*	.24*
50. RA	-1.52	2.06	.12	.03	.04	.58***	.45***
51. QRA	.09	.42	.06	-.01	-.06	-.26***	-.21*
Model - Subset							
52. Intercept	4.71	1.62	.34***	.05	.01	.92***	.63***
53. SA	1.64	1.03	-.50***	-.06	.08	-.80***	-.63***
54. QSA	-.35	.22	.49***	.04	-.09	.80***	.64***
55. TA	-2.31	2.21	.43***	.04	-.09	.25***	.32**
56. RA	-1.67	1.95	.14	.05	.03	.58***	.46***
57. QRA	.12	.41	.10	-.03	-.07	-.19**	-.15

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*p < .05. **p < .01. ***p < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	11	12	13	14	15
Trial 8							
34. SSG	6.63	2.03	.28**	.12	.35***	.76***	.32**
35. GC	5.96	1.30	.67***	.05	.12	.26*	.75***
36. Latency	6362.42	3962.84	.04	.57***	.13*	.18	-.04
37. Performance	5.80	2.44	-.04	.02	.38***	.45***	-.04
Trial 9							
38. SSG	6.78	2.05	.29**	.12	.35***	.74***	.31**
39. GC	5.94	1.33	.64***	.05	.12	.25*	.68***
40. Latency	6415.90	4309.11	.05	.61***	.08	.18	-.03
41. Performance	5.77	2.46	-.07	.08	.35***	.33**	-.04
Trial 10							
42. SSG	7.12	2.22	.29**	.22*	.33**	.71***	.37***
43. GC	5.97	1.34	.57***	.02	.11	.31**	.69***
44. Latency	6238.45	4282.44	.04	.59***	.01	.22*	-.04
45. Performance	7.09	1.99	-.01	.02	.51***	.40***	-.04
Model - Entire							
46. Intercept	4.80	1.61	.07	.05	.60***	.68***	.02
47. SA	1.62	.93	-.13	.00	-.11	-.54***	-.05
48. QSA	-.34	.20	.11	-.01	.12	.53***	.02
49. TA	-2.48	2.20	.12	-.03	-.16**	.17	.02
50. RA	-1.52	2.06	-.01	.06	.27***	.46***	.02
51. QRA	.09	.42	.07	-.06	-.22***	-.25*	.01
Model - Subset							
52. Intercept	4.71	1.62	.11	.07	.57***	.67***	.04
53. SA	1.64	1.03	-.10	.00	-.12	-.56***	-.06
54. QSA	-.35	.22	.09	-.01	.13	.56***	.03
55. TA	-2.31	2.21	.07	-.04	-.15*	.24*	.07
56. RA	-1.67	1.95	.04	.07	.26***	.48***	.01
57. QRA	.12	.41	.02	-.07	-.18**	-.20	.03

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	16	17	18	19	20
Trial 8							
34. SSG	6.63	2.03	.17	.24*	.81***	.32**	.02
35. GC	5.96	1.30	.00	.08	.26*	.86***	.06
36. Latency	6362.42	3962.84	.67***	.14*	.14	.01	.66***
37. Performance	5.80	2.44	.01	.51***	.47***	.05	.04
Trial 9							
38. SSG	6.78	2.05	.17	.28**	.80***	.361***	.01
39. GC	5.94	1.33	-.02	.05	.27*	.83***	.06
40. Latency	6415.90	4309.11	.69***	.16**	.17	.04	.64***
41. Performance	5.77	2.46	.00	.49***	.41***	.03	.06
Trial 10							
42. SSG	7.12	2.22	.20	.25*	.74***	.39***	.04
43. GC	5.97	1.34	-.02	.07	.29**	.79***	.03
44. Latency	6238.45	4282.44	.56***	.05	.17	-.02	.63***
45. Performance	7.09	1.99	-.03	.49***	.41***	.05	.01
Model - Entire							
46. Intercept	4.80	1.61	.00	.47***	.55***	.03	.03
47. SA	1.62	.93	.06	.21***	-.30**	.05	.04
48. QSA	-.34	.20	-.07	-.10	.32**	-.06	-.05
49. TA	-2.48	2.20	-.07	-.49***	-.02	-.09	-.05
50. RA	-1.52	2.06	.01	.33***	.44***	.05	.04
51. QRA	.09	.42	-.04	-.42***	-.34***	-.07	-.06
Model - Subset							
52. Intercept	4.71	1.62	.01	.40***	.56***	.05	.02
53. SA	1.64	1.03	.08	.23***	-.32**	.04	.07
54. QSA	-.35	.22	-.08	-.13	.35**	-.05	-.08
55. TA	-2.31	2.21	-.09	-.50***	.01	-.07	-.08
56. RA	-1.67	1.95	.04	.29***	.46***	.06	.05
57. QRA	.12	.41	-.08	-.41***	-.31**	-.08	-.09

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	21	22	23	24	25
Trial 8							
34. SSG	6.63	2.03	.41***	.86***	.31**	.16	.37***
35. GC	5.96	1.30	.14	.30**	.89***	.09	.08
36. Latency	6362.42	3962.84	.07	.08	.01	.79***	.01
37. Performance	5.80	2.44	.53***	.49***	.05	.06	.56***
Trial 9							
38. SSG	6.78	2.05	.45***	.87***	.31**	.18	.43***
39. GC	5.94	1.33	.14	.29**	.83***	.07	.08
40. Latency	6415.90	4309.11	.07	.15	.03	.69***	.03
41. Performance	5.77	2.46	.50***	.45***	.05	.08	.52***
Trial 10							
42. SSG	7.12	2.22	.40***	.80***	.30**	.17	.34***
43. GC	5.97	1.34	.19*	.38***	.82***	.05	.10
44. Latency	6238.45	4282.44	-.01	.13	-.05	.60***	-.02
45. Performance	7.09	1.99	.49***	.45***	.05	.02	.49***
Model - Entire							
46. Intercept	4.80	1.61	.52***	.65***	.03	.07	.59***
47. SA	1.62	.93	.06	-.37***	.06	.03	-.17**
48. QSA	-.34	.20	.09	.44***	-.05	-.03	.40***
49. TA	-2.48	2.20	-.49***	-.03	-.11	-.07	-.39***
50. RA	-1.52	2.06	.42***	.49***	.05	.05	.48***
51. QRA	.09	.42	-.46***	-.36***	-.07	-.06	-.45***
Model - Subset							
52. Intercept	4.71	1.62	.46***	.65***	.03	.05	.55***
53. SA	1.64	1.03	.09	-.40***	.06	.08	-.16*
54. QSA	-.35	.22	.05	.47***	-.06	-.07	.38***
55. TA	-2.31	2.21	-.49***	.02	-.08	-.10	-.35***
56. RA	-1.67	1.95	.38***	.52***	.02	.05	.44***
57. QRA	.12	.41	-.43***	-.35**	-.05	-.08	-.39***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	26	27	28	29	30
Trial 8							
34. SSG	6.63	2.03	.81***	.40***	.21*	.25*	.88***
35. GC	5.96	1.30	.31**	.90***	.10	-.03	.29**
36. Latency	6362.42	3962.84	.16	.04	.82***	.00	.16
37. Performance	5.80	2.44	.58***	.11	.07	.08	.44***
Trial 9							
38. SSG	6.78	2.05	.87***	.41***	.18	.19	.86***
39. GC	5.94	1.33	.32**	.86***	.08	-.05	.28**
40. Latency	6415.90	4309.11	.24*	.05	.76***	-.02	.22*
41. Performance	5.77	2.46	.47***	.10	.10	.04	.30**
Trial 10							
42. SSG	7.12	2.22	.78***	.41***	.21*	.10	.76***
43. GC	5.97	1.34	.31**	.88***	.07	-.02	.34***
44. Latency	6238.45	4282.44	.18	-.03	.79***	-.05	.19
45. Performance	7.09	1.99	.50***	.13	.00	.23***	.42***
Model - Entire							
46. Intercept	4.80	1.61	.59***	.11	.04	.34***	.57***
47. SA	1.62	.93	-.24*	.02	.03	-.38***	-.40***
48. QSA	-.34	.20	.36***	.00	-.02	.41***	.46***
49. TA	-2.48	2.20	-.19	-.12	-.10	.67***	.12
50. RA	-1.52	2.06	.52***	.09	.11	-.36***	.34***
51. QRA	.09	.42	-.45***	-.10	-.13*	.49***	-.20
Model - Subset							
52. Intercept	4.71	1.62	.57***	.12	.03	.40***	.60***
53. SA	1.64	1.03	-.25*	.01	.07	-.47***	-.44***
54. QSA	-.35	.22	.36**	.01	-.06	.51***	.50***
55. TA	-2.31	2.21	-.16	-.09	-.11	.65***	.16
56. RA	-1.67	1.95	.55***	.08	.09	-.26***	.39***
57. QRA	.12	.41	-.46***	-.09	-.13*	.46***	-.20

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	31	32	33	34	35
Trial 8							
34. SSG	6.63	2.03	.37***	.21*	.64***	--	
35. GC	5.96	1.30	.90***	.09	.08	.27**	(.92)
36. Latency	6362.42	3962.84	.01	.74***	.07	.13	.05
37. Performance	5.80	2.44	.04	.04	.67***	.54***	.09
Trial 9							
38. SSG	6.78	2.05	.37***	.21*	.64***	.93***	.32**
39. GC	5.94	1.33	.83***	.06	.10	.28**	.92***
40. Latency	6415.90	4309.11	.02	.73***	.10	.25*	.06
41. Performance	5.77	2.46	.02	.02	.67***	.45***	.09
Trial 10							
42. SSG	7.12	2.22	.40***	.22*	.57***	.81***	.36***
43. GC	5.97	1.34	.85***	.02	.12	.36***	.91***
44. Latency	6238.45	4282.44	-.05	.69***	.11	.20	-.01
45. Performance	7.09	1.99	.08	-.03	.50***	.44***	.09
Model - Entire							
46. Intercept	4.80	1.61	.07	.05	.61***	.61***	.04
47. SA	1.62	.93	.01	-.01	-.24***	-.40***	.07
48. QSA	-.34	.20	.00	.00	.38***	.48***	-.05
49. TA	-2.48	2.20	-.04	-.03	-.17**	.05	-.12
50. RA	-1.52	2.06	.00	.06	.64***	.49***	.07
51. QRA	.09	.42	.00	-.06	-.61***	-.37***	-.10
Model - Subset							
52. Intercept	4.71	1.62	.09	.05	.55***	.63***	.05
53. SA	1.64	1.03	-.01	.01	-.23***	-.45***	.08
54. QSA	-.35	.22	.01	-.02	.36***	.53***	-.06
55. TA	-2.31	2.21	-.02	-.04	-.13*	.11	-.12
56. RA	-1.67	1.95	.00	.08	.67***	.52***	.05
57. QRA	.12	.41	.00	-.08	-.62***	-.34**	-.09

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*p < .05. **p < .01. ***p < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	36	37	38	39	40
Trial 8							
34. SSG	6.63	2.03					
35. GC	5.96	1.30					
36. Latency	6362.42	3962.84	--				
37. Performance	5.80	2.44	.03	--			
Trial 9							
38. SSG	6.78	2.05	.12	.62***	--		
39. GC	5.94	1.33	.04	.14	.36***	(.90)	
40. Latency	6415.90	4309.11	.81***	.02	.23*	.02	--
41. Performance	5.77	2.46	.08	.68***	.47***	.10	.10
Trial 10							
42. SSG	7.12	2.22	.16	.53***	.86***	.35***	.26*
43. GC	5.97	1.34	.02	.15*	.31**	.89***	.01
44. Latency	6238.45	4282.44	.74***	-.01	.18	-.01	.74***
45. Performance	7.09	1.99	-.01	.58***	.49***	.13	.01
Model - Entire							
46. Intercept	4.80	1.61	.09	.62***	.63***	.06	.06
47. SA	1.62	.93	.01	-.17**	-.38***	.05	.04
48. QSA	-.34	.20	-.02	.31***	.47***	-.03	-.04
49. TA	-2.48	2.20	-.05	-.36***	-.04	-.13	-.08
50. RA	-1.52	2.06	.05	.78***	.56***	.11	.05
51. QRA	.09	.42	-.05	-.77***	-.45***	-.14	-.07
Model - Subset							
52. Intercept	4.71	1.62	.09	.58***	.63***	.06	.07
53. SA	1.64	1.03	.03	-.17**	-.40***	.05	.05
54. QSA	-.35	.22	-.04	.30***	.49***	-.04	-.05
55. TA	-2.31	2.21	-.07	-.32***	.01	-.11	-.09
56. RA	-1.67	1.95	.04	.81***	.60***	.10	.05
57. QRA	.12	.41	-.06	-.78***	-.44***	-.13	-.07

