The Effect of Subconscious Learning vs. Performance Goals on Performance on a Complex Task

by

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Abstract

This dissertation examined the effect of subconscious goals on performance of tasks that people must acquire knowledge or skill to perform them effectively. Two laboratory experiments were conducted to examine the effect of priming (1) a performance goal, (2) a learning goal, and (3) both a performance and learning goal on performance. In Experiment 1 \((n = 167)\), a 2 (primed performance goal vs. control) x 2 (primed learning goal vs. control) factorial design revealed a significant main effect for priming a learning goal on generating ideas for a complex brainstorming task. In Experiment 2 \((n = 61)\), a 2 (primed performance goal vs. control) x 2 (primed learning goal vs. control) x 3 (trials) repeated measures factorial design showed a significant main effect for priming a learning goal on performance on a complex scheduling task. On the third trial, there was a significant interaction effect between a primed learning and a performance goal on performance. In both experiments, priming a performance goal significantly increased the implicit motive of need for achievement measured by a projective test. No mediating effects were obtained for a primed learning or performance goal with task performance. The results are interpreted within three theoretical frameworks: goal setting, automaticity, and goal systems.
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Chapter 1

Introduction

Latham, Stajkovic and Locke (2010), after reviewing the literature in social psychology on primed goals, concluded that subconscious goals are both relevant to and viable in work settings. Their conclusion was based in part on both a laboratory and a field experiment conducted by organizational psychologists (Stajkovic, Locke, & Blair, 2006; Shantz & Latham, 2009). In their laboratory experiment, Stajkovic et al. found that subconscious goals enhanced the effects of conscious difficult and do-best goals on task performance. In their field experiment, Shantz and Latham found that call centre employees primed with a goal raised significantly more money from donors than those who were not primed. Shantz and Latham (2011) replicated their results in two additional call centers. Their meta-analysis, based on the data obtained from three call centers at three different points of time in three geographical areas, revealed support for the effectiveness of priming a performance goal to increase the job performance of employees.

The present research builds on the emerging subconscious goal literature in four important ways. First, all studies on subconscious goals have only investigated the effect of a primed performance goal on task performance. The effect of a subconscious learning goal on performance, as noted by Latham et al. (2010), has yet to be explored. No experiment has investigated the effect of a primed learning goal on a novel or complex task where people have yet to generate or acquire the requisite knowledge or skill to perform it. Effective performance on tasks that are complex for people requires the discovery of solutions, rather than sheer effort and persistence.
Second, no published study to date has examined the effectiveness of priming both a performance and a learning goal on task performance. As performance is a function of both ability and motivation (e.g., Maier, 1955; Vroom, 1964), given a conscious learning goal’s ability-enhancement function (Winters & Latham, 1996) and a conscious performance goal’s motivation-facilitation mechanism (Locke & Latham, 1990, 2002), the priming of both a learning goal and a performance goal may increase performance on a task that people lack the knowledge to perform effectively. Thus the present research investigated the effectiveness of priming (1) a performance goal, (2) a learning goal, and (3) both a performance and a learning goal on a task where people must acquire knowledge to perform it effectively.

Third, the present research examined three psychological mechanisms that may explain the effect of subconscious goals on task performance, namely, the implicit motive for need for achievement ($n_Ach$) (Atkinson, 1957; McClelland, 1987; Schultheiss, 2008), self-efficacy, and strategy (Winters & Latham, 1996; Seijts & Latham, 2001). Based on implicit motives theory and recent empirical findings that a subconscious performance goal can arouse need for achievement (Shantz & Latham, 2009; Latham & Piccolo, 2012), the present research assessed need for achievement as a mediator through a projective test, namely, the Picture Story Exercise (PSE; McClelland, Koestner, & Weinberger, 1989), after the goal priming intervention, but prior to measuring the dependent variable (Experiments 1 & 2). Goal setting theory (Locke & Latham, 1990, 2002) suggests that self-efficacy and strategy mediate the learning goal-task performance relationship. Automaticity theory (Bargh & Chartrand, 1997) argues that subconscious goals operate in identical ways to conscious goals in affecting behavior. Thus the present research also assessed self-efficacy and strategy as mediators, after the goal priming, but prior to each trial of performing a complex task (Experiment 2).
Fourth, Forster, Liberman, and Friedman (2007) criticized the extant research on subconscious goals. They argued that there is a rival hypothesis that non-goal mental representations have been activated. They suggested as yet untested ways to assess whether it is indeed a subconscious goal that affects behavior. Thus the second laboratory experiment was the first attempt to overcome this limitation of extant research by implementing a novel manipulation check for determining whether a subconscious goal has been set, namely, assessing a participant’s affective arousal.

Overall, the present research differed from previous research on subconscious goals in terms of its choice of (1) independent variables, (2) dependent variables, (3) mediating mechanisms, and (4) manipulation check. As such, it contributes knowledge to both theory and practice in human resource management (HRM), industrial-organizational psychology (I-O), and organizational behavior (OB) in the domain of subconscious motivation. The relevant literature regarding goal setting theory (Locke & Latham, 1990, 2002), automaticity theory (Bargh & Chartrand, 1997, 1999), goal systems theory (Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keppler, 2002; Shah, Kruglanski, & Friedman, 2003), and implicit motives theory (McClelland, 1987; Schultheiss, 2008) are reviewed in Chapter 2 as each provided a theoretical framework for conducting this research. A brief overview of performance measures is also described in this chapter. This literature review forms the basis for the hypotheses formulated at the end of that chapter.

Chapter 3 describes three pilot studies that were conducted for testing the goal priming materials that were used in the two subsequent laboratory experiments. The purpose of the pilot studies was three-fold: (1) to select a photograph for priming a learning goal, (2) to select a
complex brainstorming task, and (3) to examine the effect of two photographs for priming a performance and a learning goal on the need for achievement motive.

Chapters 4 and 5 present the method and results from Experiments 1 and 2, respectively. The primary difference between these two experiments was the choice of task to assess performance, namely, brainstorming (Experiment 1) versus making accurate class schedules (Experiment 2).

Finally, chapter 6 addresses the theoretical contributions and limitations of the present research. Suggestions for future research directions in the emergent field of subconscious goals in HRM, I-O, and OB are given.
Chapter 2

Literature Review

The purpose of this chapter is six-fold. First, Locke and Latham’s (1990, 2002) goal setting theory is reviewed. Second, Bargh and Chartrand’s (1997) automaticity theory is described. Third, Kruglanski and colleagues’ goal systems theory (Kruglanski et al., 2002) is explained. Fourth, the implicit motives theory (McClelland, 1987; Schultheiss, 2008) is examined with an emphasis on the possible mediating effect of need for achievement on the relationship between a subconscious goal and task performance. Fifth, this chapter provides a brief review of task performance measures. Finally, this chapter presents the hypotheses derived from this literature review.

Goal Setting Theory

Locke and Latham (1990) inductively developed a theory of goal setting based on more than four hundred goal setting studies. This theory states that: (1) specific, high goals lead to significantly higher performance than no goals or a vague, abstract goal such as ‘do your best’; (2) given goal commitment, there is a linear relationship between goal difficulty and task performance; and (3) feedback and incentives affect behavior positively only when they result in the setting of and commitment to a specific, difficult goal.

The theory distinguishes between two types of goal content, namely, performance and learning goals (Locke & Latham, 2002). These goals differ from each other in two important ways. First, a performance goal focuses on a specific quantity or quality target to be attained on a task; a learning goal emphasizes the discovery of specific strategies, processes, or procedures for effective performance on a task as opposed to relying on extant knowledge and skill (Seijts & Latham, 2005). Second, while a performance goal, during declarative learning, diverts limited
attentional resources away from mastering the task (Kanfer & Ackerman, 1989), a learning goal shifts attention to the discovery and implementation of task-relevant strategies or procedures (Seijts & Latham, 2001; Seijts, Latham, Tasa, & Latham, 2004). In short, whereas the setting of a performance goal increases one’s motivation to implement one’s knowledge, the setting of a learning goal develops one’s task-related ability through knowledge generation/acquisition resulting in high performance. More importantly, a performance goal and a learning goal affect performance through different mechanisms. Briefly, the mediators of a performance goal are choice, effort, and persistence (Locke & Latham, 1990); the mediators of a learning goal are the development of task strategy and self-efficacy (Winters & Latham, 1996; Seijts, Latham, Tasa, & Latham, 2004). Task strategy and self-efficacy have a reciprocal effect on one another (Seijts & Latham, 2001; Noel & Latham, 2006).

Extant goal setting research has revealed that a performance goal and a learning goal have differential effects on task performance. When people are performing a task that is straightforward for them, learning a strategy is not critical. Rather, setting a specific difficult performance goal increases performance because it focuses on effort and persistence towards goal attainment (Winters & Latham, 1996). A specific difficult performance goal, however, has a detrimental effect on performance when people are performing a task in their initial stages of knowledge acquisition (Kanfer & Ackerman, 1989; Earley, Connolly, & Ekegren, 1989; Seijts & Latham, 2001). In fact, both Winters and Latham (1996) and Seijts and Latham (2001) found that participants with a ‘do your best’ goal outperformed those assigned a specific, difficult performance goal on a complex class-scheduling task that they had yet to master. The primary explanation for this finding is that when knowledge acquisition, rather than motivation, is essential to effectively performing a task, setting a specific, difficult performance goal can lead
people to focus on the potential negative consequences of failure rather than developing the effective task-relevant strategies or procedures to attain their goals (Brown & Latham, 2002).

Winters and Latham (1996) were the first to find that setting a specific learning goal leads to significantly higher performance on a task that is complex for people than either an assigned performance goal or a vague “do-your-best” goal. They also found that participants assigned a learning goal developed significantly more effective task strategies than those assigned either a performance or a do-best goal. Self-efficacy in the learning goal condition was significantly higher than it was in the do-best condition. Consistent with Winters and Latham, Seijts and Latham (2001) found that a specific, difficult learning goal led to higher performance than urging people to ‘do their best.’ In addition, they found that setting a learning goal led to significantly higher goal commitment than did setting a performance goal. They attributed this effect to the increase in self-efficacy across task trials in contrast to a decrease in self-efficacy in the performance goal condition. Finally, they found that discovering the strategies necessary to effectively perform the task increased self-efficacy.

In another laboratory experiment involving a complex stock market prediction task, Drach-Zahavy and Erez (2002) found that participants assigned a learning goal had significantly higher adaptation to change and better performance than those assigned either a difficult performance or a ‘do-best’ goal. Similarly, using a complex business simulation, Seijts et al. (2004) found that a specific high learning goal led to higher performance than did a specific performance goal or a do-best goal. Kozlowski and Bell (2006) found that trainees with learning goals for performing a complex computer-based radar-tracking simulation training program engaged in significantly more self-regulatory activities (more exploratory practice focus) than those with performance goals. Finally, Noel and Latham (2006) examined the effect of goal
setting on entrepreneurial behavior in starting up and maintaining a business through a complex simulation. They found that participants who had a learning goal managed to keep their simulated firms running significantly longer than those who had a performance goal.

Results of laboratory experiments of goal setting typically generalize to field settings (Latham & Lee, 1986; O'Leary-Kelly, Martocchio, & Frink, 1994). In a field experiment, Latham and Brown (2006) found that first year MBA students who set specific difficult learning goals in their first week of classes had significantly higher satisfaction with the MBA program and obtained a significantly higher GPA at the end of the academic year than those who set a specific high distal performance goal or those who were urged by the Dean to do their best to obtain a meaningful MBA education.

To date, research on goal setting theory has primarily focused on conscious cognitive processes that affect behavior. It has ignored the subconscious as a storehouse of knowledge beyond that found in awareness at any given point in time (Locke & Latham, 2002, 2005). Nevertheless, Latham and Locke (2007) acknowledged the theoretical and practical significance that subconscious goals might have on task performance. This is because people can only allocate and process a limited amount of information consciously, and a subconscious goal consumes minimal cognitive resources (Anderson, 1985). Thus, a subconscious goal should be an asset for employees who perform tasks that tax their cognitive resources. Either a subconscious performance goal or a subconscious learning goal may lead to significantly higher performance than priming no goal. As the cognitive resources one possesses are limited, those resources, when not being consumed by a conscious goal, should benefit other mental activities that are advantageous to effective task performance. Consistent with goal setting theory, a
primed learning goal may lead to significantly higher performance than a primed performance goal on a task that requires knowledge acquisition or skill development.

To date, limited research on conscious goal setting has examined the effect of setting both a performance and a learning goal simultaneously on performance of a complex task. Noel (1997) found that the addition of a performance goal hurt rather than helped the performance of groups relative to those with only a learning goal. This is because setting both goals depleted cognitive resources. Nevertheless, at the subconscious level, a primed learning and a primed performance goal may be beneficial because their respective mental representations are automatically formed; hence they consume minimal cognitive resources. Thus they might lead to higher performance than priming either goal alone. A primed performance goal might automatically “follow” a primed learning goal to increase task performance. Kruglanski and colleagues’ goal systems theory (Kruglanski et al., 2002; Shah et al., 2003) offers a theoretical framework for hypothesizing this possibility. A review of this literature is provided in a later section in this chapter.

**Automaticity Theory**

Automaticity theory states that goals can be activated subconsciously, and pursuit of a goal can occur outside of conscious awareness (Bargh, 1994; Bargh & Chartrand, 1997, 1999; Bargh, Gollwitzer, & Oettingen, 2010). Because a goal is a mental representation, it can be activated by situational cues or naturally occurring environmental stimuli through the technique of priming (Bargh, 1994; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001; Higgins, 1996). Social psychologists currently use *priming* as a technique or procedure to exert a passive influence on an individual’s thoughts, feelings, and behavior through either exposing participants to an environmental stimulus or cue, or instructing people to engage in an unobtrusive priming
task (Bargh & Chartrand, 1997). Individuals are neither aware of, nor able to control the influence of such stimuli on their behavior (Bargh, 1994; Bargh, Gollwitzer, & Oettingen, 2010). In short, priming activates goal-dependent automatic processes (Bargh & Chartrand, 1997).

Social psychology experiments on priming over the past two decades suggest that primes can activate a variety of attitudes and complex social, physical behaviors without an individual’s intent to react, respond or behave in a certain way, and without awareness of their influence or consequences (Bargh, 2006; Bargh et al., 2010). Trait constructs or knowledge structures that have been primed affect an individual’s attribution and encoding of ambiguous social behavior (e.g., aggression, stereotypes; Bargh, Chen, & Burrows, 1996). Social norms have been primed to guide or channel behavior within a given situation, without conscious awareness (Aarts & Dijksterhuis, 2003). Goals have been primed to increase performance, to cooperate with an opponent, or to be egalitarian (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001; Moskowitz, Gollwitzer, Wasel, & Schaal, 1999). Emotions have been primed to affect reactions to subsequent, unrelated stimuli (Lerner, Small, & Loewenstein, 2004). Cognitive procedures have been primed to facilitate finding effective solutions to subsequent problem-solving that benefit from using the same cognitive process (Kirmani, Lee, & Yoon, 2004). Finally, even deep cultural ideologies have been primed to affect bicultural individuals’ attribution, perception, and judgement (Nisbett, 2003).

Taken together, extant priming research suggests that nearly all forms of social representation can be primed to influence subsequent behavior without an individual’s awareness of this influence (Bargh, 2006). A critical difference between conscious and unconscious goal pursuits is that: “unlike unconscious goal strivers, conscious goal strivers know why they do what they do” (Bargh et al., 2010, p. 299). Bargh et al. concluded that conscious and
subconscious goal pursuits follow the same processing stages, predict the same phenomenal qualities, and produce the same outcomes. The following section reviews priming techniques, relevant social psychology experiments on automaticity, and subconscious goal experiments on organizational behavior.

**Priming**

Priming techniques are either **supraliminal** or **subliminal**. In supraliminal priming, participants are presented the priming stimulus as part of a conscious task; however, they are unaware of the potential influence of the prime on their subsequent affect or behavior (Bargh & Chartrand, 1997). By contrast, in subliminal priming, participants are exposed to a stimulus below perceptual threshold. Hence they are unable to verbally identify the nature of the subliminally primed material. Supraliminal and subliminal priming manipulations result in the same behavioral outcomes (Bargh & Chartrand, 1997).

Zhong and DeVoe (2010) used both subliminal and supraliminal priming techniques to explore how incidental exposure to fast food induces impatient behavior. In Experiment 1 (subliminal priming), they used a computer to flash a series of six fast food logo images (McDonald’s, KFC, Subway, Taco Bell, Burger King, and Wendy’s) for 12 miniseconds. Consistent with prior subliminal priming experiments, they found that the conscious mind cannot recognize flashed stimuli at this speed. Yet, such flashing images, processed at a subconscious level, influence behavior (Bargh, Chen, & Burrows, 1996). Participants subliminally primed by the fast food logo had significantly faster reading speed than those primed by blank images (control condition). In Experiment 2 (supraliminal priming), participants were asked to recall either a time they had a meal at a fast-food restaurant (priming condition) or the last time they did grocery shopping (control). Participants primed with the fast-food memory recall task
demonstrated significantly higher desirability towards time-saving products than did those in the control condition. These results suggest that the two priming techniques affect behavior similarly.

Chartrand and Bargh (2002), however, have criticized subliminal priming due to its lack of ecological validity relative to supraliminal priming. An advantage of supraliminal priming in terms of ecological validity is that it occurs naturally in the environment so that people are consciously aware of it, but unaware of its potential consequences for their behavior. Consistent with Latham and colleagues (Shantz & Latham, 2009, 2011; Latham & Piccolo, 2012), the present research used supraliminal priming of goals through the presentation of a photograph. As such, findings from this research can be more easily and readily applied to work settings than subliminal priming. The following section reviews automaticity research that used supraliminal priming techniques.

*Automaticity Research in Social Psychology*

Using photographs as a prime, Aarts and Dijksterhuis (2003) conducted three experiments examining whether the activation of situational norms can guide social behavior automatically. In Experiment 1, participants were randomly assigned to one of six conditions in a 3 (prime: goal-control vs. non-goal-library vs. goal-library) x 2 (silence vs. control words) factorial design. They found that when participants were exposed to a library picture and assigned a goal of visiting the library (goal-library condition), they responded to concepts related to normative library behavior (i.e., being silent, quiet) significantly faster than those in the other two conditions. No significant difference between the goal-control and non-goal-library conditions was found. In Experiment 2, using the same factorial design as used in Experiment 1, they found that participants in the goal-library condition spoke significantly softer than did those
in the other two conditions. Again, no significant difference between the goal-control and non-goal-library conditions was found. In Experiment 3, their hypothesis was tested in a different context. Participants were randomly assigned to either the goal-control prime or goal-restaurant prime condition. They found that participants who were primed with a picture of an exclusive up-scale restaurant and were told that they would visit the restaurant (goal-restaurant prime) demonstrated well-mannered behavior (i.e., cleaning up their table while eating crumbly cookies) significantly more often than did those in the control condition. In none of these experiments were the participants aware of the effect of the photographs (normative behavior prime) on their subsequent behavior.

Similarly, Fishbach, Friedman, and Kruglanski (2003, Study 5) manipulated environmental cues by presenting magazines and posters with three varying themes: exercise and dieting, high-fat food, and geography and politics (control). Participants were randomly assigned to one of the three conditions. Results showed that participants primed with diet, as well as those primed with food, had a significantly higher likelihood of choosing an apple over a Twix bar than those in the control group. This finding suggests that the environmental stimuli of presenting magazines activated a goal of keeping fit, thereby affecting their food choice.

Additional research has shown that the mere activation of a mental representation can automatically affect subsequent goal-directed behavior. Fitzsimons and Bargh (2003) conducted a series of experiments to examine the effect of priming people’s interpersonal relationship on subsequent goal-directed behavior in line with that relationship. In their field experiment conducted in a large international airport (Study 1), volunteer travellers were first exposed to a supraliminal priming task that involved answering a series of questions related to either their friend or a coworker. Next, they were asked if they would help with a longer study. Results
showed that people in the friend condition were three times more willing to help than those in the co-worker condition. The mere act of thinking of a friend as a prime led to helping behavior in the absence of the participants’ conscious awareness. Replicating this effect in a different type of relationship (child-mother) and a different interpersonal goal (to make one’s mother proud), in Study 4a they found that participants primed with thinking of mother had significantly higher task performance than those in the control condition. Taken together, these results suggest that subconsciously activated goals associated with an individual’s significant other affect subsequent goal-directed behavior.