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	41	42	43	44	45
Trial 8							
34. SSG	6.63	2.03					
35. GC	5.96	1.30					
36. Latency	6362.42	3962.84					
37. Performance	5.80	2.44					
Trial 9							
38. SSG	6.78	2.05					
39. GC	5.94	1.33					
40. Latency	6415.90	4309.11					
41. Performance	5.77	2.46	--				
Trial 10							
42. SSG	7.12	2.22	.55***	--			
43. GC	5.97	1.34	.16*	.36***	(.91)		
44. Latency	6238.45	4282.44	.03	.17	-.03	--	
45. Performance	7.09	1.99	.52***	.40***	.14	-.08	--
Model - Entire							
46. Intercept	4.80	1.61	.53***	.55***	.10	.04	.59***
47. SA	1.62	.93	-.04	-.31**	.02	-.05	-.06
48. QSA	-.34	.20	.17**	.38***	.01	.04	.14*
49. TA	-2.48	2.20	-.42***	-.09	-.12	.01	-.20***
50. RA	-1.52	2.06	.73***	.57***	.14	.07	.38***
51. QRA	.09	.42	-.76***	-.48***	-.15*	-.05	-.38***
Model - Subset							
52. Intercept	4.71	1.62	.49***	.58***	.12	.04	.59***
53. SA	1.64	1.03	-.06	-.34**	.01	.00	-.13*
54. QSA	-.35	.22	.18**	.41***	.01	-.01	.19**
55. TA	-2.31	2.21	-.36***	-.05	-.10	-.03	-.16*
56. RA	-1.67	1.95	.74***	.62***	.14	.07	.40***
57. QRA	.12	.41	-.75***	-.49***	-.15	-.07	-.34***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	46	47	48	49	50
Trial 8							
34. SSG	6.63	2.03					
35. GC	5.96	1.30					
36. Latency	6362.42	3962.84					
37. Performance	5.80	2.44					
Trial 9							
38. SSG	6.78	2.05					
39. GC	5.94	1.33					
40. Latency	6415.90	4309.11					
41. Performance	5.77	2.46					
Trial 10							
42. SSG	7.12	2.22					
43. GC	5.97	1.34					
44. Latency	6238.45	4282.44					
45. Performance	7.09	1.99					
Model - Entire							
46. Intercept	4.80	1.61	--				
47. SA	1.62	.93	-.67***	--			
48. QSA	-.34	.20	.73***	-.96***	--		
49. TA	-2.48	2.20	.06	-.62***	.49***	--	
50. RA	-1.52	2.06	.60***	-.29***	.39***	-.47***	--
51. QRA	.09	.42	-.34***	-.11	-.02	.73***	-.92***
Model - Subset							
52. Intercept	4.71	1.62	1.00***	-.71***	.75***	.15*	.57***
53. SA	1.64	1.03	-.70***	1.00***	-.96***	-.68***	-.28***
54. QSA	-.35	.22	.75***	-.96***	1.00***	.58***	.35***
55. TA	-2.31	2.21	.15*	-.69***	.56***	1.00***	-.38***
56. RA	-1.67	1.95	.62***	-.33***	.42***	-.37***	1.00***
57. QRA	.12	.41	-.29***	-.15*	.03	.70***	-.89***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
*p < .05. **p < .01. ***p < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	51	52	53	54	55
Trial 8							
34. SSG	6.63	2.03					
35. GC	5.96	1.30					
36. Latency	6362.42	3962.84					
37. Performance	5.80	2.44					
Trial 9							
38. SSG	6.78	2.05					
39. GC	5.94	1.33					
40. Latency	6415.90	4309.11					
41. Performance	5.77	2.46					
Trial 10							
42. SSG	7.12	2.22					
43. GC	5.97	1.34					
44. Latency	6238.45	4282.44					
45. Performance	7.09	1.99					
Model - Entire							
46. Intercept	4.80	1.61					
47. SA	1.62	.93					
48. QSA	-.34	.20					
49. TA	-2.48	2.20					
50. RA	-1.52	2.06					
51. QRA	.09	.42	--				
Model - Subset							
52. Intercept	4.71	1.62	-.27***	--			
53. SA	1.64	1.03	-.15*	-.72***	--		
54. QSA	-.35	.22	.04	.77***	-.97***	--	
55. TA	-2.31	2.21	.68***	.18**	-.71***	.60***	--
56. RA	-1.67	1.95	-.89***	.60***	-.31***	.39***	-.34***
57. QRA	.12	.41	1.00***	-.26***	-.17**	.06	.68***

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Table 6 (cont.)

Descriptives and Intercorrelations

	M	SD	56	57
Trial 8				
34. SSG	6.63	2.03		
35. GC	5.96	1.30		
36. Latency	6362.42	3962.84		
37. Performance	5.80	2.44		
Trial 9				
38. SSG	6.78	2.05		
39. GC	5.94	1.33		
40. Latency	6415.90	4309.11		
41. Performance	5.77	2.46		
Trial 10				
42. SSG	7.12	2.22		
43. GC	5.97	1.34		
44. Latency	6238.45	4282.44		
45. Performance	7.09	1.99		
Model - Entire				
46. Intercept	4.80	1.61		
47. SA	1.62	.93		
48. QSA	-.34	.20		
49. TA	-2.48	2.20		
50. RA	-1.52	2.06		
51. QRA	.09	.42		
Model - Subset				
52. Intercept	4.71	1.62		
53. SA	1.64	1.03		
54. QSA	-.35	.22		
55. TA	-2.31	2.21		
56. RA	-1.67	1.95	--	
57. QRA	.12	.41	-.88***	--

Note. SSG = self-set goal; GC = goal commitment; Latency = average speed of trial decisions; Performance = trial performance; Intercept = basal task performance; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability.
**p* < .05. ***p* < .01. ****p* < .001.

Appendix A

The following is an example aircraft. In the upper left are the contents of each report, while in the lower left is the results from each report. In the upper right, each level of threat is associated with a particular decision and the corresponding keyboard key noted. Finally, in the lower right, their current score is reported.

Report Alpha
1. Corridor Status: Slightly Threatening
2. Radar Type: Very Threatening
3. Range: Extremely Threatening

Report Bravo
4. Speed: Very Threatening
5. Altitude: Threatening
6. Direction: Threatening

Report Charlie
7. Size: Very Threatening
8. Angle: Threatening
9. IFF: Threatening

Key	Threat	Decision
1	00-02	Ignore
2	03-05	Review
3	06-08	Monitor
4	09-11	Warn
5	12-14	Ready
6	15-17	Lock On
7	18-20	Defend

Estimated Threat Levels
Alpha = 2
Bravo = 2
Charlie = 3

Make a decision and press the corresponding keyboard key.

Score: 0

Appendix B

Detection and Demographics

1. After the first trial, did you notice a change in how important the reports were?

   Circle: Yes or No

   If Yes, during which trial do you think the change occurred?

Trial Number								
2	3	4	5	6	7	8	9	10

2. In a typical week, how many hours do you play videogames? ______

3. Are you currently or have you ever been in the navy?

   Circle: Yes or No

4. Please provide us with a little information about yourself. This information is completely anonymous and cannot be used to identify you in any way.

   Age: _____ years

   Sex: Male Female

   Racioethnic Group: Caucasian/White/European American
   African American
   Hispanic/Latino
   Asian/Pacific Islander
   Native American
   Other (please specify)_____________

Appendix C

Self-efficacy
Assess your confidence in achieving the following ten levels of performance or higher in the next trial by using, for each level, a number between 0 (low) and 100 (high) to indicate how confident you are in achieving that performance level or higher.

	Level of Performance	Level of Confidence
1	-8	
2	-6	
3	-4	
4	-2	
5	0	
6	2	
7	4	
8	6	
9	8	
10	10	

Goal Commitment
For the following five statements, please mark the one response that best describes your agreement with the statement.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
It's hard to take this goal seriously					
Quite frankly, I don't care if I achieve this goal or not					
I am strongly committed to pursuing this goal					
It wouldn't take much to make me abandon this goal					
I think this is a good goal to shoot for					

Appendix D

I-ADAPT Scale

This survey asks a number of questions about your preferences, styles, and habits at work. Read each statement carefully. Then, for each statement please record the corresponding number that best represents your opinion.

1	2	3	4	5
Strongly Disagree		Neither Disagree nor Agree		Strongly Agree

Dealing with Uncertainty

1. I need for things to be "black and white"
2. I become frustrated when things are unpredictable
3. I am able to make effective decisions without all relevant information
4. I tend to perform best in stable situations and environments
5. When something unexpected happens, I readily change gears in response
6. I can adapt to changing situations
7. I perform well in uncertain situations
8. I easily respond to changing conditions
9. I can adjust my plans to changing conditions

Learning

1. I take responsibility for acquiring new skills
2. I take action to improve work performance deficiencies
3. I quickly learn new methods to solve problems
4. I enjoy learning new approaches for conducting work

Appendix E

Introduction, Cover Story, and Tutorial

Screen 01
Over the next few screens, you will be introduced to the task that you will be performing during this study. It's vital that you read or listen to the instructions. Once the spacebar prompt shows up at the bottom of the screen, you can proceed to the next set of instructions.

Screen 02
You are the Commander of the naval carrier group Woden, which is stationed in East Asia. A conflict between two nations in this area has recently broken out, and your mission is to protect commercial traffic and yourself from attacks by hostile aircraft.

However, it is also important that you do not accidentally shoot down friendly military or civilian aircraft. Several such incidents have occurred in the past, so it is vital that no future accidents happen.

Screen 03
You will go through a total of 10 trials with 5 aircraft per trial. For every aircraft within a trial, you will receive three reports and, as Commander, you must do the following:

A. Determine how much of a threat the aircraft poses. Every aircraft is rated on a 0 to 20 threat scale, where 0 is completely nonthreatening and 20 is extremely threatening.

B. Based on that threat level, you must make the correct decision in how to respond to the aircraft. Namely, you must choose one of the following options:

1. Ignore: Devote no further attention to the aircraft
2. Review: Check up on the aircraft occasionally
3. Monitor: Continuously track the aircraft
4. Warn: Send a warning message to the aircraft to steer clear of your group's position
5. Ready: Adopt a defensive posture and set defensive weapons to fire automatically
6. Lock On: Target the aircraft and ready weapons to fire
7. Defend: Immediately target and attack the aircraft

Screen 04

Every decision is tied to a specific range of threat levels. When you have made your decision, you just have to hit the corresponding keyboard key tied to that decision. For example, if I determined the threat to be a 7, then the correct response is to Monitor; so I'd just hit the 3 key on the keyboard.

Key	Threat	Decision
1	00-02	Ignore
2	03-05	Review
3	06-08	Monitor
4	09-11	Warn
5	12-14	Ready
6	15-17	Lock On
7	18-20	Defend

During each aircraft trial, all of this information will be presented in the upper right of the screen and look like the list above.

Screen 05

For each aircraft, you will receive three reports which cover multiple characteristics about the aircraft and how threatening they are. Based upon this information, each report produces an Estimated Threat Level.

You should NOT base your decision on the characteristics. You should only consider the reports' Estimated Threat Level when making your decision as it takes into account the interaction of those individual characteristics.

Not all reports are equally important when determining how much of a threat an aircraft poses. It is up to you to figure out which report or reports deserve the most attention.