In still another study, Harris, Bargh, and Brownell (2009) investigated the effect of television advertising as a “real-world” prime on an individual’s eating behavior. In Experiment 1, children were randomly assigned to watch a cartoon with either food advertising or other types of non-food advertising. All participants were given a snack while watching. They found that children in the food-advertising prime condition ate significantly more crackers while watching television than did those in the nonfood control condition. In addition, they found that a child’s demographic characteristics including age, weight status, and ethnicity did not moderate the consumption of crackers. Only a main effect for advertising was found. Replicating this result with adults, in Experiment 2, they found that participants who saw snack ads ate significantly more food than did control participants. Also, participants who saw snack ads ate for a significantly longer amount of time compared to control participants. During the debriefing following Experiment 2, most participants reported that they were aware of the advertising and believed the authors’ cover story that the study was concerned with the effect of television content on mood states; they were not aware of how a prime affected their intake of food.
Although social psychologists have been investigating subconscious goals through priming for two decades (Bargh, 2006), research on the effect of subconscious goals on organizational behavior has not been conducted until recently (Latham, Stajkovic, & Locke, 2010). The following section reviews this emerging line of research.

Effect of Subconscious Goals on Organizational Behavior

Following Locke and Latham’s (2004) recommendation to examine subconscious motivation on task performance, Stajkovic, Locke, and Blair (2006) conducted the first laboratory experiment to examine the effect of a primed subconscious goal, and a specific conscious goal on task performance. Social psychology experiments that compared conscious and subconscious goals did not include conscious goals that were specific, let alone difficult. Rather, the conscious goals in those experiments were vague (e.g., focus on quality).

In their experiment, participants were either asked by Stajkovic et al. to construct grammatically correct sentences that included achievement-related (prime) or achievement-neutral words (control). Subsequently, participants performed a brainstorming task, a commonly used task in work settings, to generate ideas for uses for a wire coat hanger. Results showed that participants in the primed condition generated significantly more ideas than did those in the control condition. In their subsequent laboratory experiment, a 2 (achievement prime vs. no prime) x 3 (conscious easy, do your best, and difficult goals) factorial design revealed a main effect for both the subconscious and the specific conscious goal conditions. Consistent with previous automaticity experiments, no participant showed any awareness of the hypothesis that constructing achievement-related sentences had a beneficial effect on their performance.

Based on Stajkovic et al.’s (2006) finding that a primed goal and a conscious goal have additive effects on task performance, Shantz and Latham (2009) conducted a field experiment in a
call centre involving employees soliciting money from donors. Participants were randomly assigned to one of four conditions in a 2 (primed goal vs. no prime) x 2 (conscious, specific goal vs. ‘do your best’) factorial design. They used a photograph of a woman winning a race to prime the performance goal. They found that employees who were assigned a conscious difficult goal raised significantly more money than those who were urged to do their best. In addition, employees who were primed with the photograph also solicited significantly more money than did those in the control group. No interaction effect was found. Finally, no employee indicated an awareness of the hypotheses.

Following the same procedure, Shantz and Latham (2011) replicated their results regarding a subconscious goal in two additional call centers. Their meta-analysis of the data obtained from the three different field settings at three different time periods provide support for the effectiveness of priming a goal to enhance job performance. Again, none of the employees from the two call centers indicated any awareness of the hypothesis that the primed goal increased their job performance. Taken together, these studies on the subconscious goal-task performance relationship lend support for Latham and Lee’s (1986) conclusion that goal setting findings from laboratory experiments generalize to field settings, and Bargh et al.’s conclusion that subconscious goals affect behavior in the same way as conscious goals.

Based on goal setting theory, Latham and Piccolo (2012) examined whether a context specific prime and a general achievement prime differ in their effect on job performance. They randomly assigned call center employees to a condition where the employees viewed a photograph of people making telephone calls in a call center, or the woman racer. They found that both a subconscious context specific goal and the general achievement prime led to a significant increase in job performance relative to those individuals randomly assigned to the
control group. Consistent with goal setting theory, those with a context specific goal performed better than those with a general achievement goal. Both primes aroused the implicit need for achievement relative to the control group. Again, none of the participants showed an awareness of the primes in terms of their effect on performance.

To date, both social and organizational psychology experiments on the subconscious goal-task performance relationship have only investigated the effect of a subconscious performance goal on task performance. These studies in organizational psychology have primed need for achievement either by semantic priming (e.g., through finding achievement words in a word matrix) or by using a naturally occurring environmental stimulus (e.g., through presenting a photograph of a person winning a race). No study has been conducted to test the effect of a primed learning goal on performing a task that is complex for people, where the generation or acquisition of knowledge rather than sheer effort and persistence is necessary for goal attainment.

Following Shantz and Latham’s (2009) recommendation, the present research used the photograph of Rodin (The Thinker) to prime a learning goal. As noted earlier, Bargh et al. (2010) argued that a goal-priming manipulation produces the same effect on behavior as does conscious pursuit of the same goal. Consistent with their argument, and goal setting theory, the present research hypothesized that priming a learning goal increases performance on a task that is complex for people. Although Noel (1997) found that assigning both a specific conscious performance and learning goal decreased performance on a task that was complex for people, the present research hypothesized that priming both goals is beneficial for performance because, as noted earlier, primed goals consume minimal cognitive resources (Anderson, 1985). This hypothesis is based on goal systems theory (Kruglanski et al., 2002; Shah et al., 2003).
Goal Systems Theory

Goal systems theory (Kruglanski et al., 2002; Shah et al., 2003) states that goal concepts are knowledge structures governed by general cognitive principles. The theory defines goal systems as “the mental representations of motivational networks composed of interconnected goals and means” (Kruglanski et al., 2002, p. 333). The theory also states that different goal systems can be activated through priming. Depending on the strength of activation, some cognitive elements in the goal systems may enter conscious awareness as focal goals, while others may not be consciously registered but nevertheless exist as background goals. For example, one might feel that one needs to study harder to achieve higher academic performance (focal), while being unaware that a significant other is also a causal variable (background).

Shah, Friedman, and Kruglanski (2002) examined the “goal shielding” effect that occurs when the activation of focal goals to which the individual is committed inhibits the accessibility of alternative goals. They found that inter-goal inhibition occurs automatically, outside conscious awareness (Studies 2–5). In one study (Study 6), participants were first informed that they would engage in an anagram task to assess their verbal fluency, and then would take an additional object-use test to assess their analytical skills. Next, they performed the anagram task (focal task goal) on multiple trials. While performing the task, the participants were subliminally primed with words related to the anagram task (e.g., anagram, verbal), or the object-use task (e.g., object, analytic), or words unrelated to either the focal task goal or the alternative goal (e.g., finger, spacebar). Results revealed that when the primed background goals were unrelated to the focal task of solving anagrams, the primed background goal “pulled participants’ attention away from their conscious goal pursuit thus lowering performance and persistence on the focal task” (Shah, Kruglanski, & Friedman, 2003, p. 254). By contrast, when the two goals were
related, “the primed background goal served as a reminder of participants’ conscious focal goal, and enhanced persistence and performance on the task seen as a means to attaining that goal” (p. 255). Taken together, these findings suggest that intergoal inhibition yields “self-regulatory benefits by shielding a focal pursuit from the potential distraction posed by ready alternative goals” (p. 1263).

Of particular relevance to the present research, the goal shielding effect suggests that priming a learning and a performance goal may be beneficial to an individual’s performance of a task people perceive to be complex. As noted earlier, unlike simultaneously setting a conscious learning and a performance goal, priming both goals may not tax cognitive resources. The goal shielding mechanism suggests that when a primed learning and a performance goal are focused on the same task, performance may increase. For example, an individual who has yet to acquire the requisite skills to perform a task effectively may initially inhibit the performance goal automatically until the requisite knowledge has been acquired. Once ability to perform the task is no longer an issue, the primed performance goal may automatically become the focal pursuit with the primed learning goal in the background.

In addition to the abovementioned goal shielding mechanism, Shah et al.’s (2002) notion of contextual relativity of goal interrelations may further explain the beneficial effect of priming both a learning and a performance goal for performing a complex task. Facilitatively interrelated goals serve as “means to each other’s attainment”; substitutively interrelated goals serve as “means to the same overarching objective” (p. 1263).

In a complex task context, a learning and a performance goal can be both facilitatively and substitutively interrelated to each other as an individual learns to perform effectively. The second experiment, for example, dealt with performing a complex task that met three criteria of
complexity: component complexity, coordinative complexity, and dynamic complexity (Wood, 1986). Given a large amount of task instructions, rules, and information (component), the participants had to integrate cues in judgment, coordinate simultaneous information (coordinative), and adapt to on-going changes in information cues (dynamic) to perform effectively. With both goals primed, an individual may automatically pursue a learning or a performance goal whenever the individual deems it instrumental to increasing their task performance outside of awareness. No study in social or organizational psychology to date, however, has examined the effect of priming a learning and a performance goal on performing a task where ability has yet to be acquired. Thus, it was hypothesized that there is a significant interaction effect between a primed learning and a performance goal on performance of a task requiring the generation or acquisition of knowledge.

A limitation of research based on automaticity and goal systems theories is that, to date, psychological mechanisms underlying the subconscious goal-performance link remain unclear (Aarts, Custers, & Holland, 2007; Stajkovic, Locke, & Blair, 2006). To fill this gap in the literature, the present research used implicit motives theory (McClelland, 1987, 1989; Schultheiss, 2008) as a framework to examine the possible mediating variable that may explain the effect of a subconscious goal on task performance. Given that implicit motives are influential determinants of human behavior that operate outside of conscious awareness (Schultheiss, Strasser, Rosch, Kordik, & Graham, in-press), the present research integrated goal setting and implicit motives theories to generate hypotheses on subconscious goal pursuit on a task where people have yet to acquire the requisite knowledge to perform it effectively. Specifically, based on both theory and empirical research, the present research assessed the potential mediating role of the implicit motive of need for achievement (n Ach) on the subconscious goal-task
performance relationship. This variable was chosen because the majority of priming experiments by Bargh and his colleagues (e.g., Bargh, Chen, & Burrows, 1996; Bargh & Chartrand, 1997, 1999) have involved creating achievement related words from anagrams or circling achievement words in a word matrix. Moreover, a laboratory experiment by Shantz and Latham (2009) and a field experiment by Latham and Piccolo (2012) found that a primed (performance) goal increased the subconscious need for achievement.