Screen 06
For example, let's say that an aircraft has the following Estimated Threat Levels:

Alpha: 1
Brave: 0
Charlie: 6

Key	Threat	Decision
1	00-02	Ignore
2	03-05	Review
3	06-08	Monitor
4	09-11	Warn
5	12-14	Ready
6	15-17	Lock On
7	18-20	Defend

Ultimately, it would take several aircraft to figure out if some reports are more important than others. For now though, here are some potential decisions that could be made.

1. If all reports are equally important, the Threat Level is 7 (1 + 0 + 6). Therefore, I should Monitor.
2. If Charlie is twice as important as the other reports, the Threat Level is 13 (1 + 0 + [2 * 6]). Therefore, I should Ready.
3. If Bravo is the only important report, the Threat Level is 0. Therefore, I should Ignore."

Screen 07
For each decision you make, you will receive feedback about how correct your decision was and how your score has changed.

The possible outcomes are:

1. Hit: Your decision was exactly correct. +2 points
2. Near Miss: Your decision was only off by one place (e.g., you Warned the aircraft instead of Readying your ships). +1 point
3. Miss: Your decision was off by two places. You neither receive nor lose points
4. Incident: Your decision was off by three places. -1 point
5. Disaster: Your decision was off by four places. -2 points

During a trial, your score will be displayed at the bottom of the page. For each trial, your score starts off at 0. Based on your performance, it can range from -10 to 10 by the end of the trial.

Appendix F

Neutral Word-Search

While the program is being readied, please complete the following word-search. For each word below, please record the unique subscript number for the beginning letter and the ending letter. For example, 'Doze' would be: 77 & 80.

H_{01}	C_{02}	H_{03}	L_{04}	K_{05}	W_{06}	O_{07}	F_{08}	E_{09}	Q_{10}
A_{11}	O_{12}	A_{13}	O_{14}	A_{15}	O_{16}	W_{17}	O_{18}	R_{19}	U_{20}
T_{21}	W_{22}	O_{23}	R_{24}	P_{25}	M_{26}	U_{27}	L_{28}	U_{29}	O_{30}
W_{31}	B_{32}	T_{33}	M_{34}	P_{35}	L_{36}	P_{37}	D_{38}	T_{39}	F_{40}
S_{41}	T_{42}	A_{43}	P_{44}	L_{45}	E_{46}	R_{47}	E_{48}	C_{49}	W_{50}
J_{51}	H_{52}	Y_{53}	X_{54}	X_{55}	E_{56}	T_{57}	R_{58}	I_{59}	K_{60}
S_{61}	R_{62}	I_{63}	A_{64}	T_{65}	S_{66}	N_{67}	N_{68}	P_{69}	S_{70}
I_{71}	I_{72}	D_{73}	D_{74}	D_{75}	N_{76}	D_{77}	O_{78}	Z_{79}	E_{80}
S_{81}	A_{82}	N_{83}	D_{84}	R_{85}	O_{86}	S_{87}	N_{88}	H_{89}	D_{90}
Y_{91}	F_{92}	W_{93}	U_{94}	W_{95}	E_{96}	U_{97}	V_{98}	N_{99}	P_{100}

Word List

BOOK
CARPET
DESK
FOLDER
HAT
LAMP
PHONE
PICTURE
SAND
SHAMPOO
STAIRS
STAPLER
WINDOW

Appendix G

Achievement Word-Search Prime

While the program is being readied, please complete the following word-search. For each word below, please record the unique subscript number for the beginning letter and the ending letter. For example, 'Bets' would be: 41 & 44.

E_{01}	H_{02}	L_{03}	K_{04}	T_{05}	M_{06}	U_{07}	E_{08}	G_{09}	D_{10}
K_{11}	R_{12}	M_{13}	K_{14}	A_{15}	O_{16}	D_{17}	T_{18}	E_{19}	A_{20}
O_{21}	S_{22}	U_{23}	S_{24}	S_{25}	N_{26}	X_{27}	E_{28}	M_{29}	T_{30}
O_{31}	S_{32}	T_{33}	T_{34}	A_{35}	E_{36}	C_{37}	P_{38}	R_{39}	T_{40}
B_{41}	E_{42}	T_{43}	S_{44}	C_{45}	C_{46}	D_{47}	M_{48}	D_{49}	A_{50}
R_{51}	M_{52}	O_{53}	R_{54}	U_{55}	I_{56}	P_{57}	O_{58}	I_{59}	I_{60}
O_{61}	S_{62}	Y_{63}	S_{64}	I_{65}	T_{66}	P_{67}	C_{68}	Y_{69}	N_{70}
A_{71}	C_{72}	H_{73}	I_{74}	E_{75}	V_{76}	E_{77}	W_{78}	V_{79}	F_{80}
E_{81}	N_{82}	O_{83}	H_{84}	P_{85}	S_{86}	E_{87}	C_{88}	I_{89}	K_{90}
L_{91}	A_{92}	M_{93}	P_{94}	H_{95}	Y_{96}	D_{97}	I_{98}	S_{99}	N_{100}

Word List

ACHIEVE
ATTAIN
BOOK
COMPETE
DESK
LAMP
MASTER
PHONE
PICTURE
SAND
STRIVE
SUCCEED
WIN

Appendix H

Implementation Intention Manipulation

To help you deal with any possible change you may encounter within the Naval Commander program, please write the following sentence five times: “If a change occurs, then I will reconsider how I will approach the task.”

Implementation Intention Strong Control

To help you deal with any possible change you may encounter within the Naval Commander program, please write the following sentence five times: “In future trials, we suggest that you reconsider how you approach the task.”

Appendix I

The development of the lexical decision was adapted from Webb and Sheeran's (2008) version. First, participants were informed that their role in the task is to quickly assess if the presented string of letters is a verb or not and to indicate their choice by pressing the "E" key for 'yes' and the "I" key for 'no.' Following this instruction, ten practice trials occured followed by three blocks of 11 experimental trials each. For the entire set of 43 trials the following order of events will occur: (1) a fixation dot appeared in the middle of the screen for 700 ms, (2) a prime or target word appeared for 250 ms, and (3) a blank screen appeared until the participant responded. Once a participant had responded, the next trial began and the process continued until the trials were completed. Within each block, the trials were ordered so that the below combinations where all assessed.

For the prime and target words, the following words were used: (1) one word associated with the critical cue – *change*, (2) one neutral word matched to the critical cue word – *chairs*, (3) one word representing the critical response - *reconsider*, (4) one neutral word matched to the critical response - *represents*, and (5) ten neutral words for filler pairings - *compute, caress, yogurt, inform, wander, borrow, antibodies, condescend, identifies,* and *complexity*. The Table below lists the seven prime-target combinations that all participants will experience per block. Of these seven combinations, the two of interest are the critical cue accessibility (Prime: neutral; Target: Change) and critical cue – critical response link (Prime: Change; Target: Reconsider). If the implementation intention produces the theoretical effects discussed above, then the participants who received it should respond significantly faster than the control group in both of these combinations. The other five combinations are used to provide comparison data in the analyses.

List of Trials for each Block of the Lexical Decision Task.

Component Process	Prime Word	Target Word
Filler pairings*	Neutral	Neutral
Critical cue accessibility	Neutral	Change
Neutral cue accessibility	Neutral	Chairs
Critical response accessibility	Neutral	Reconsider
Critical cue – critical response link	Change	Reconsider
Critical cue – neutral response link	Change	Represents
Critical response – critical cue link	Reconsider	Change

Note: * a total of 5 fillers will occur per block.

Appendix J

Funneled Debriefing

1. What do you think the purpose of this experiment was?

2. What do you think this experiment was trying to study?

3. Did you think that any of the tasks you did were related in any way? If yes, in what way were they related?

4. Did anything you did on one task affect what you did on any other task? If yes, how exactly did it affect you?

5. When you were completing the word-search, did you notice anything unusual about the words?

6. Did you notice any particular pattern or theme to the words that were included in the word-search?

7. Did the word-search have any effect on how you performed in the naval task?

Appendix K

Trial Coding for Level-1 of the Discontinuous Growth Model

Parameter	Trial										Explanation
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
SA	0	1	2	3	4	5	6	7	8	9	Linear increase in performance pre-trial 6
TA	0	0	0	0	0	1	1	1	1	1	Linear decrease in performance from trial 5 to trial 6
RA	0	0	0	0	0	0	1	2	3	4	Linear increase (relative to SA) in performance following trial 6
QSA	0	1	4	9	16	16	16	16	16	16	Quadratic term in performance pre-trial 6
QRA	0	0	0	0	0	0	1	4	9	16	Quadratic term in performance following trial 6
CSA	0	1	8	27	64	64	64	64	64	64	Cubic term in performance pre-trial 6
CRA	0	0	0	0	0	0	1	8	27	64	Cubic term in performance following trial 6

Note. SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

<u>Original Level-1 Model Building</u>

Level-1 Discontinuous Growth Models of Change Parameters on Performance – Entire Sample

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.45	.12	2526	44.68	< .001
SA	.27	.04	2526	7.89	< .001
TA	-2.03	.14	2526	-13.98	< .001
RA	.20	.05	2526	4.06	< .001
Quadratic Level-1 model					
(Intercept)	4.76	.13	2524	35.62	< .001
SA	1.66	.12	2524	13.83	< .001
TA	-2.52	.16	2524	-15.52	< .001
RA	-1.58	.17	2524	-9.27	< .001
QSA	-.35	.03	2524	-12.02	< .001
QRA	.10	.03	2524	3.40	< .001
Cubic Level-1 model					
(Intercept)	4.70	.14	2522	34.13	< .001
SA	2.09	.27	2522	7.69	< .001
TA	-3.13	.32	2522	-9.67	< .001
RA	-1.14	.38	2522	-2.97	< .01
QSA	-.64	.17	2522	-3.73	< .001
QRA	-.50	.17	2522	-2.92	< .01
CSA	.05	.03	2522	1.74	.08
CRA	.10	.03	2522	3.54	< .001

Note. $N = 281$. $k = 2810$. Coef. = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Level-1 Discontinuous Growth Models of Change Parameters on Performance - Subset Sample

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.39	.12	2157	44.79	< .001
SA	.25	.04	2157	6.52	< .001
TA	-1.87	.16	2157	-11.88	< .001
RA	.20	.05	2157	3.67	< .001
Quadratic Level-1 model					
(Intercept)	4.67	.14	2155	32.70	< .001
SA	1.69	.13	2155	12.88	< .001
TA	-2.34	.18	2155	-13.22	< .001
RA	-1.73	.19	2155	-9.32	< .001
QSA	-.36	.03	2155	-11.43	< .001
QRA	.12	.03	2155	3.90	< .001
Cubic Level-1 model					
(Intercept)	4.60	.15	2153	31.22	< .001
SA	2.17	.30	2153	7.32	< .001
TA	-2.99	.35	2153	-8.48	< .001
RA	-1.48	.42	2153	-3.53	< .01
QSA	-.69	.19	2153	-3.69	< .001
QRA	-.39	.19	2153	-2.05	.04
CSA	.06	.03	2153	1.81	.07
CRA	.08	.03	2153	2.74	< .001

Note. $N = 240$. $k = 2400$. Coef. = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Log-Likelihood Tests of Random Slope Models – Entire Sample

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
1	9	11900.49	11953.94	-5941.25	--	--	--
2	11	11886.79	11952.11	-5932.40	1 vs. 2	17.70	< .001
3	14	11874.14	11957.28	-5923.07	2 vs. 3	18.65	< .001
4	18	11878.83	11985.72	-5921.41	3 vs. 4	3.32	.51
5	23	11870.90	12007.48	-5912.45	4 vs. 5	17.93	< .01
6	29	11676.02	11848.24	-5809.01	5 vs. 6	206.87	< .001
7	36	11693.23	11907.01	-5810.62	6 vs. 7	3.21	.87

Log-Likelihood Tests of Random Slope Models – Subset Sample

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
1	9	10191.06	10243.08	-5086.53	--	--	--
2	11	10180.34	10243.92	-5079.17	1 vs. 2	14.72	< .001
3	14	10172.02	10252.95	-5072.01	2 vs. 3	14.31	< .01
4	18	10177.87	10281.91	-5070.93	3 vs. 4	2.16	.71
5	23	10165.17	10298.12	-5059.59	4 vs. 5	22.70	< .001
6	29	10028.19	10195.82	-4985.09	5 vs. 6	148.98	< .001
7	36	10248.40	10248.40	-4984.16	6 vs. 7	1.88	.97