Despite the past 60 years of on-going research and theoretical development in social psychology, the theory of implicit motives has garnered limited attention in HRM, I-O, and OB. An exception is Kehr’s (2004) “compensatory” theoretical model of work motivation, according to which “congruence of implicit motives, explicit motives, and perceived abilities is associated with flow experience” (p. 489). Consistent with Kehr’s model, Kanfer (2009) called for research on implicit motivation in the workplace. Johnson and Tan (2009) too have argued why an understanding of implicit motives is relevant to work settings. They argued that multi-tasking in the modern workplace easily consumes and depletes an employee’s cognitive resources. Due to the increasing work demands placed on cognitive resources, “processing in the explicit motive system becomes prohibitive, which leaves processing responsibilities in the hands of the implicit motive system” (p. 104). Consequently, the implicit motive system often has “a larger impact on behavior because, as the default [information] processing mode, it operates automatically and on a faster time scale than the explicit system” (p. 103). The following section reviews the theory of implicit motives.
Implicit Motives Theory

“I never put much faith in what people say their values are on questionnaires, because I don’t believe that these statements bear very much relationship to what they in fact do or even to the values that implicitly guide their lives. This also gave me a strong belief in the reality of unconscious values or motives, which were obviously affecting what they did in ways that were quite unknown to themselves” (McClelland, 1984, p. 4, italics in original).

Defined as “motivational dispositions that operate outside of a person’s conscious awareness” (Schultheiss, 2008, p. 603), implicit motives influence physiological, cognitive, affective, and behavioral responses to incentives (Schultheiss & Brunstein, 2010). As “enduring nonconscious needs that drive humans’ behavior toward the attainment of specific classes of incentives” (Schultheiss & Brunstein, 2010, p. ix), implicit motives differ from explicit motives in terms of their measurement, antecedents and behavioural correlates.

Implicit versus Explicit Motives

Implicit motives operate outside conscious awareness; they cannot be measured through self-report (McClelland, Koestner, & Weinberger, 1989; Schultheiss & Pang, 2007; Schultheiss & Brunstein, 2010). Rather, implicit motives are measured by a projective test. The initial projective test for assessing implicit motives is the Thematic Apperception Test (TAT) developed by Morgan and Murray (1935). Briefly, participants are asked to write an imaginative story about each of a set of 31 picture cue cards. As such, the TAT stimulates “literary creativity and thereby evoke[s] fantasies that reveal covert and unconscious complexes” (Murray, 1938, p. 530).

Based on the principles of the TAT, McClelland developed an assessment tool of implicit motives called the Picture Story Exercise (PSE; McClelland, Koestner, & Weinberger, 1989). Similar to the TAT, the PSE instructs participants to write imaginative stories about a series of
photographs featuring people in various social situations (Schultheiss & Pang, 2007). The PSE differs from the TAT in three important ways. First, the PSE pictures were obtained from magazines and other print sources. They feature more current, everyday contexts than the TAT cards that were designed and chosen for clinical psychology purposes. Second, unlike the TAT that is usually conducted by a clinician during individual clinical interviews, the PSE is administered in neutral, usually group testing conditions. Third, the scoring of the PSE protocols is done according to objective scoring criteria as opposed to clinician assessments (Pang, 2006, 2010a). Thus, the PSE is an approach to “studying and measuring motivations systematically and scientifically” (Pang, 2010b, p. 32).

The PSE involves experimentally arousing the relevant motive (e.g., $n_{Ach}$), and then examining differences in the motive imagery in stories written in motive arousal conditions versus those generated in neutral conditions (McClelland, Atkinson, Clark, & Lowell, 1953; McClelland, Clark, Roby, & Atkinson, 1949; Pang, 2010b). Empirical research shows that “situational arousal of a motivational need is associated with characteristic changes in thought content” (Schultheiss & Brunstein, 2010, p. xviii). Because subconscious thought content, as manifested in imaginative picture stories, changes as a function of arousal (Atkinson & McClelland, 1948), Schultheiss and Brunstein (2010) argued for the use of the PSE for measuring implicit motives. The present research followed this tradition, using the PSE to assess need for achievement.

Studies have consistently found little overlap between the PSE and explicit measures (e.g., self-report questionnaires) of motives across the thematic content domain of motivation (i.e., power, achievement, affiliation) (Schultheiss, Yankova, Dirlikov, & Schad, 2009; Schultheiss, Rosch, Rawolle, Kordik, & Graham, in-press). The first study comparing the
validity of implicit and explicit measures of need for achievement was conducted by deCharm, Morrison, Reitman, and McClelland (1955). They found that the implicit and explicit measures shared no significant variance overlap. Consistent with this finding, Spangler’s (1992) meta-analytic study showed that the PSE and self-report questionnaire measures of achievement motivation had an average variance overlap of less than 1%. Collins, Hanges, and Locke (2004) performed a meta-analysis of all known studies using projective tests and a self-report personality questionnaire as predictors of entrepreneurial success. The intercorrelation among them was low, yet all had a low but significant correlation with the criterion. They concluded that the projective and self report measures were assessing different, albeit unknown, aspects of achievement motivation. Howard (2005) found that a composite measure of three projective tests, one of which was the TAT, had incremental validity with a measure of a specific conscious goal and job advancement over a 25-year time span, even when cognitive ability was controlled. Similarly, across cultures, studies have reported typically low correlations between the PSE and questionnaire measures of achievement motivation (e.g., .06 with 195 German students, Schultheiss & Brunstein, 2001; .02 with 323 American undergraduates, Pang & Schultheiss, 2005). In a recent review of more than 50 years of studies, Schultheiss (2008) found close-to-zero correlation between PSE measures and self-reports of a given motivational domain. Finally, Schultheiss, Yankova, Dirlikov, and Schad (2009) found that the correlation between the two measures was not significant even when the explicit measure was made as similar as possible to an implicit measure.

Finally, implicit and explicit motives respond preferentially to different types of stimuli or cues, and predict different kinds of behavior (Schultheiss & Brunstein, 2010; Schultheiss & Pang, 2007; Schultheiss, 2008; Schultheiss et al., in-press). Schultheiss and colleagues’
information-processing model of implicit and explicit motives states that implicit motives are “more likely to become engaged by nonverbal cues than by verbal cues” (Schultheiss, 2008, p. 612). For example, exposure to an achievement-oriented experimenter increased participants’ achievement motivation (assessed by the PSE) even when the participants could not hear the experimenter’s verbal instructions (Kilnger, 1967).

Need for Achievement (n Ach)

McClelland and his colleagues’ empirical research on the need for achievement forms the basis of the theory of implicit motives. In testing this theory, researchers typically experimentally arouse the relevant motive, assess the effects of motive arousal, and then examine the subsequent motive-motivated processes and outcomes (McClelland, Atkinson, Clark, & Lowell, 1953). In the early 1950s, the implicit motive of need for achievement (n Ach) became the focus of McClelland’s research due to his hypothesis that this particular need explains success in life and work (McClelland & Winter, 1969; Schultheiss & Brunstein, 2010). Thus, need for achievement may be a mediating variable for both a subconscious learning and a performance goal and their relationship with performance. Empirical research supports this inference.

Referred to as “a nonconscious and recurrent preference for affectively rewarding experiences related to improving one’s performance,” need for achievement is an acquired drive that is based on instrumental responses directed by human sensory effect (Pang, 2010b, p. 30). McClelland et al. (1953) argued that over time, people develop instrumental approach tendencies associated with pleasure. McClelland (1961) found that implicit achievement motivation motivates people to choose activities that increase skills (i.e., ability) and effort (i.e., motivation), provide moderate challenge and risk, and provide clear performance feedback. Empirical research has shown that a high need for achievement motive predicts significantly higher
performance on learning (i.e., ability) and speed (i.e., motivation) on scrambled word tasks (Lowell, 1952), as well as better performance on anagram tasks (Raynor & Entin, 1982), paired associate tasks (Karabenick & Yousseff, 1968), and general academic performance (O'Connor, Atkinson, & Horner, 1966).

Implicit Motives Assessed in Organizational Behavior

No experiment in the social psychology literature has investigated whether a primed goal affects the subconscious, that is, an implicit motive. The investigators were only interested in showing that a primed goal affects behavior in the absence of an individual’s awareness of the goal-performance relationship. Consequently, recent research on subconscious goals in HRM, I-O, OB used implicit motives theory as a framework for examining the relationship between priming a goal and task performance. In a laboratory experiment, Shantz and Latham (2009) randomly assigned college students to either a primed performance goal of a photograph showing a woman winning a race or a control condition. They found that participants who were primed with the photograph wrote stories using significantly more achievement-related words than did those in the control condition. Consistent with this finding, Latham and Piccolo (2012) found that employees primed by the photograph of people making calls (context specific prime) had significantly more work and money related imagery words in their written stories than did those in the general achievement prime condition. Consistent with implicit motives theory, these results suggest that priming a goal through a photograph increased the use of words related to that goal-related theme used in participants’ stories.

Consistent with implicit motives theory, the present research focused on the hypothesized mediating role of the implicit motive of need for achievement (n Ach) for explaining the subconscious goal-task performance relationship. However, the present research differed from
the experiments by Latham and his colleagues in terms of the independent variables (priming a performance goal alone, priming a learning goal alone, and priming both goals) and dependent variable (performance on a task where people must generate or acquire knowledge to perform effectively). Moreover, to measure the implicit motive of need for achievement, the PSE rather than the TAT was used. As noted earlier, the PSE consists of a series of picture cues that have been found by implicit motives researchers to have low cue ambiguity, and both high test-retest and inter-rater reliabilities (Pang, 2010a, 2010b; Schultheiss & Pang, 2007; Schultheiss, Liening, & Schad, 2008).

Thus it was hypothesized that a goal priming manipulation, through presentation of photographs, functions as a situational cue to arouse the implicit need for achievement. Since no mediation analysis has been conducted in previous subconscious goal research in social or organizational psychology, the present experiment tested the hypothesis that the implicit motive of need for achievement mediates the effect of a subconscious learning and performance goal on task performance.

**Dependent Variables**

The primed goal-performance relationship was tested in two laboratory experiments. In the first experiment, the dependent variable was the number of ideas generated for a complex brainstorming task. This task was used because brainstorming is an organizationally relevant task. It was used by Stajkovic, Locke, and Blair (2006). A pilot study was conducted to determine the choice of a complex brainstorming task based on ratings of perceived complexity by participants randomly assigned to two brainstorming conditions. The pilot study is described in the next chapter.
In the second experiment, the scheduling task developed by Earley (1985) was used. The rationale for choosing this task was two-fold. First, scheduling is a required task in most organizations; using this task enhanced the generalizability of the findings to similar tasks in organizational settings (Latham & Lee, 1986). Second, previous research has shown that this task has both high coordinative and dynamic complexity (Winters & Latham, 1996). In short, this task, similar to the brainstorming task, is likely to be perceived as complex by participants. Yet, unlike the brainstorming task, the scheduling task is both objectively as well as subjectively complex. In addition, the task requires the discovery or development of strategies in order to perform effectively. Finally, this task involves three trials.

Consistent with Shantz and Latham (2009) and Latham and Piccolo (2012), the implicit motive of need for achievement was measured using a text analysis program, the Linguistic Inquiry Word Count (LIWC; Pennebaker, Francis, & Booth, 2001). The LIWC program scans all stories and computes the percentage of words (relative to the total word counts of each passage) that represent certain categories of human speech patterns such as standard linguistic dimensions (e.g., articles, auxiliary verbs), psychological constructs (e.g., positive and negative emotions, cognitive processes), personal concern (e.g., work, home, leisure activities), and paralinguistic dimensions (e.g., fillers, nonfluencies). Each LIWC dimension of words is part of an extensive dictionary that is composed of almost 4,500 words and word stems (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). This dictionary was developed based on an initial vocabulary pool of almost 100,000 English words (Tausczik & Pennebaker, 2010). In the present study, the LIWC calculated the total number of words in each passage of each participant and the percentage of unique n Ach words. The LIWC n Ach motive dictionary includes words and word stems such as accomplish*, achiev*, advanc*, challeng*, determina*, fail*, win, etc.
**Hypotheses**

Based on goal setting theory, automaticity theory, goal systems theory, and implicit motives theory, the present research tested the following five hypotheses:

On a task that requires the generation or acquisition of knowledge:

**Hypothesis 1:** There is a significant main effect for a primed learning goal on performance. This hypothesis is consistent with both goal setting theory and automaticity theory.

**Hypothesis 2:** There is a significant interaction effect between a primed learning and a performance goal on performance. This hypothesis is consistent with goal systems theory.

**Hypothesis 3:** There is a significant main effect for a primed performance and a learning goal on need for achievement. This hypothesis is consistent with implicit motives theory and Shantz and Latham’s (2009, 2011) and Latham and Piccolo’s (2012) findings.

**Hypothesis 4:** There is a significant interaction effect between a primed learning and a performance goal on need for achievement. This is consistent with implicit motives and goal systems theories.

**Hypothesis 5:** Need for achievement motive mediates the relationship between the two primed goals and task performance. This hypothesis is consistent with the theory of implicit motives.
Chapter 3

Pilot Studies

Three pilot studies were conducted. The first pilot study assessed the choice of a photograph to be used for priming a learning goal. The second pilot study assessed whether the brainstorming task to be used is complex for participants. A third pilot study was conducted to determine whether the primes arouse participants’ need for achievement motive.

Pilot Study 1

Shantz and Latham (2009) suggested that a photograph of Rodin, “The Thinker,” might prime a subconscious goal for knowledge acquisition. As there was neither a theoretical nor an empirical basis for predicting that one photograph is superior to another in terms of its effectiveness on need to achieve in terms of knowledge generation/acquisition, a pilot test was conducted, prior to collecting performance data, to identify which Rodin photograph among a set of 8 collected from the internet is likely to make people “think” the most. The eight photographs varied in terms of backdrop, color scheme, and statue position/orientation.

Method

Sample

Twenty-eight undergraduate students enrolled in an upper division organizational behavior course in a large North American business school volunteered to participate in the pilot study.

Procedure

At the end of a class session, the course instructor delivered a one-page study sheet to the participants that contained eight photographs of Rodin in two rows (i.e., 4 photographs on each
row). All photographs of Rodin were adjusted to the same size (Appendix 1). The following instructions appeared on the top of the sheet: “Please rank order the following 8 pictures from 1 (the most) to 8 (the least) in terms of which ones make you think. Please indicate your rankings below each picture. You should use each number between 1 and 8 ONLY ONCE. Thank you for your time!” Three participants did not follow the instructions, yielding a sample size of 25 participants for subsequent data analysis. Participants were debriefed about the purpose of this study after they ranked the photographs.

Results and Discussion

Descriptive statistics of the ranking of each photograph showed that there were two Rodin pictures sharing the same mode of 1 (the most), with two photographs sharing the mode of 3, two the mode of 4, one the mode of 7, and one the mode of 8 (the least). Among the two top ranked photos, the one with the lowest overall mean ranking and standard deviation ($M = 3.52, SD = 2.16$ vs. $M = 3.60, SD = 2.18$) was chosen for priming a learning goal in the subsequent two experiments.

Pilot study 2

A second pilot study was conducted to ensure that a brainstorming task to be used in the subsequent experiment would be perceived as complex.

Method

Sample

Seventy undergraduate students from the same large North American business school volunteered to participate in the study. None of these participants were involved in the first pilot
study. Participants’ mean age was 22.04 ($SD = 5.79$); 41.3% were male. They were randomly assigned to one of two brainstorming task conditions.

**Procedure**

In Condition 1, participants ($n = 32$) read the following instructions: “*Thank you for agreeing to help me. Here are the instructions for a brainstorming task. Please read them carefully and answer the questions below. You do not have to do the actual brainstorming task, I only need you to answer three questions about the following directions: I am interested in your opinion about how this management school can fulfill its mission of becoming a top 10 world-class business school. I am asking you to take part in this brainstorming task to help me identify ways that this can be done. Please spend 10 minutes listing as many ways that you can think of.*”

In Condition 2 ($n = 38$), the instructions were the same with the exception of one sentence: “*I am interested in your opinion about how Canada can become a more significant and influential player in the global economy*”.

Upon reading the task instructions, participants completed a 3-item questionnaire that assessed their perceived complexity of the task. Specifically, they responded to the following items using a 5-point Likert-type scale (1 = low, 5 = high): (1) “How difficult is this task?”, (2) “How complex is this task?” (3) “To what extent do you see yourself as having subject matter expertise regarding this task?”

**Results and Discussion**

The Cronbach’s $\alpha$ for the 3-item questionnaire was .93. A one-way analysis of variance (ANOVA) revealed a significant main effect for participants’ perceived complexity of the two brainstorming tasks [$F(1, 68) = 9.45, p < .01$]. Participants perceived the management school task significantly more complex ($M = 3.56, SD = 1.01$) than the country task ($M = 2.79, SD = $)}
1.08). In addition, ANOVA revealed a significant main effect on participants’ subject matter expertise on the brainstorming tasks [$F (1, 68) = 4.12, p < .05$]. Specifically, participants reported significantly lower subject matter expertise for the school task ($M = 2.31, SD = 1.06$) than on the task for generating ways Canada can increase its influence on the global stage ($M = 2.79, SD = .91$). Given the results of this pilot study, the management school task was used in the first laboratory experiment.

**Pilot Study 3**

The third pilot study was conducted to investigate whether the different photographs prime the need for achievement motive.

**Method**

**Sample**

Participants ($n = 100$) were undergraduate students from the same large North American business school who did not participate in the two earlier pilot studies. Among the 100 participants, ninety-one were between 18 and 22 years of age, eight between 23 and 27, and one between 28 and 32; 47% were male. Participants were randomly assigned to one of four conditions, namely, (1) a primed performance goal of a woman racer ($n = 26$), (2) a primed learning goal of Rodin ($n = 25$), (3) a primed goal of both the woman racer and Rodin ($n = 26$), and (4) a no primed goal control group ($n = 23$). A graphic representation of all goal primes are shown in Appendix 2.

The photograph of a woman winning a race was used in this study because as noted earlier, Shantz and Latham (2009) found that this photograph elicited the implicit motive for need for achievement as measured by the TAT (Morgan & Murray, 1935). Moreover, in their three field experiments, Shantz and Latham (2009, 2011) found that this photograph significantly
increased the performance of call center employees relative to those in the control group. Thus the use of this photograph facilitated comparisons with previous research, and served as a check on the competency of the researcher to prime a goal.

Procedure

Participants were given a study packet with an identical cover sheet containing the following instructions: “This packet includes several unrelated surveys. Please follow the instructions, answer the questions in the set order, and do not read ahead. You will have approximately 12 minutes to complete this packet. Your participation is voluntary, and you may refuse to participate or withdraw from the study, at any time, without penalty. Thank you for your cooperation.”

The participants in the three experimental conditions read the following task instructions adopted from Latham and Piccolo (2012) presented along with the photographs on the first page of the packet: “This is a test of imagination, one form of intelligence. Here is (are) one picture (two pictures); please look at it (them) carefully. Your task is to write ONE complete story about this picture (these two pictures) – an imaginative story with a beginning, a middle, and an end. In the space below and on the following page, try to describe the situation, what led to the situation, and how everything turned out in the end. Write your thoughts as they come to your mind. Don’t worry about grammar, spelling, or punctuation – they are of no concern here. You will have approximately 7 minutes to devote to this task.” In the control condition, no photograph was presented. The instructions given to the participants were: “Close your eyes and picture something. Now tell a story about it!” With the exception of these two sentences, the instructions in all four conditions were identical.
Results

Table 1 shows descriptive statistics on need for achievement word imagery for all conditions. A one-way analysis of variance (ANOVA) revealed significant differences among the four groups in terms of the use of \( n \text{ Ach} \) motive words \([F (3, 96) = 7.41, p < .001]\). To further determine the differences of need for achievement between different goal priming conditions, a series of planned independent-sample two-tailed t-tests were conducted.

Results in Table 1 show that the stories written by participants primed with the woman racer (\( M = 4.68, SD = 3.27 \)) contained significantly more \( n \text{ Ach} \) words than those written by participants in the control condition (\( M = 2.30, SD = 1.47 \)) \((t (47) = 3.21, p < .005, d = .98)\). Participants primed with photographs of both the racer and Rodin (\( M = 4.96, SD = 2.84 \)) generated significantly more \( n \text{ Ach} \) words than those primed with only Rodin (\( M = 2.62, SD = 1.94 \)) \((t (49) = 3.42, p < .005, d = .98)\), and those in the control condition (\( M = 2.30, SD = 1.47 \)) \((t (47) = 4.04, p < .005, d = 1.21)\). However, there was no significant difference in the use of \( n \text{ Ach} \) words in the stories written by participants primed with both photographs (\( M = 4.96, SD = 2.84 \)) versus those primed with only the racer (\( M = 4.68, SD = 3.27 \)) \((t (50) = .33, n.s.)\). Moreover, participants primed with the racer generated significantly more \( n \text{ Ach} \) words than those primed with Rodin (\( M = 2.62, SD = 1.94 \)) \((t (49) = 2.72, p < .01, d = .79)\). There was no significant difference in the use of \( n \text{ Ach} \) words between the participants primed with Rodin (\( M = 2.62, SD = 1.94 \)) and those in the control condition (\( M = 2.30, SD = 1.47 \)) \((t (46) = .64, n.s.)\).