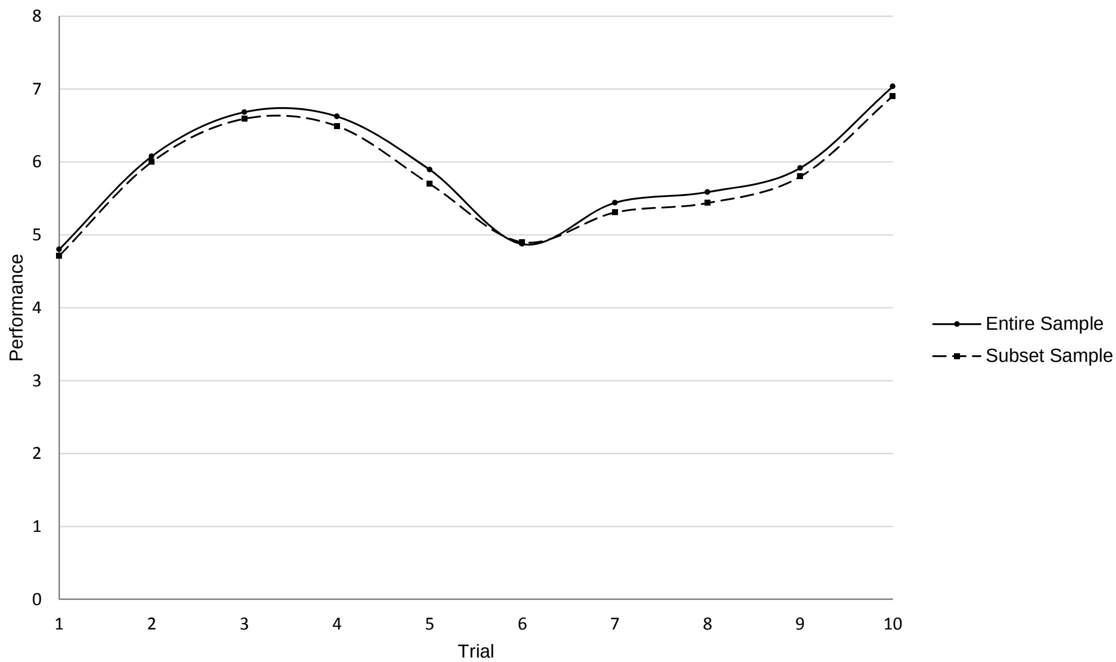
Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Fixed Effects

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
(Intercept)	4.80	.14	2523	35.34	< .001
SA	1.61	.12	2523	13.02	< .001
TA	-2.63	.21	2523	-12.60	< .001
RA	-.63	.29	2523	-2.17	.03
QSA	-.33	.03	2523	-11.74	< .001
QRA	-.51	.15	2523	-3.51	< .001
CRA	.10	.02	2523	4.28	< .001
Subset Sample					
(Intercept)	4.71	.15	2154	31.76	< .001
SA	1.63	.14	2154	11.81	< .001
TA	-2.43	.23	2154	-10.70	< .001
RA	-.92	.31	2154	-2.91	< .01
QSA	-.35	.03	2154	-11.00	< .001
QRA	-.39	.16	2154	-2.45	.01
CRA	.09	.03	2154	3.28	< .01

Note. Entire Sample: $N = 281$, $k = 2810$. Subset Sample: $N = 240$, $k = 2400$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.53	1.88	--					
2. SA	1.85	1.36	-.69	--				
3. TA	7.62	2.76	.19	-.60	--			
4. RA	6.66	2.58	.56	-.43	-.33	--		
5. QSA	.08	0.29	.67	-.96	.47	.48	--	
6. QRA	.25	0.50	-.24	-.05	.66	-.88	-.04	--
Residual	2.04	1.43						
Subset Sample								
1. (Intercept)	3.53	1.88	--					
2. SA	2.04	1.43	-.73	--				
3. TA	7.67	2.77	.27	-.68	--			
4. RA	6.10	2.47	.56	-.43	-.23	--		
5. QSA	.09	0.30	.72	-.97	.57	.47	--	
6. QRA	.24	0.49	-.17	-.12	.62	-.84	.04	--
Residual	2.10	1.45						



Predicted performance as a function of Level-1 change parameters.

Level-1 Modeling Builidng with Sex-Identified Data

Level-1 Discontinuous Growth Models of Change Parameters on Performance - Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.44	.13	2364	42.54	< .001
SA	.28	.04	2364	7.75	< .001
TA	-2.04	.15	2364	-13.53	< .001
RA	.19	.05	2364	3.76	< .001
Quadratic Level-1 model					
(Intercept)	4.74	.14	2362	33.92	< .001
SA	1.68	.12	2362	13.42	< .001
TA	-2.53	.17	2362	-15.00	< .001
RA	-1.60	.18	2362	-9.05	< .001
QSA	-.35	.03	2362	-11.63	< .001
QRA	.10	.03	2362	3.34	< .001
Cubic Level-1 model					
(Intercept)	4.68	.14	2360	32.48	< .001
SA	2.13	.28	2360	7.55	< .001
TA	-3.17	.34	2360	-9.43	< .001
RA	-1.20	.40	2360	-3.02	< .01
QSA	-.67	.18	2360	-3.72	< .001
QRA	-.49	.18	2360	-2.75	< .01
CSA	.05	.03	2360	1.80	.07
CRA	.10	.03	2360	3.36	< .001

Note. $N = 263$. $k = 2630$. Coef. = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Level-1 Discontinuous Growth Models of Change Parameters on Performance - Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.37	.14	1995	39.11	< .001
SA	.26	.04	1995	6.35	< .001
TA	-1.87	.17	1995	-11.28	< .001
RA	.19	.06	1995	3.32	< .001
Quadratic Level-1 model					
(Intercept)	4.64	.15	1993	30.84	< .001
SA	1.71	.14	1993	12.43	< .001
TA	-2.34	.19	1993	-12.63	< .001
RA	-1.77	.19	1993	-9.11	< .001
QSA	-.36	.03	1993	-11.02	< .001
QRA	.13	.03	1993	3.85	< .001
Cubic Level-1 model					
(Intercept)	4.57	.16	1991	29.42	< .001
SA	2.23	.31	1991	7.17	< .001
TA	-3.03	.37	1991	-8.21	< .001
RA	-1.58	.44	1991	-3.61	< .001
QSA	-.73	.20	1991	-3.68	< .001
QRA	-.36	.20	1991	-1.85	.06
CSA	.06	.03	1991	1.87	.06
CRA	.08	.03	1991	2.53	.01

Note. $N = 220$. $k = 2220$. Coef = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Log-Likelihood Tests of Random Slope Models – Entire Sample

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
1	9	11173.69	11226.54	-5577.85	--	--	--
2	11	11163.53	11228.12	-5570.76	1 vs. 2	14.16	< .001
3	14	11151.84	11234.05	-5561.92	2 vs. 3	17.69	< .001
4	18	11157.37	11263.06	-5560.68	3 vs. 4	2.47	.65
5	23	11149.83	11284.88	-5551.91	4 vs. 5	17.54	< .01
6	29	10967.78	11138.07	-5454.89	5 vs. 6	194.05	< .001
7	36	10984.02	11195.42	-5456.01	6 vs. 7	2.24	.95

Log-Likelihood Tests of Random Slope Models – Subset Sample

Model	*df*	*AIC*	*BIC*	*logLik*	Test	L.Ratio	*p*
1	9	9463.89	9515.21	-4722.95	--	--	--
2	11	9456.39	9519.11	-4717.19	1 vs. 2	11.51	< .001
3	14	9449.35	9529.17	-4710.67	2 vs. 3	13.04	< .01
4	18	9456.25	9558.88	-4710.12	3 vs. 4	1.10	.89
5	23	9443.36	9574.51	-4698.68	4 vs. 5	22.87	< .001
6	29	9317.30	9482.66	-4629.65	5 vs. 6	138.06	< .001
7	36	9330.29	9535.57	-4629.15	6 vs. 7	1.00	.99

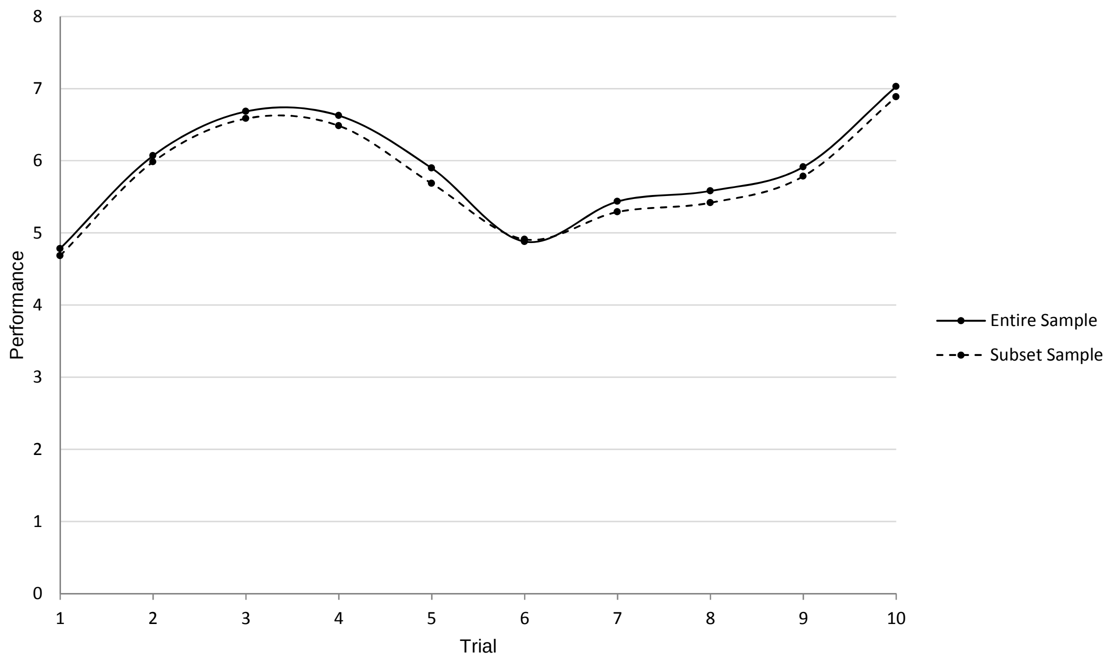
Final Level-1 Discontinuous Growth Models of Change Parameters on Performance

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Entire Sample					
(Intercept)	4.78	.14	2361	33.16	< .001
SA	1.62	.13	2361	12.57	< .001
TA	-2.64	.22	2361	-12.20	< .001
RA	-.66	.30	2361	-2.19	.03
QSA	-.34	.03	2361	-11.36	< .001
QRA	-.50	.15	2361	-3.31	.001
CRA	.10	.02	2361	4.5	< .001
Subset Sample					
(Intercept)	4.68	.16	1992	29.37	< .001
SA	1.65	.15	1992	11.31	< .001
TA	-2.42	.24	1992	-10.20	< .001
RA	-.98	.33	1992	-2.97	< .01
QSA	-.35	.03	1992	-10.55	< .001
QRA	-.37	.17	1992	-2.21	.03
CRA	.08	.03	1992	3.02	< .01

Note. Entire sample: $N = 263$, $k = 2630$. Subset sample: $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Final Level-1 Discontinuous Growth Models of Change Parameters on Performance – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.80	1.95	--					
2. SA	1.90	1.38	-.72	--				
3. TA	7.62	2.76	.21	-.60	--			
4. RA	6.76	2.60	.56	-.43	-.33	--		
5. QSA	.08	0.29	.70	-.96	.46	.48	--	
6. QRA	.25	0.50	-.23	-.06	.65	-.87	-.03	--
Residual	2.07	1.44						
Subset Sample								
1. (Intercept)	3.88	1.97	--					
2. SA	2.13	1.46	-.76	--				
3. TA	7.67	2.77	.30	-.68	--			
4. RA	6.05	2.46	.56	-.43	-.21	--		
5. QSA	.10	0.31	.75	-.97	.56	.47	--	
6. QRA	.24	0.49	-.15	-.13	.61	-.83	.05	--
Residual	2.16	1.47						



Predicted performance as a function of Level-1 change parameters.

Level-2 Analyses with sex-identified data

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex- Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2356	20.18	< .001
SA	1.80	.19	2356	9.24	< .001
TA	-2.12	.32	2356	-6.58	< .001
RA	-1.61	.38	2356	-4.21	< .001
QSA	-.38	.04	2356	-8.66	< .001
QRA	-.33	.16	2356	-2.04	.04
CRA	.10	.02	2356	4.00	< .001
Level-2 Model					
Sex	.75	.29	261	2.59	.01
SA x Sex	-.29	.26	2356	-1.13	.26
TA x Sex	-.93	.43	2356	-2.17	.03
RA x Sex	1.65	.42	2356	3.94	< .001
QSA x Sex	.08	.06	2356	1.33	.18
QRA x Sex	-.31	.08	2356	-4.09	< .001

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

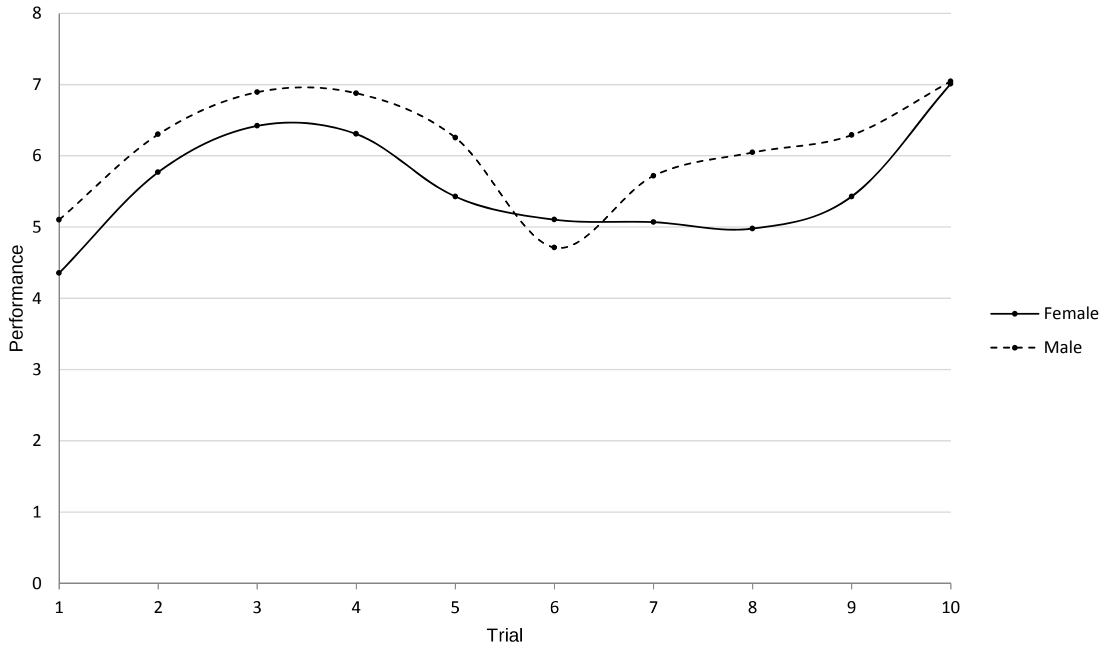
Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex- Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.25	.24	1987	17.57	< .001
SA	1.88	.22	1987	8.43	< .001
TA	-1.98	.36	1987	-5.47	< .001
RA	-1.95	.41	1987	-4.70	< .001
QSA	-.41	.05	1987	-8.11	< .001
QRA	-.20	.17	1987	-1.16	.25
CRA	.08	.03	1987	3.03	< .01
Level-2 Model					
Sex	.75	.32	220	2.36	.02
SA x Sex	-.40	.29	1987	-1.37	.17
TA x Sex	-.78	.47	1987	-1.64	.10
RA x Sex	1.68	.45	1987	3.77	< .001
QSA x Sex	.11	.07	1987	1.60	.11
QRA x Sex	-.30	.08	1987	-3.60	< .001

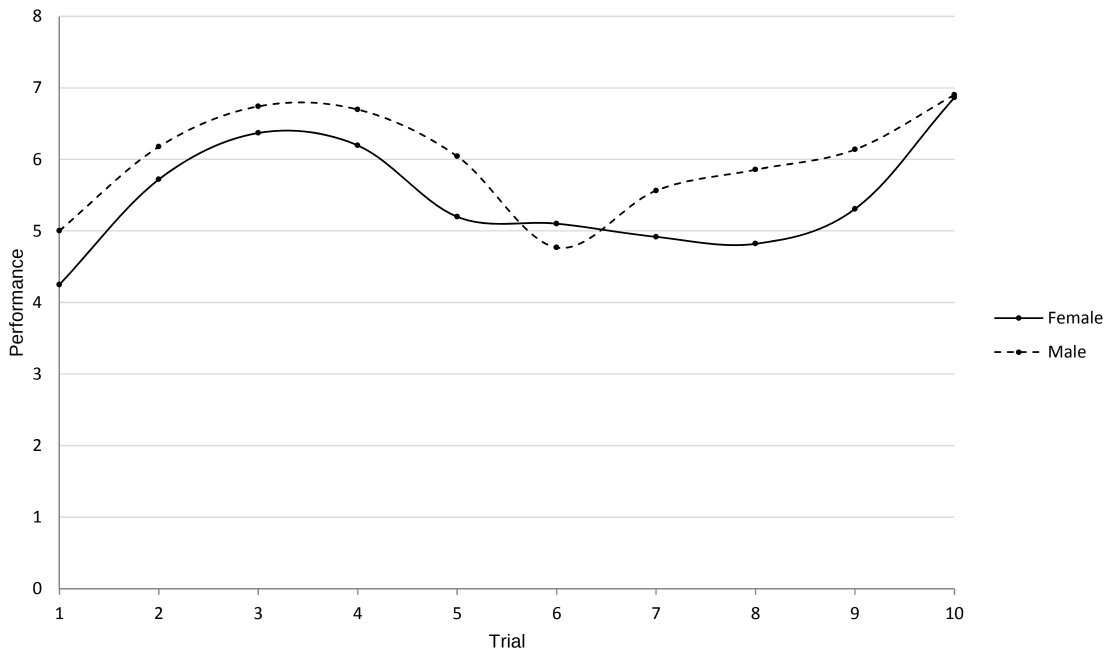
Note. N = 222, k = 2220. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Sex – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.57	1.89	--					
2. SA	1.74	1.32	-.74	--				
3. TA	7.24	2.69	.23	-.64	--			
4. RA	5.90	2.43	.56	-.40	-.31	--		
5. QSA	.07	.27	.77	-.97	.52	.45	--	
6. QRA	.22	.47	-.20	-.111	.64	-.86	.04	--
Residual	2.13	1.46						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.67	2.77	.34	-.71	--			
4. RA	5.43	2.33	.54	-.41	-.18	--		
5. QSA	.10	.31	.73	-.96	.59	.44	--	
6. QRA	.22	.47	-.09	-.18	.60	-.82	.11	--
Residual	2.13	1.46						



Predicted performance as a function of sex – entire sample.



Predicted performance as a function of sex – subset sample.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.22	.29	2346	14.44	< .001
SA	1.77	.26	2346	6.67	< .001
TA	-1.92	.43	2346	-4.42	< .001
RA	-1.99	.47	2346	-4.20	< .001
QSA	-.38	.06	2346	-6.26	< .001
QRA	-.23	.17	2346	-1.37	< .001
CRA	.10	.02	2346	4.06	< .001
Level-2 Model					
Sex	.74	.29	259	2.54	.01
Assigned	.28	.35	259	.80	.42
Self-set	.16	.35	259	.44	.66
SA x Sex	-.29	.26	2346	-1.12	.26
SA x Assigned	.02	.32	2346	.08	.94
SA x Self-set	.04	.32	2346	.12	.90
TA x Sex	-.91	.43	2346	-2.13	.03
TA x Assigned	-.41	.52	2346	-.78	.43
TA x Self-set	-.21	.52	2346	-.40	.69
RA x Sex	1.62	.42	2346	3.86	.00
RA x Assigned	.75	.51	2346	1.48	.14
RA x Self-set	.51	.51	2346	.99	.32
QSA x Sex	.08	.06	2346	1.30	.19
QSA x Assigned	.00	.07	2346	.00	1.00
QSA x Self-set	.00	.07	2346	-.02	.98
QRA x Sex	-.30	.08	2346	-4.02	.00
QRA x Assigned	-.18	.09	2346	-1.92	.06
QRA x Self-set	-.14	.09	2346	-1.49	.14

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

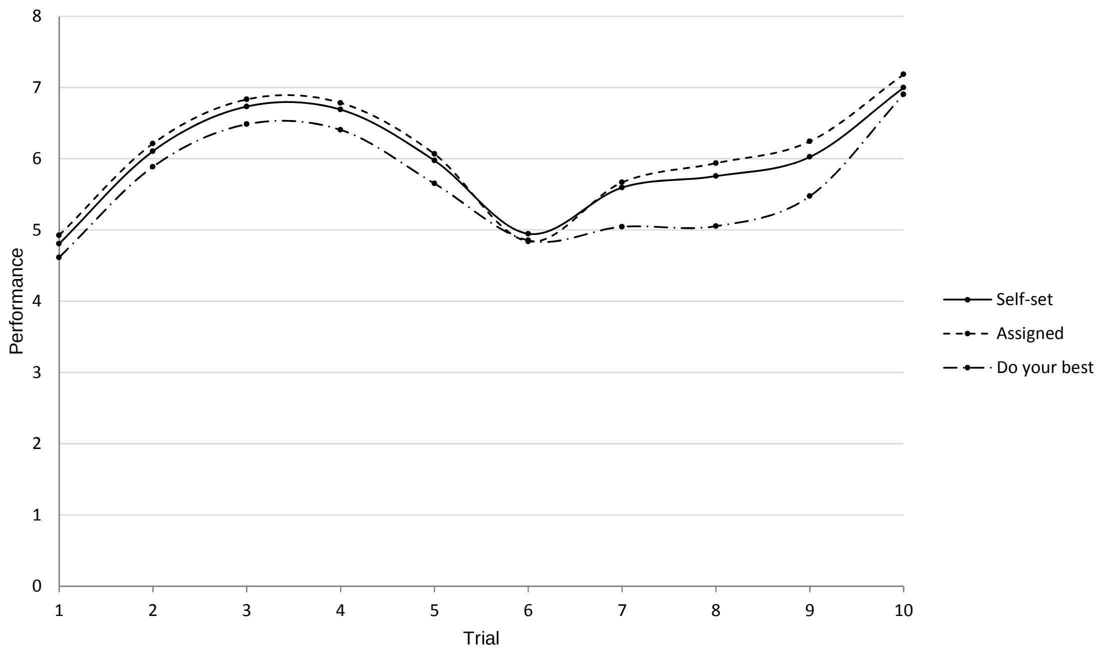
Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.21	.33	1977	12.88	< .001
SA	1.78	.30	1977	5.89	< .001
TA	-1.86	.49	1977	-3.81	< .001
RA	-2.21	.52	1977	-4.28	< .001
QSA	-.39	.07	1977	-5.64	< .001
QRA	-.11	.18	1977	-.61	.54
CRA	.08	.03	1977	3.02	< .01
Level-2 Model					
Sex	.75	.32	218	2.35	.02
Assigned	.04	.38	218	.10	.92
Self-set	.08	.39	218	.21	.84
SA x Sex	-.40	.30	1977	-1.35	.18
SA x Assigned	.16	.35	1977	.46	.64
SA x Self-set	.16	.36	1977	.45	.65
TA x Sex	-.78	.47	1977	-1.64	.10
TA x Assigned	-.18	.57	1977	-.32	.75
TA x Self-set	-.19	.58	1977	-.33	.74
RA x Sex	1.68	.45	1977	3.75	< .001
RA x Assigned	.29	.54	1977	.54	.59
RA x Self-set	.52	.54	1977	.96	.34
QSA x Sex	.11	.07	1977	1.58	.11
QSA x Assigned	-.04	.08	1977	-.47	.64
QSA x Self-set	-.04	.08	1977	-.45	.65
QRA x Sex	-.30	.08	1977	-3.62	< .001
QRA x Assigned	-.10	.10	1977	-1.03	.30
QRA x Self-set	-.18	.10	1977	-1.78	.08