Discussion

The results from this third pilot study suggest that the photograph of the woman winning a race, with or without the photograph of Rodin, primes the need for achievement motive. This finding regarding the woman racer is consistent with Shantz and Latham’s (2009) experiment.
involving students and Latham and Piccolo’s (2012) experiment involving employees. The priming of both the woman racer and Rodin did not result in a significantly higher need for achievement motive than did the prime of the racer alone. Finally, the prime for the learning goal, Rodin, did not arouse the implicit need for achievement. This suggests that contrary to implicit motives theory, the mediator for the subconscious learning goal-performance relationship may not be the same as that for the subconscious performance goal-performance relationship. This finding, however, is consistent with research on consciously set learning and performance goals (Winters & Latham, 1996; Seijts & Latham, 2001; Seijts et al., 2004). Hence new hypotheses regarding self-efficacy and strategy were formulated before conducting the second of the two laboratory experiments.
Chapter 4

Experiment 1

Based on the four theories reviewed in Chapter 2, the findings from empirical research, and results of three pilot studies, a laboratory experiment was conducted to test the five hypotheses on the effect of primed learning and performance goals on performance of a complex brainstorming task.

Method

Sample

Participants \((n = 176)\) were undergraduate students from the same large North American business school. None of them had been involved in any of the three pilot studies. They volunteered to participate in this experiment for 1 extra credit in their course. The sample size was reduced to 167 because five participants became aware of the primed goal-performance relationship, and four participants did not follow the experimenter’s instructions. The mean age of the participants was 19.89 \((SD = 1.46)\); 32.3\% were male. Participants were randomly assigned to one of four conditions (Appendix II), namely, a primed performance goal of a woman racer \((n = 40)\), a primed learning goal of Rodin \((n = 45)\), a primed goal of both the woman racer and Rodin \((n = 41)\), or a control group \((n = 41)\), yielding a 2 (woman racer vs. no racer) \(\times\) 2 (Rodin vs. no Rodin) factorial design.

Procedure

Upon arrival at the laboratory, each participant sat at separated computer workstations. After participants read and signed the study consent form, the experimenter distributed a study packet to each of them. Each packet included an identical cover sheet with the following...
instructions: “This packet includes several unrelated surveys. Please follow the instructions, answer the questions in the set order, and do NOT read ahead until the researcher tells you to do so. Thank you for your cooperation.”

Next, the experimenter instructed the participants to open their packets and turn to the page where task instructions were presented. On this 8 ½ by 11 inch page, participants were instructed to carefully read the task instructions for the Picture Story Exercise (PSE) developed by Schultheiss and Pang (2007). Specifically, in the upper-left hand quadrant of this page there were (1) four identical photographs of a woman winning a race (a primed performance goal), (2) four identical photographs of the Thinker (a primed learning goal), (3) two woman racer and two thinker photographs (a prime of both goals), or (4) a photograph of two trees and two rocks (control).

In the upper-right hand quadrant of the page, a general PSE instruction appeared: “In this Picture Story Exercise, your task is to write a complete story about each of a series of 5 pictures in this packet – an imaginative story with a beginning, a middle, and an end. Try to portray who the people in each picture are, what they are feeling, thinking, and wishing for. Try to tell what led to the situation depicted in each picture and how everything will turn out in the end” (Pang, 2010a, pp. 135-136).

In the lower quadrant of this page, further instructions pertaining to the computer administration of the PSE were provided: “Please type your stories in your computer work sheets. Your work sheets are labelled PSE 1 through PSE 5 in the upper right-hand corner. In the upper left-hand corner of your work sheets, there are some guiding questions - these should be used only as guides to writing your story. You do NOT need to answer them specifically. Don't worry about grammar, spelling, or punctuation - they are of no concern here. You will
have about 5 minutes for each story. The researcher will let you know when you have 20 seconds left and when it’s time to move on to the next picture” (adapted from Pang, 2010a, p. 136). With the exception of the priming photograph set presented in the upper-left hand quadrant of the page, the instructions in all four conditions were identical.

After 75 seconds had elapsed following the participants reading the PSE instruction, the experimenter asked the participants to proceed to the next page that contained the first PSE picture (PSE1: women chemists in a laboratory). After 15 seconds, the participants were instructed to turn to the next page and start typing their stories onto their computer work sheets. The participants were asked to stay on this blank page while typing their stories. This procedure, as suggested by Schultheiss and Pang (2007), was followed to ensure that picture cues did not confound the assessment of the need for achievement (with an instruction: “Please stay on this page while you are typing up PSEx. Do not turn the page until the researcher asks you to do so.”). After 4 minutes and 40 seconds had elapsed, the experimenter notified the participants that 20 seconds remained for PSE1. When 5 minutes had elapsed, the experimenter asked the participants to proceed to the second PSE picture (PSE2: female gymnast). The same procedure was followed with the remaining three pictures, namely, male workers in a workshop, boy at a desk, and trapeze artists (see Appendix 3: PSE1 – PSE5).

Following the administration of the PSE, the participants performed the brainstorming task for 10 minutes. At the end of the brainstorming task, participants responded in writing to four open ended questions adapted from Shantz and Latham (2009) to assess their awareness of the purpose of the study: (1) “What was the purpose of this exercise?” (2) “What do you think this study was trying to uncover?” (3) “Did the photograph set presented at the beginning of this packet affect your performance? If so, how? If not, leave blank.” and (4) “Did the photograph set
presented at the beginning of this packet affect what you did in the brainstorming task in any way? If so, how? If not, leave blank.” Finally, the participants were thanked and debriefed.

Results

*Manipulation check*

Consistent with previous research on subconscious goals, an awareness check served as the manipulation check for goal priming. The typical answers to question 1 were “to earn a research credit” or “don’t know.” In responding to question 2, participants either reported “don’t know,” or wrote general psychological concepts such as “emotion,” “thought processes” without elaborating on what specific relationships were being tested. Other participants included a brief account related to the study information in the consent form they completed at the beginning of the experiment (e.g., “to test one’s brainstorming ability”). In responding to questions 3 and 4, participants either left blank or included a summary of how they thought their performance had been affected by time pressure, creativity, language, verbal ability, etc.

Five participants were dropped from the analysis because they had become aware of the priming technique (e.g., “to uncover how people think after exposed to many pictures”) or they correctly guessed the purpose of the experimental procedure (e.g., “how a certain picture/object affects how people think in the future”). As noted earlier, four participants were dropped because they did not follow the instructions. Hence, the sample size for data analysis was 167.
Hypotheses

Task Performance

Table 2 and Figure 1 report descriptive statistics on key variables for all conditions in Experiment 1. A 2 x 2 ANOVA on task performance was conducted. Consistent with the first hypothesis, there was a significant main effect for the primed learning goal \[ F(3,163) = 7.94, p < .01, \eta^2 = .05 \]. Because the participants’ experience in the management school may have confounded the effect of subconscious goals on generating ideas to improve the school, a 2 x 2 ANCOVA on task performance was also conducted, using participants’ year in the business school as the covariate. The results remained the same. There was a significant main effect for the primed learning goal \[ F(3,159) = 6.79, p < .05, \eta^2 = .04 \], but not for the primed performance goal \[ F(3,159) = 2.93, p < .10, \eta^2 = .02 \]. Therefore, hypothesis 1 was supported.

Contrary to the second hypothesis, there was no significant interaction effect. Therefore, hypothesis 2 was rejected. However, participants primed with both the Thinker and the racer photographs (\( M = 15.00, SD = 6.84 \)) generated significantly more ideas than those in the control condition (\( M = 11.22, SD = 3.92 \) \( t(80) = 3.07, p < .005, d = .70 \)).

Need for Achievement

Figure 2 shows the means of need for achievement for all conditions. Consistent with the third pilot study, the stories written about the photographs in the PSE were analyzed using the LIWC program. Specifically, the number of \( n \text{ Ach} \) words relative to the total word count of the PSE stories was assessed across the four conditions. As was the case in the pilot study, a 2 x 2 ANOVA revealed a statistically significant main effect only for priming a performance goal \[ F(3,163) = 4.60, p < .05, \eta^2 = .03 \]. This finding is also consistent with Shantz and Latham’s (2009) and Latham and Piccolo’s (2012) findings. Neither the main effect for the primed
learning goal nor the interaction effect was significant. Hence, hypothesis 3 was partially supported, and hypothesis 4 was rejected.

**Mediator analyses**

Because the relationship between a subconscious performance goal and task performance was not significant, and the subconscious learning goal did not arouse a significantly higher implicit need for achievement than the control group, no mediation of n Ach could have occurred. To confirm this, mediation analyses (controlling for participants’ year of study) were conducted by following Baron and Kenny’s (1986) 3-step regression approach and Preacher and Hayes’ (2004) bootstrapping method.

To test the mediation role of n Ach on the effect of priming a performance goal and performance, Baron and Kenny’s approach was first followed: (1) regressing n Ach (mediator) on a primed performance goal (independent variable) (Equation 1), (2) regressing performance (dependent variable) on a primed performance goal (Equation 2), (3) regressing performance on both a primed performance goal and energetic arousal (Equation 3) (see Table 3a). The results showed that priming a performance goal affected n Ach (β = 1.22, p = .05), but did not affect performance (β = 1.39, n.s.). The effect of priming a performance goal on performance did not drop (β = 1.64, p < .10) when n Ach (β = -.21, p < .10) was controlled for. Preacher and Hayes’ (2004) bootstrapping procedure showed a point estimate of -.25 for the indirect effect of priming a performance goal on task performance through n Ach (95% CI [-.76, -.0003]). Thus, n Ach did not mediate the primed performance goal-task performance relationship.