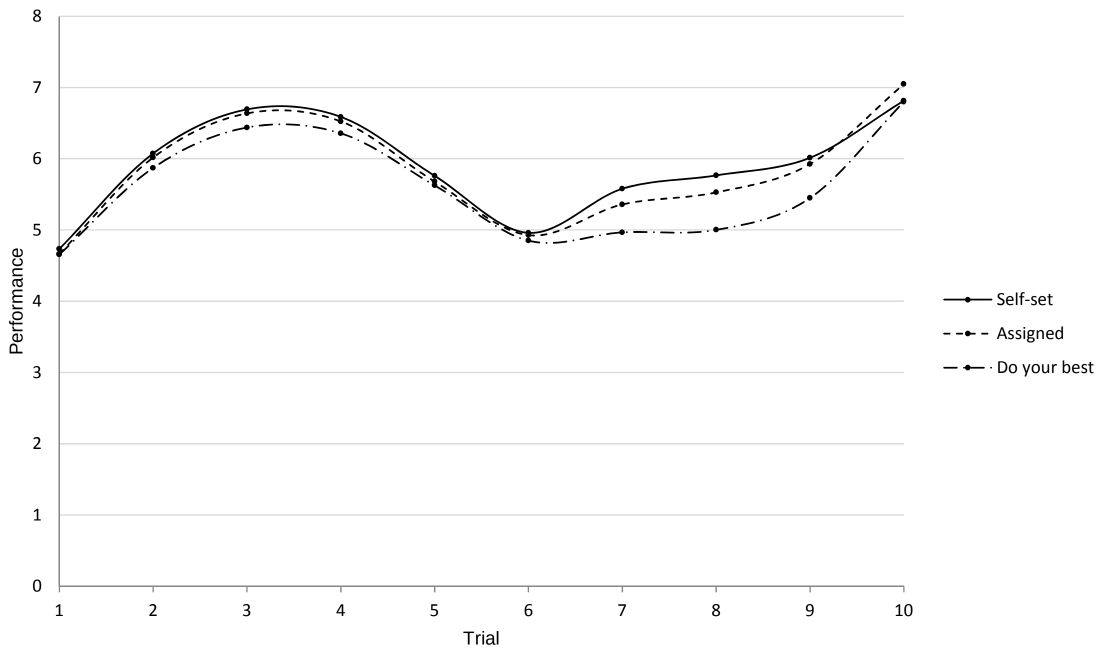
Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Goal-Setting – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	1.99	1.41	-.71	--				
3. TA	7.56	2.75	.26	-.62	--			
4. RA	6.20	2.49	.54	-.44	-.28	--		
5. QSA	.09	.30	.68	-.96	.49	.48	--	
6. QRA	.23	.48	-.17	-.09	.63	-.85	.01	--
Residual	2.04	1.43						
Subset Sample								
1. (Intercept)	3.80	1.95	--					
2. SA	2.16	1.47	-.75	--				
3. TA	7.67	2.77	.34	-.70	--			
4. RA	5.52	2.35	.54	-.43	-.17	--		
5. QSA	.10	.31	.74	-.97	.58	.46	--	
6. QRA	.21	.46	-.10	-.16	.60	-.81	.10	--
Residual	2.16	1.47						



Predicted performance as a function of goal-setting – entire sample.



Predicted performance as a function of goal-setting – subset sample.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.09	.26	2351	15.75	< .001
SA	1.95	.24	2351	8.31	< .001
TA	-2.07	.39	2351	-5.33	< .001
RA	-1.73	.44	2351	-3.96	< .001
QSA	-.42	.05	2351	-7.79	< .001
QRA	-.34	.16	2351	-2.08	.04
CRA	.10	.02	2351	4.03	< .001
Level-2 Model					
Sex	.77	.29	260	2.68	.01
Prime	.52	.28	260	1.83	.07
SA x Sex	-.31	.26	2351	-1.19	.24
SA x Prime	-.32	.26	2351	-1.23	.22
TA x Sex	-.93	.43	2351	-2.17	.03
TA x Prime	-.09	.42	2351	-.21	.84
RA x Sex	1.66	.42	2351	3.95	< .001
RA x Prime	.26	.42	2351	.63	.53
QSA x Sex	.08	.06	2351	1.38	.17
QSA x Prime	.07	.06	2351	1.26	.21
QRA x Sex	-.31	.08	2351	-4.06	< .001
QRA x Prime	.02	.08	2351	.32	.75

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

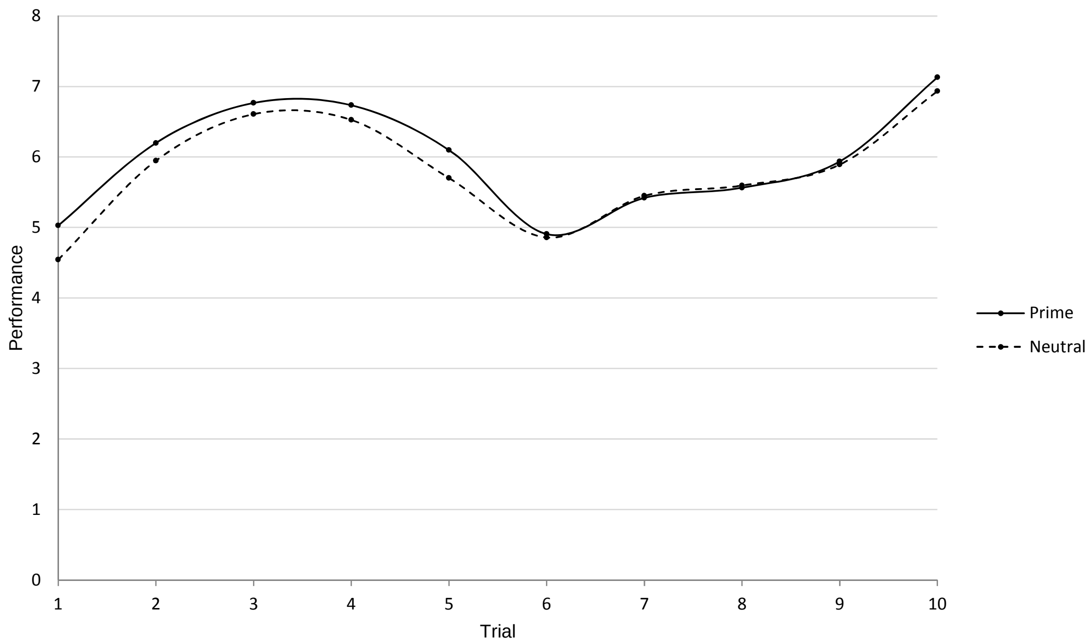
Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.10	.27	1982	14.94	< .001
SA	2.01	.25	1982	7.96	< .001
TA	-2.14	.41	1982	-5.24	< .001
RA	-1.89	.45	1982	-4.16	< .001
QSA	-.43	.06	1982	-7.54	< .001
QRA	-.25	.18	1982	-1.39	.16
CRA	.08	.03	1982	3.03	< .01
Level-2 Model					
Sex	.76	.32	219	2.39	.02
Prime	.37	.32	219	1.15	.25
SA x Sex	-.41	.29	1982	-1.4	.16
SA x Prime	-.32	.30	1982	-1.09	.28
TA x Sex	-.77	.47	1982	-1.62	.10
TA x Prime	.41	.48	1982	.86	.39
RA x Sex	1.68	.45	1982	3.75	< .001
RA x Prime	-.15	.45	1982	-.33	.74
QSA x Sex	.11	.07	1982	1.62	.11
QSA x Prime	.06	.07	1982	.83	.40
QRA x Sex	-.29	.08	1982	-3.58	< .001
QRA x Prime	.11	.08	1982	1.32	.19

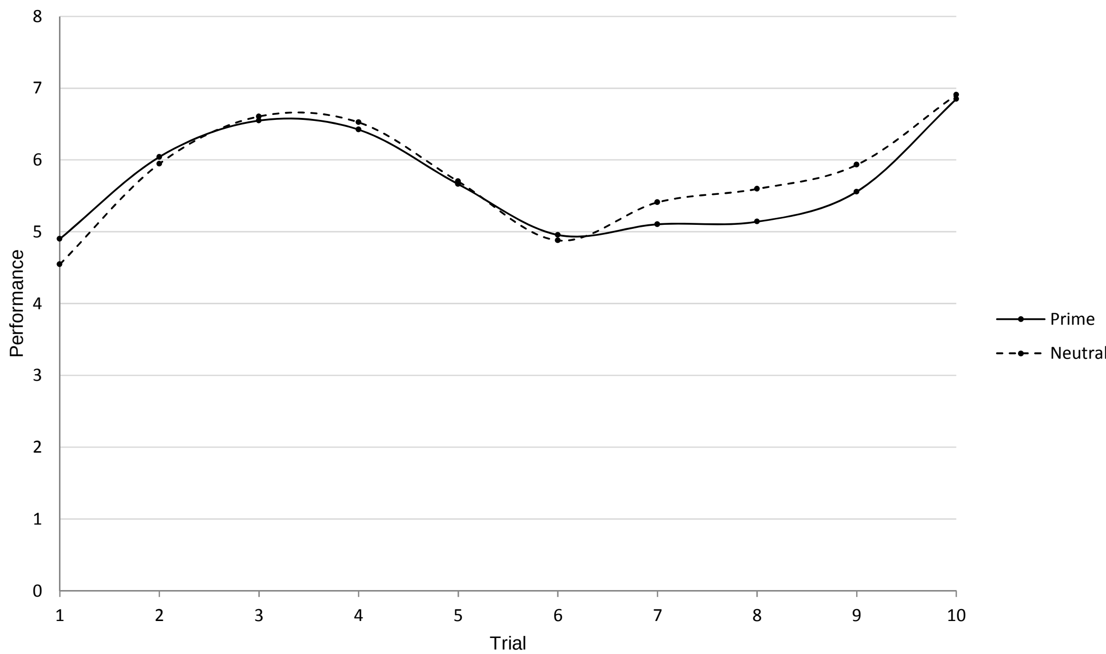
Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Primed Subconscious Goal – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.61	1.90	--					
2. SA	1.82	1.35	-.72	--				
3. TA	7.40	2.72	.25	-.62	--			
4. RA	6.15	2.48	.54	-.42	-.30	--		
5. QSA	.08	.29	.71	-.96	.49	.47	--	
6. QRA	.23	.48	-.19	-.08	.64	-.87	-.01	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.62	2.76	.33	-.70	--			
4. RA	5.90	2.34	.54	-.42	-.18	--		
5. QSA	.09	.30	.73	-.96	.58	.45	--	
6. QRA	.21	.46	-.11	-.17	.59	-.82	.10	--
Residual	2.13	1.46						



Predicted performance as a function of primed subconscious goal – entire sample.



Predicted performance as a function of primed subconscious goal – subset sample.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.20	.29	2346	14.23	< .001
SA	2.06	.27	2346	7.76	< .001
TA	-2.50	.44	2346	-5.73	< .001
RA	-1.59	.48	2346	-3.31	< .001
QSA	-.43	.06	2346	-7.09	< .001
QRA	-.38	.17	2346	-2.25	.02
CRA	.10	.02	2346	4.03	< .001
Level-2 Model					
Sex	.79	.29	259	2.73	.01
Strong	-.02	.35	259	-.05	.96
Weak	.43	.35	259	1.23	.22
SA x Sex	-.33	.26	2346	-1.26	.21
SA x Strong	-.21	.31	2346	-.66	.51
SA x Weak	-.56	.32	2346	-1.76	.08
TA x Sex	-.81	.43	2346	-1.89	.06
TA x Strong	-.06	.51	2346	-.11	.91
TA x Weak	1.04	.52	2346	1.99	.05
RA x Sex	1.59	.42	2346	3.77	< .001
RA x Strong	.25	.51	2346	.49	.62
RA x Weak	-.19	.51	2346	-.37	.71
QSA x Sex	.09	.06	2346	1.42	.15
QSA x Strong	.04	.07	2346	.51	.61
QSA x Weak	.11	.07	2346	1.45	.15
QRA x Sex	-.30	.08	2346	-3.86	< .001
QRA x Strong	-.01	.09	2346	-.09	.93
QRA x Weak	.13	.09	2346	1.43	.15

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

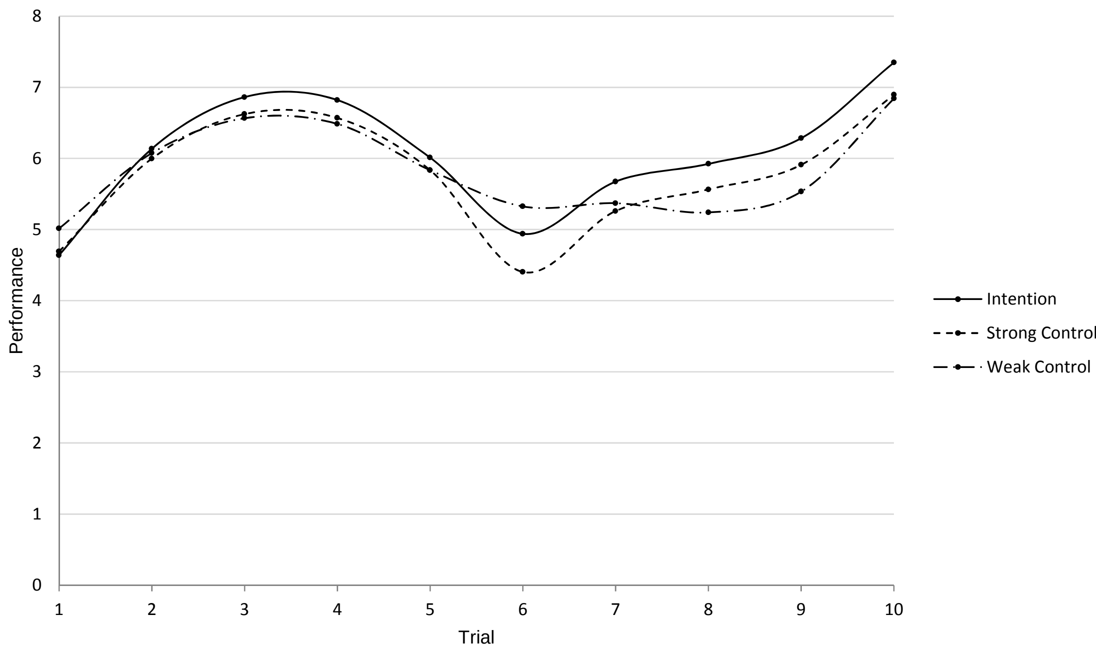
Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.08	.34	1977	12.11	< .001
SA	2.13	.31	1977	6.88	< .001
TA	-2.33	.50	1977	-4.70	< .001
RA	-2.01	.53	1977	-3.78	< .001
QSA	-.45	.07	1977	-6.38	< .001
QRA	-.24	.18	1977	-1.29	.20
CRA	.08	.03	1977	3.03	< .01
Level-2 Model					
Sex	.82	.32	218	2.55	.01
Strong	-.04	.38	218	-.11	.92
Weak	.46	.39	218	1.17	.24
SA x Sex	-.47	.30	1977	-1.59	.11
SA x Strong	-.08	.35	1977	-.24	.81
SA x Weak	-.56	.36	1977	-1.55	.12
TA x Sex	-.60	.47	1977	-1.27	.20
TA x Strong	-.26	.56	1977	-.45	.65
TA x Weak	1.05	.58	1977	1.82	.07
RA x Sex	1.64	.45	1977	3.62	< .001
RA x Strong	.28	.54	1977	.52	.61
RA x Weak	-.05	.55	1977	-.08	.93
QSA x Sex	.12	.07	1977	1.76	.08
QSA x Strong	.01	.08	1977	.07	.95
QSA x Weak	.09	.08	1977	1.14	.25
QRA x Sex	-.28	.08	1977	-3.34	< .001
QRA x Strong	-.03	.10	1977	-.29	.77
QRA x Weak	.11	.10	1977	1.07	.29

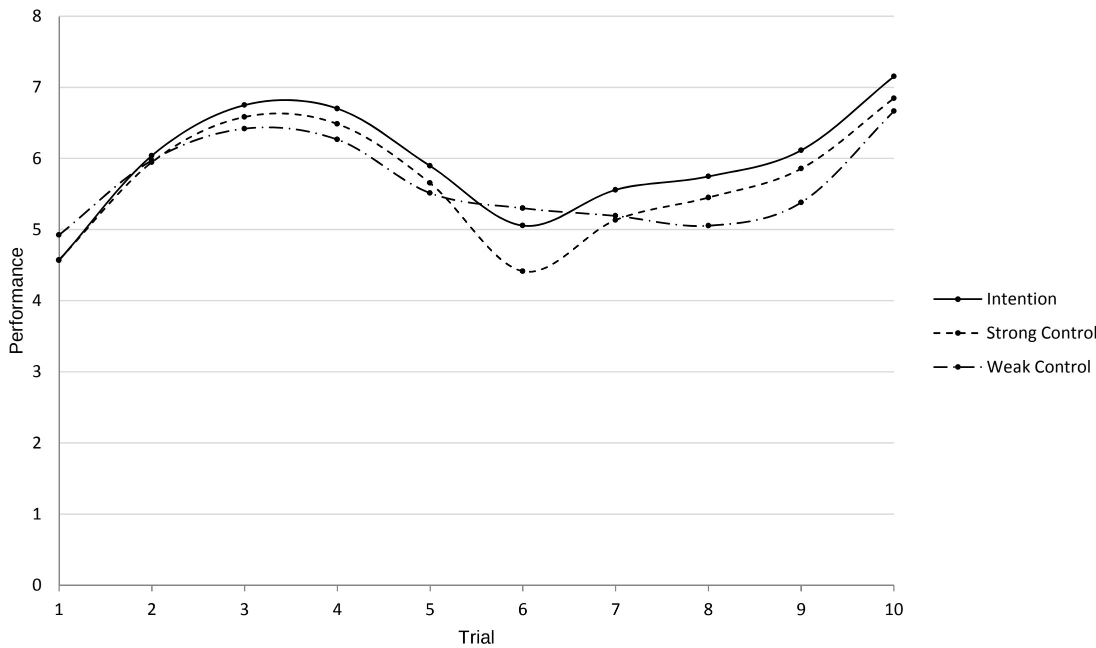
Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of Implementation Intention Condition – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.82	1.35	-.72	--				
3. TA	7.24	2.69	.23	-.61	--			
4. RA	6.15	2.48	.55	-.44	-.30	--		
5. QSA	.08	.29	.71	-.96	.47	.49	--	
6. QRA	.23	.48	-.20	-.07	.63	-.86	-.02	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.40	2.72	.32	-.70	--			
4. RA	5.57	2.36	.55	-.43	-.17	--		
5. QSA	.10	.31	.73	-.96	.57	.46	--	
6. QRA	.22	.47	-.12	-.15	.58	-.82	.09	--
Residual	2.13	1.46						



Predicted performance as a function of implementation intention condition – entire sample.



Predicted performance as a function of implementation intention condition – subset sample.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2351	19.94	< .001
SA	1.79	.20	2351	9.06	< .001
TA	-2.14	.33	2351	-6.55	< .001
RA	-1.55	.38	2351	-4.04	< .001
QSA	-.38	.05	2351	-8.38	< .001
QRA	-.34	.16	2351	-2.12	.03
CRA	.10	.02	2351	4.03	< .001
Level-2 Model					
Sex	.74	.29	260	2.53	.01
Uncertain	.00	.19	260	.02	.98
SA x Sex	-.28	.26	2351	-1.06	.29
SA x Uncertain	-.04	.17	2351	-.22	.83
TA x Sex	-.89	.44	2351	-2.05	.04
TA x Uncertain	-.11	.28	2351	-.38	.70
RA x Sex	1.56	.43	2351	3.67	< .001
RA x Uncertain	.26	.28	2351	.96	.34
QSA x Sex	.07	.06	2351	1.20	.23
QSA x Uncertain	.02	.04	2351	.49	.63
QRA x Sex	-.29	.08	2351	-3.80	< .001
QRA x Uncertain	-.05	.05	2351	-1.09	.28

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.24	.24	1982	17.33	< .001
SA	1.88	.22	1982	8.38	< .001
TA	-1.99	.36	1982	-5.47	< .001
RA	-1.92	.42	1982	-4.60	< .001
QSA	-.41	.05	1982	-8.03	< .001
QRA	-.21	.18	1982	-1.19	.23
CRA	.08	.03	1982	3.01	< .01
Level-2 Model					
Sex	.77	.32	219	2.37	.02
Uncertain	-.06	.21	219	-.30	.76
SA x Sex	-.39	.30	1982	-1.32	.19
SA x Uncertain	-.05	.19	1982	-.27	.79
TA x Sex	-.75	.48	1982	-1.56	.12
TA x Uncertain	-.11	.31	1982	-.36	.72
RA x Sex	1.62	.45	1982	3.58	< .001
RA x Uncertain	.26	.29	1982	.88	.38
QSA x Sex	.10	.07	1982	1.48	.14
QSA x Uncertain	.03	.04	1982	.70	.48
QRA x Sex	-.28	.08	1982	-3.39	< .001
QRA x Uncertain	-.05	.05	1982	-.10	.32

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Uncertainty Scale – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.85	1.36	-.72	--				
3. TA	7.40	2.72	.24	-.62	--			
4. RA	6.10	2.47	.55	-.42	-.30	--		
5. QSA	.08	.29	.72	-.96	.49	.47	--	
6. QRA	.23	.48	-.19	-.09	.64	-.86	-.00	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.76	1.94	--					
2. SA	2.04	1.43	-.77	--				
3. TA	7.56	2.75	.34	-.71	--			
4. RA	5.43	2.33	.54	-.41	-.18	--		
5. QSA	.09	.30	.77	-.97	.60	.44	--	
6. QRA	.22	.47	-.09	-.17	.60	-.83	.10	--
Residual	2.16	1.47						

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Fixed Effects of Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2351	20.00	< .001
SA	1.79	.20	2351	9.10	< .001
TA	-2.12	.32	2351	-6.53	< .001
RA	-1.57	.38	2351	-4.09	< .001
QSA	-.38	.04	2351	-8.43	< .001
QRA	-.33	.16	2351	-2.11	.04
CRA	.10	.02	2351	4.03	< .001
Level-2 Model					
Sex	.75	.29	260	2.58	.01
Learning	-.03	.24	260	-.14	.89
SA x Sex	-.29	.26	2351	-1.09	.28
SA x Learning	-.04	.21	2351	-.17	.87
TA x Sex	-.92	.43	2351	-2.13	.03
TA x Learning	-.03	.35	2351	-.07	.94
RA x Sex	1.59	.42	2351	3.75	< .001
RA x Learning	.28	.34	2351	.81	.42
QSA x Sex	.07	.06	2351	1.23	.22
QSA x Learning	.02	.05	2351	.47	.64
QRA x Sex	-.30	.08	2351	-3.88	< .001
QRA x Learning	-.07	.06	2351	-1.06	.29

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Fixed Effects of Subset Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.24	.24	1982	17.37	< .001
SA	1.88	.22	1982	8.37	< .001
TA	-1.97	.36	1982	-5.44	< .001
RA	-1.94	.42	1982	-4.64	< .001
QSA	-.41	.05	1982	-8.02	< .001
QRA	-.21	.17	1982	-1.18	.24
CRA	.08	.03	1982	3.02	< .01
Level-2 Model					
Sex	.78	.32	219	2.41	.02
Learning	-.16	.26	219	-.62	.53
SA x Sex	-.40	.30	1982	-1.35	.18
SA x Learning	-.03	.24	1982	-.12	.91
TA x Sex	-.78	.48	1982	-1.64	.10
TA x Learning	.04	.39	1982	.09	.93
RA x Sex	1.66	.45	1982	3.67	< .001
RA x Learning	.16	.37	1982	.43	.67
QSA x Sex	.10	.07	1982	1.52	.13
QSA x Learning	.03	.06	1982	.55	.58
QRA x Sex	-.29	.08	1982	-3.48	< .001
QRA x Learning	-.05	.07	1982	-.68	.50

Note. $N = 222$, $k = 2220$. Coef = coefficient; SA = linear skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QSA = quadratic skill acquisition; QRA = quadratic reacquisition adaptability; CRA = cubic reacquisition adaptability.