The same procedures were applied to test for the mediation role of n Ach on the primed learning goal-task performance relationship. Results showed that priming a learning goal did not affect n Ach (β = .03, n.s.), but affected performance (β = 2.14, p < .05). The effect of priming a
learning goal on performance did not drop ($\beta = 2.15, p < .05$) when $n Ach$ ($\beta = -0.18, p < .10$) was controlled (see Table 3b). Preacher and Hayes’ bootstrapping procedure showed a point estimate of $-0.01$ for the indirect effect of priming a learning goal on task performance through $n Ach$ (95% CI [-.34, .24]). Thus, $n Ach$ did not mediate the primed learning goal-performance relationship.

In short, these results show that $n Ach$ did not mediate the primed performance goal-performance or the primed learning goal-performance relationship. Therefore, hypothesis 5 was rejected.

Discussion

Consistent with research on conscious goals (e.g., Winters & Latham, 1996), the present findings suggest that on a task that requires knowledge generation, only a primed learning goal has a significant effect on performance. That a goal that is primed affected performance supports automaticity theory. No previous research on goal setting or automaticity theory has shown the significant relationship between a primed learning goal and performance on a task that is complex for people.

Although the interaction effect of a subconscious performance and a learning goal was not significant, priming both goals led to significantly higher performance than did priming no goal (control). The primed learning and performance goals appeared to be aligned to jointly increase performance, with the learning goal remaining a focal goal. This finding provides modest support for goal systems theory.

The results of both the pilot study and the present experiment suggest that need for achievement is not a mediator of the learning goal-performance relationship. An explanation can be found in Schultheiss’ research (Schultheiss, 2008; Schultheiss et al., in-press). Because implicit motives respond preferentially to nonverbal cues after arousal, Schultheiss reported that
implicit motives tend to have an effect on non-declarative measures of motivation, but have minimal or no effect on declarative measures of motivation. Non-declarative measures include “goal-directed behaviors through processes of Pavlovian and instrumental learning, and utilization of such learned stimulus connections and behaviors in the appropriate contexts” (Schultheiss, 2008, pp. 612-613). Non-declarative behaviors and processes are not controlled by conscious intentions. Declarative measures, however, “tap into a person’s conscious sense of self and the beliefs, judgements, decisions, and attitudes associated with it” (Schultheiss & Pang, 2007, p. 323).

Seijts and Latham (2001) found that task strategies and self-efficacy mediated the effect of a conscious learning goal on performance on a task that is complex for people. These two mediators had a reciprocal effect on one another. Discovering task strategies, consistent with having a learning goal, increased self-efficacy that the task could be mastered; increasing self-efficacy increased the discovery of task strategies for task mastery. The mediating effects of these two variables on the subconscious learning goal-task performance relationship was therefore investigated in the second experiment.

A limitation of the brainstorming task for assessing goal systems theory is that it arguably involved creativity rather than the discovery of ways to master a task, and it involved only one trial. As task mastery occurs, it is likely that a subconscious learning goal diminishes in importance for increasing performance and a subconscious performance goal increases in importance (i.e., the performance goal becomes the focal goal with the learning goal as the background goal). Consequently, a second experiment was conducted using a task that has also been found to be complex for people, a task that requires the acquisition of knowledge rather
than sheer effort before participants can perform effectively, a task that contains multiple trials. The use of multiple trials allowed for an assessment of learning, namely, task mastery.
Chapter 5

Forster, Liberman, and Friedman (2007) criticized the literature on primed goals that purportedly show support for automaticity theory. This is because no study has included a manipulation check to eliminate the rival hypothesis that a change in the dependent variable(s) was due to other automatic, activation-based phenomena, namely, a primed semantic concept or a procedural routine, non motivational explanations, rather than a goal. As noted earlier, social psychology experiments on primed goals typically check solely for lack of awareness of the relationship between the prime and task performance.

The priming of semantic concepts increases their accessibility, facilitating processing of related constructs (Neely, 1977). Forster et al. gave the example of a shoe advertisement that may trigger the goal to buy new footwear, promoting enhanced accessibility of constructs related to the goal and thereby engendering increased efficiency at detecting shoe stores. Nevertheless, it is not possible to determine, they argued, whether the advertisement actually primed a goal to purchase shoes or merely enhanced the accessibility of semantic constructs related to the goal by keeping the concept of shoes in long-term memory. More than a century ago, James’ (1890) theory of ideo-motor action stated that the mere act of thinking about a behavior increases the probability that a person will demonstrate the behavior, given an appropriate situation to do so.

A prime may also activate a procedure, in the absence of awareness, as opposed to a goal. Mussweiler and Forster (2000), for example, found that the semantic activation of sexually related aggression occurred for women as well as men, but the procedure elicited by the prime was different for men versus women. Forster et al. again argued that such findings illustrate the problem of determining whether a given manipulation has primed a semantic concept, a goal, or a procedural routine. Not every effect of priming, they said, can be attributed to a goal. That
participants, primed by Bargh et al. (1996) with the word elderly, subsequently walked slower to an elevator than those in a control group is arguably due to a perception-behavior link, “a process that in no way requires the involvement of goals” (Forster et al., 2007, p. 214).

Few if any experiments in social psychology on subconscious goals have included manipulation checks for awareness, let alone for eliminating rival hypotheses (Latham et al., 2010). This is likely due to the fear that such checks, following supraliminal or subliminal primes, may bring the goal to consciousness, undermining the ability to draw conclusions regarding subconscious goal pursuit.

Forster et al. (2007) suggested several ways of distinguishing goal-priming effects from semantic and procedural priming. No study to the author’s knowledge has used any of them as a manipulation check. They argued that people feel energized, eager, and vigilant in the process of goal pursuit. They are frustrated, tense, and/or depressed when they fail to attain their goal. Related to Forster et al.’s argument is Epstein’s (1994) cognitive-experiential self theory that is based in part on Bargh’s experimental research on primed goals. This theory states that a subconscious goal activates affect. If one’s activated feelings are pleasant, the person is likely to take action to reproduce those feelings. Conversely, if the feelings are unpleasant, the person will likely be motivated to take action to avoid them. There is at least one study suggesting that a mediating mechanism, aside from motive arousal, that helps explain the effect of a primed goal on performance is in fact affect. Custers and Aarts (2007) found that people pursue a primed goal only to the extent that it pre-exists in their minds as a desired state associated with positive affect. Accordingly, the present experiment was conducted to overcome Forster et al.’s criticisms by including a manipulation check of affective arousal. Data from this manipulation check
allowed for a test of an overarching hypothesis that affective arousal mediates the subconscious goal-task performance relationship.

The present experiment used the class-scheduling task developed by Earley (1985). As noted earlier, this task was used by Winters and Latham (1996) and Seijts and Latham (2001) to assess the effect of conscious learning goals on performance. The number of accurate schedules produced was the performance measure in this study. This scheduling task meets Wood’s (1986) criteria for task complexity. First, it involves a large amount of task information inputs such as scheduling rules and a great number of course listings (component complexity). Second, creating an accurate schedule requires integrating cues in judgement, and coordinating simultaneous information from different sources and rule items (coordinative complexity). Third, on-going changes in information cues are essential to performing the task effectively. Finally, both Winters and Latham and Seijts and Latham reported that participants perceive the task as complex.

The hypotheses tested in this experiment were the same as those tested in the first experiment with the exception that three additional mediators were hypothesized to explain the learning goal-performance relationship: On a task that requires the acquisition of knowledge,

Hypothesis 6: Self-efficacy mediates the relationship between a primed learning goal and task performance. This hypothesis is consistent with goal setting theory.

Hypothesis 7: Strategy mediates the relationship between a primed learning goal and task performance. This hypothesis is consistent with goal setting theory.
Hypothesis 8: Affective arousal mediates the relationship between a primed learning goal and task performance. This hypothesis is consistent with Forster et al.’s arguments.

Experiment 2

Method

Sample

Participants (n =61) were undergraduate students from the same large North American university who did not participate in any of the previous pilot studies or experiment 1. The mean age of the participants was 20.52 (S.D. = 3.23); 19.7% were male. Participants were randomly assigned to one of four conditions, namely, (1) a primed performance goal of a woman racer (n = 16), (2) a primed learning goal of Rodin (n = 12), (3) a primed goal of both the woman racer and Rodin (n = 16), and (4) a no primed goal control group (n = 17). The experiment typically lasted 75 to 80 minutes. Upon successful completion of all tasks, each participant received twelve dollars. In addition, the top 10% performers were given a five-dollar bonus.

Procedure

Upon arrival at the laboratory, participants were asked to sit at separated computer workstations. After they read and signed the study consent forms, the experimenter administered a 14-minute session for the scheduling task whereby participants spent the first 10 minutes reviewing the instructions (Appendix 4) and class lists for the task. Participants were subsequently given 4 minutes to produce class schedules. The number of accurate schedules produced in this 4-minute period provided a premeasure of each participant’s ability to perform the scheduling task (Winters & Latham, 1996). This number was entered as a covariate in
subsequent data analyses. After this practice trial, participants’ affective arousal was measured for the first time (T1).

Participants then completed a 4-photograph Picture Story Exercise (PSE) (PSE1: women chemists in a laboratory; PSE2: female gymnast; PSE3: male workers in a workshop; and PSE4: trapeze artists) following the same procedure used in Experiment 1. It is important to note that the goal priming manipulation occurred at the beginning of the PSE by presenting the priming photographs along with the PSE instructions.

Immediately following the PSE, two self-report questionnaires were administered: (1) achievement motivation (International Personality Item Pool), and (2) sense of learning (Porath, Spreitzer, Gibson, & Garnett, 2012). The results obtained from the self-report achievement motivation scale assessed whether it was measuring aspects of this construct not assessed by the PSE. The results from the learning scale assessed whether priming a learning goal affected a conscious sense of learning. In short, explicit measures were taken to see if behavioral changes that were not captured by the PSE had occurred. As noted earlier, implicit motives theory states, and empirical research has shown, that implicit motives and explicit motives do not necessarily overlap (Collins, Hanges, & Locke, 2004; Spangler, 1992; Schultheiss, 2008; Schultheiss, Yankova, Dirlikov, & Schad, 2009).