Discontinuous Growth Mixed-Effects Models Predicting Change in Performance as a Function of I-ADAPT Learning Scale – Random Effects

			Correlations					
Random Effects	Variance	*SD*	1	2	3	4	5	6
Entire Sample								
1. (Intercept)	3.65	1.91	--					
2. SA	1.85	1.36	-.72	--				
3. TA	7.40	2.72	.24	-.62	--			
4. RA	6.10	2.47	.55	-.42	-.30	--		
5. QSA	.08	.29	.71	-.96	.49	.47	--	
6. QRA	.23	.48	-.19	-.09	.64	-.86	.00	--
Residual	2.10	1.45						
Subset Sample								
1. (Intercept)	3.80	1.95	--					
2. SA	2.10	1.45	-.75	--				
3. TA	7.62	2.76	.34	-.71	--			
4. RA	5.52	2.35	.54	-.42	-.18	--		
5. QSA	.09	.30	.74	-.96	.60	.45	--	
6. QRA	.22	.47	-.10	-.17	.60	-.82	.10	--
Residual	2.26	1.47						

Level-1 analyses with sex-identified and goal commitment data.

Level-1 Discontinuous Growth Models of Change Parameters on Performance - Entire Sample

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.25	.16	1572	33.95	< .001
SA	.29	.05	1572	6.42	< .001
TA	-2.04	.19	1572	-10.90	< .001
RA	.20	.06	1572	3.10	< .01
Quadratic Level-1 model					
(Intercept)	4.83	.18	1570	27.21	< .001
SA	1.68	.16	1570	10.78	< .001
TA	-2.65	.21	1570	-12.57	< .001
RA	-1.36	.22	1570	-6.17	< .001
QSA	-.35	.04	1570	-9.29	< .001
QRA	.04	.04	1570	1.14	.26
Cubic Level-1 model					
(Intercept)	4.79	.18	1570	26.20	< .001
SA	1.95	.35	1570	5.51	< .001
TA	-3.04	.41	1570	-7.38	< .001
RA	-1.46	.36	1570	-4.09	< .001
QSA	-.54	.22	1570	-2.38	.02
CSA	.03	.04	1570	.84	.40

Note. N = 175. k =1750. Coef. = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Level-1 Discontinuous Growth Models of Change Parameters on Performance - Subset Sample

Fixed Effects	Unstandardized Coef.	*SE*	*df*	*t*	*p*
Linear Level-1 model					
(Intercept)	5.41	.18	1293	30.22	< .001
SA	.26	.05	1293	5.07	< .001
TA	-1.80	.21	1293	-8.61	< .001
RA	.19	.07	1293	2.64	< .01
Quadratic Level-1 model					
(Intercept)	4.66	.20	1291	23.84	< .001
SA	1.76	.17	1291	10.17	< .001
TA	-2.39	.23	1291	-10.21	< .001
RA	-1.64	.24	1291	-6.68	< .001
QSA	-.38	.04	1291	-9.05	< .001
QRA	.08	.04	1291	1.93	> .05
Cubic Level-1 model					
(Intercept)	4.62	.20	1291	22.89	< .001
SA	2.08	.39	1291	5.28	< .001
TA	-2.91	.46	1291	-6.35	< .001
RA	-1.63	.40	1291	-4.11	< .001
QSA	-.60	.25	1291	-2.38	.02
CSA	.04	.04	1291	.89	.37

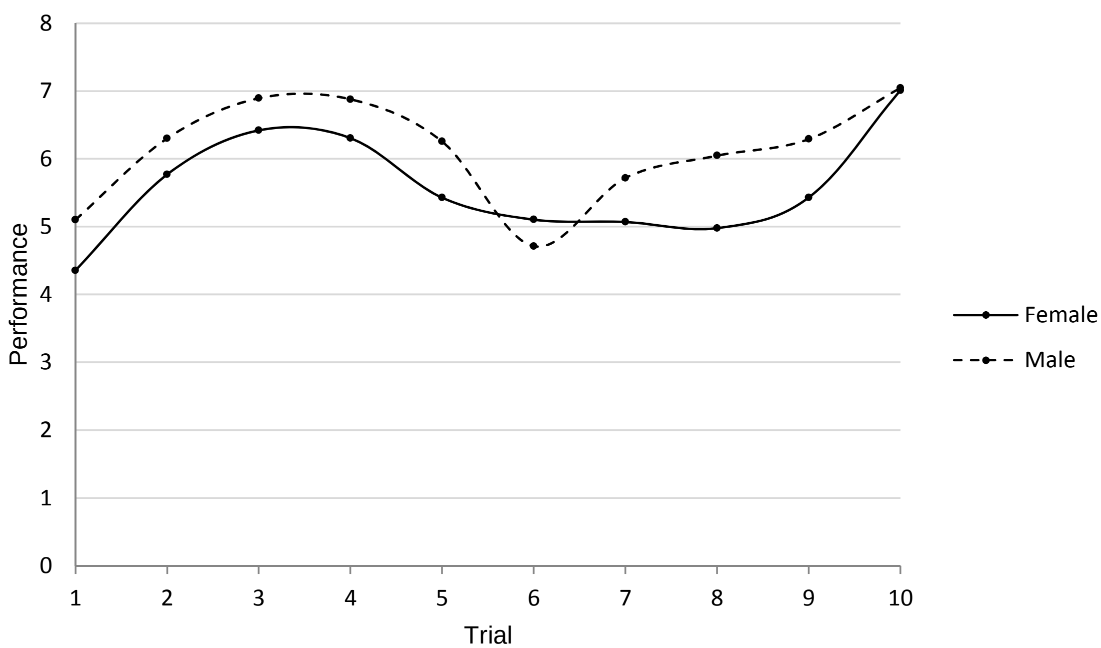
Note. N = 144. k = 1440. Coef. = coefficient; SA = linear skill acquisition; QSA = quadratic skill acquisition; TA = transition adaptability; RA = linear reacquisition adaptability; QRA = quadratic reacquisition adaptability; CSA = cubic skill acquisition; CRA = cubic reacquisition adaptability.

Appendix L

Results for the Sex Model of the Entire Sample

Fixed Effects	Unstandardized Coef	*SE*	*df*	*t*	*p*
Level-1 Model					
(Intercept)	4.36	.22	2357	20.16	< .001
SA	1.80	.20	2357	9.21	< .001
QSA	-.38	.04	2357	-8.59	< .001
TA	-1.97	.32	2357	-6.17	< .001
RA	-2.46	.31	2357	-7.85	< .001
QRA	.27	.06	2357	4.70	< .001
Level-2 Model					
Sex	.75	.29	261	2.59	.01
SA x Sex	-.29	.26	2357	-1.12	.26
QSA x Sex	.08	.06	2357	1.32	.19
TA x Sex	-.92	.43	2357	-2.17	.03
RA x Sex	1.64	.42	2357	3.93	< .001
QRA x Sex	-.31	.08	2357	-4.08	< .001

Note. $N = 263$, $k = 2630$. Coef = coefficient; SA = instantaneous rate of change for skill acquisition; TA = linear transition adaptability; RA = instantaneous rate of change for reacquisition adaptability; QSA = quadratic curvature for skill acquisition; QRA = quadratic reacquisition adaptability.



Interpreting a Discontinuous Growth Model

Recall that the equation of the Level-1 Model is:

$Y_{ti} = \pi_{0i} + \pi_{1i}SA_{ti} + \pi_{2i}TA_{ti} + \pi_{3i}RA_{ti} + \pi_{4i}QSA_{ti} + \pi_{5i}QRA_{ti} + e_{ti}$

Where Y_{ti} is performance, π_{0i} is the intercept (i.e., basal task performance), $\pi_{1i}SA_{ti}$ is the instantaneous rate of change for skill acquisition, $\pi_{2i}TA_{ti}$ is the slope of transition adaptability, $\pi_{3i}RA_{ti}$ is the instantaneous rate of change for reacquisition adaptability, $\pi_{4i}QSA_{ti}$ is the curvature for skill acquisition, $\pi_{5i}QRA_{ti}$ is the curvature for reacquisition adaptability, and e_{ti} is within-person error.

Also, recall that the equation for the Level-2 Model is:

$\pi 0i = \beta_{00} + \beta_{01}Sex + r_{0i}$

$\pi 1i = \beta_{10} + \beta_{11}Sex + r_{1i}$

$\pi 2i = \beta_{20} + \beta_{21}Sex + r_{2i}$

$\pi 3i = \beta_{30} + \beta_{31}Sex + r_{3i}$

$\pi 4i = \beta_{40} + \beta_{41}Sex + r_{4i}$

$\pi 5i = \beta_{50} + \beta_{51}Sex + r_{5i}$

Where $\beta_{00}, \beta_{10},\ldots,\beta_{50}$ represents the average of females in that parameter, $\beta_{01}Sex$, $\beta_{11}Sex,\ldots,\beta_{51}Sex$ is testing how males differ in those parameters, and r_{0i}, $r_{1i},\ldots$, r_{5i} is between-person random effects.

Interpreting Level-1 Model Results

Since females were the reference category, the Level-1 Model represents their results.

The intercept represents that the average performance for females in the first trial was 4.36.

The instantaneous rate of change for the skill acquisition (SA) notes that performance will initially increase with an intention of improving at a rate of 1.80 per trial. However, the quadratic curvature for skill acquisition (QSA) alters this intended slope in Trial 2 by -.38. This curvature diminishes the expected improvement by an exponentially higher rate until the expected performance change becomes negative in Trials 4 and 5.

Due to the coding of parameters, transition adaptability (TA) is relative to SA. Since the value of TA is negative and is a larger absolute value than SA, this means that performance will decrease between Trials 5 and 6 by the difference between the parameters (i.e., 1.80 – 1.97 = -.17).

The instantaneous rate of change for reacquisition adaptability (RA) is relative to SA as well. Since RA is negative and a larger absolute value, this means that performance will initially decrease with an intention of declining from Trial 7 onward at a rate of -.66 (i.e., 1.80 – 2.46). However, the quadratic curvature for reacquisition adaptability (QRA) alters this intention by .27 in Trial 7 and onward.

Interpreting Level-2 Model Results

Since females were the reference category, the Level-2 Model represents the results for males.

The base intercept was 4.36, which is augmented by .75 for males. So the average performance for males in the first trial was 5.11.

The base SA was 1.80, which is augmented by -.29 for males. For males, performance will initially increase with an intention of improving at a rate of 1.51 (i.e., 1.80 – .29) per trial.

The base QSA was -.38 and was augmented by .08 for males. This quadratic curvature of -.30 alters the intended male SA slope in Trial 2 and onward. This curvature diminishes the expected improvement by an exponentially higher rate until the expected performance change becomes negative in Trials 4 and 5.

The base TA was -1.97, which is augmented by -.92 for males to a value of -2.89. Recall that TA is relative to SA. Because these are the results for males, the SA value this is being contrasted to is 1.51. Since TA is negative and is a larger absolute value than SA, this means that performance will decrease between Trials 5 and 6 by the difference between the parameters (i.e., 1.51 – 2.89 = -1.38).

The base RA was -2.46, which is augmented by 1.64 for males to a value of -.82. Since this value is negative and is a smaller absolute value than males' SA (i.e., 1.51), males are expected to improve from Trial 7 onward at a rate of .69 (i.e., 1.51 – .82).

The base QRA was .27, which is augmented by -.31 for males to -.04. So from Trial 7 onward, the rate of improvement is altered by -.04 for males.