Next, participants reported their affective arousal for a second time (T2). Then, three trials of the scheduling task were administered (8 minutes per trial). Prior to each trial, participants reported their self-efficacy for performing the scheduling task (SSE1, SSE2, and SSE3, for trials 1, 2, and 3, respectively). Consistent with Winters and Latham (1996), this multi-trial procedure allowed for an assessment of the potential mediating effect of self-efficacy on the subconscious goal-task performance relationship.
Upon completion of trial 3, participants reported their perceived complexity of the scheduling task. Subsequently, they provided typed answers to a series of open-ended questions pertaining to their awareness of the experimental manipulation and the hypotheses and reported their demographic information. Finally, the experimenter debriefed, compensated, and thanked the participants.

**Measures**

**Dependent variable**

*Task performance.* Consistent with Winters and Latham (1996) and Seijts and Latham (2001), task performance was operationalized as the number of correct schedules generated on each of the three trials.

**Mediating variables**

*Self-efficacy.* Consistent with Seijts and Latham (2001), self-efficacy was measured after priming the goals, and prior to the administration of the scheduling task. Sixteen levels of self-efficacy were assessed, ranging from completing 3.0 to 12.0 class schedules during the 20-minute period. A sample item was ‘I am able to complete 4.8 class schedules’. Participants reported either YES or NO to each of the 16 statements. Self-efficacy magnitude was operationalized as the total number of ‘YES’ s to the statements. In addition, participants rated each of the 16 levels on a 10-point scale (where 1 = ‘no confidence at all’; 10 = ‘total confidence’). The sum of the 16 ratings assessed self-efficacy strength. Consistent with Locke and Latham (1990) and Seijts and Latham (2001), the scores of self-efficacy magnitude and strength were converted to z-scores and summed to yield a total self-efficacy score.
Strategy. Earley (1985), who developed the scheduling task, identified four types of strategies participants could implement in producing accurate class schedules: (1) recording class names and times in chronological order, (2) repeatedly scheduling the same subject (e.g., organizational behavior for the Monday, Wednesday and Friday schedules), (3) repeatedly scheduling the same section (e.g., the Monday morning 8:00 – 9:00 time slot, and (4) scheduling night classes. A research assistant coded participants’ uses of each of these strategies for each trial. The four separate strategy scores for each trial were added together to obtain a strategy score for that trial.

Explicit measures

Achievement motivation. Achievement motivation was measured by seven 5-point Likert-type items (1 = strongly disagree, 5 = strongly agree) obtained from the International Personality Item Pool (IPIP). Sample items include: “I go straight for the goal”. “I work hard”. And “I do more than what’s expected of me”. The IPIP reports high internal reliability for this scale (α = .78). Data from this scale were analyzed to determine if goal priming affected participants’ self-reported achievement motivation and whether the scores correlated with the implicit motive of need for achievement.

Sense of learning. Sense of learning was measured by five 5-point Likert-type items (1 = strongly disagree, 5 = strongly agree) adapted from Porath et al.’s (2012) thriving scale. Sample items include: “I continue to learn more as time goes by”. “I find myself learning often”. And, “I am not learning” (R). Porath et al. reported high internal reliability for this scale (α ranging from .78 to .90). Data from this scale were analyzed to determine if goal priming affected participants’ self-reported sense of learning.
Manipulation checks

Task complexity

Task complexity was measured by six 5-point Likert-type items (1 = not at all, 5 = very much so) adopted from Wood’s (1987) Task Complexity Scale. Three items measure coordinative complexity: “To what extent did the task of completing class schedules require you to coordinate many different things at the same time”. “Many times, I had to check one thing before I scheduled something else”. “I had to think about a lot of different things at the same time to successfully perform this task”. Two items assess dynamic complexity: “It got so that I could just predict what I would need to do in order to complete a schedule”. “This task required that I use many different types of information items.” One item asks about the generally perceived complexity: “How complicated was the task of completing class schedules?” Previous research reported relatively high internal reliability of this scale (α = .78; Seijts & Latham, 2001).

Awareness

Consistent with the first experiment and previous experiments on automaticity theory, a revised version of Bargh et al.’s (1996) open-ended funnel debriefing questionnaire for assessing awareness of the hypothesized relationship between the primes and task performance was used: (1) “What was the purpose of this study?” (2) “What do you think this study was trying to uncover?” (3) “Did the woman racer (or Rodin Thinker, or the woman racer and Thinker, or the trees and rocks) photograph presented at the beginning of this packet affect your performance? If so, how? If not, leave blank.” and (4) “Did the photograph presented at the beginning of this packet affect what you did in the brainstorming task in any way? If so, how? If not, leave blank.”
Affective arousal

Following Forster et al.’s (2007) recommendation, participants’ affective arousal was assessed before (T1) and after (T2) the goal priming manipulations. Specifically, affective states were checked using the affective arousal measure adapted from the UWIST Mood Adjective Checklist (Matthews, Jones, & Chamberlain, 1990). This checklist was recommended by Schultheiss and Brunstein (1999). Three items were taken from the Energetic Arousal scale: active, vigorous, passive (reverse coded), and tired (reverse coded); and three from the Tense Arousal scale: calm (reverse coded), jittery, and tense. The computer presented all items in random order. Participants were instructed to rate the applicability of each adjective to their present mood on a 4-point scale (1 = definitely not, 2 = slightly not, 3 = slightly, and 4 = definitely). Matthews et al. (1990) found that participants did not appear to find this 4-choice symmetric format a difficult choice to make.

Results

Manipulation checks

Task complexity

The coefficient alpha for the 6-item task complexity scale was .70. An ANOVA revealed no significant difference regarding participants’ perceived task complexity across the four conditions. The mean overall rating was 3.78 (S.D. = .63) indicating that participants perceived the scheduling task to be moderately complex.

Awareness

Consistent with previous research on subconscious goals and the findings in Experiment 1, an awareness check served as one of two manipulation checks for goal priming. The typical
answers to question 1 were “to study how students solve problems under time pressure,” “to get an insight into different people’s organizational skills,” or “don’t know.” In responding to question 2, participants either reported “don’t know,” or wrote general psychological concepts such as “mood,” “stress,” “confidence,” and “cognitive speed” without elaborating on what specific relationships were being tested. Other participants included a brief account related to the information in the consent form they completed at the beginning of the experiment (e.g., “to test my ability of making a schedule and creativity in writing stories”). In responding to questions 3 and 4, participants either left them blank, or indicated their behavior and performance were not affected by the (priming) photographs, or included a summary of how they thought their performance had been affected by factors such as time pressure, cognitive concentration, and anxiety. No participant expressed an awareness of the priming technique. Neither did any participant correctly identify the purpose of the experimental procedure. Hence, no participant was dropped in the subsequent data analysis.

Affective arousal

Affective arousal was the second of two manipulation checks for priming goals. The results showed that both arousal scales had acceptable to satisfactory internal consistency at T1 (Energetic: Cronbach’s $\alpha = .45$; Tense: Cronbach’s $\alpha = .59$); and at T2 (Energetic: Cronbach’s $\alpha = .67$; Tense: Cronbach’s $\alpha = .79$). The respective test-retest reliability coefficients were $.59 (p < .001)$ and $.68 (p < .001)$ for energetic arousal and tense arousal, respectively.

At T1, the premeasure, no significant difference in both types of affective arousal across conditions was found. At T2, 2 x 2 ANOVAs (with arousal at T1 as covariates) indicated a significant main effect for priming a learning goal on energetic arousal [$F (1, 56) = 4.22, p < .05, \eta^2 = .07$], and a significant main effect for priming a performance goal on tense arousal [$F (1,$
56) = 8.55, \( p < .01, \eta^2 = .13 \). Additional results from a series of planned independent-sample two-tailed \( t \)-tests showed that participants primed with both a learning and a performance goal \( (M = 5.25, S.D. = 1.29) \) reported significantly lower tension arousal than did those in the control condition \( (M = 7.00, S.D. = 1.41) \) \( (t(31) = -3.71, p < .005, d = -1.29) \).

These results suggest that priming goals led to significant changes in affective arousal. Specifically, whereas priming a learning goal energized participants, priming a performance goal reduced tension. Priming both a learning and a performance goal did not appear to energize participants, but did reduce tension. Hence, the present research successfully primed goals via presentations of photographs. To the best of the author’s knowledge, this is the first empirical study to utilize a measure of affective arousal to check for the manipulation of goal priming.

Effect of primed goals on explicit measures

Achievement motivation

The coefficient alpha for the 7-item self-report achievement motivation scale was .87. The correlation between need for achievement, as assessed by the PSE, and the explicit measure of achievement motivation was not significant \( (r = -.01, n.s.) \). This finding is consistent with implicit motives theory which states that implicit and explicit measures for achievement motivation typically do not overlap. A 2 x 2 ANOVA revealed no significant difference across goal priming conditions. This result suggests that goal priming did not affect self-reported achievement motivation.
Sense of learning

The coefficient alpha for the 5-item sense of learning scale was .77. A 2 x 2 ANOVA revealed no significant difference across goal priming conditions. Thus there is no evidence to suggest that goal priming affected sense of learning as measured by a self-report questionnaire.

Hypotheses

Task performance

The results for performance are shown in Table 3. A 2 x 2 x 3 repeated measures ANCOVA with primed performance and learning goals as between-group factors, trials as a within-group factor, and performance on the pre-test as a covariate indicated a significant within-effect for trials \( F(1, 56) = 4.24, p < .05, \eta^2 = .07 \). A series of paired sample two-tailed t-tests indicated that performance on trials 2 \( t(60) = 4.94, p < .001 \) and 3 \( t(60) = 6.15, p < .001 \) was significantly higher than performance on trial 1. Moreover, performance on trial 3 was marginally higher than performance on trial 2 \( t(60) = 1.85, p < .07 \). This suggests that learning/task mastery increased across the three trials.

The results show a significant main effect for a primed learning goal on performance \( F(1, 56) = 7.95, p < .01, \eta^2 = .12 \). Figure 3 presents the overall task performance and pre-test performance across conditions. Results from a series of planned independent-sample two-tailed t-tests indicate that priming a learning goal \( (M = 9.42, S.D. = 3.36) \) led to significantly higher performance than priming a performance goal \( (M = 6.38, S.D. = 3.32) \) \( t(26) = 2.39, p < .05 \) as well as significantly higher performance than the control condition \( (M = 5.80, S.D. = 4.97) \) \( t(27) = 2.19, p < .05 \). Priming a performance goal, however, did not increase performance \( F(1, 56) = .001, p = .97, \eta^2 = .00 \), relative to the control group. Therefore, hypothesis 1 was supported.
In addition, the results show that there was a significant two-way interaction effect between priming a learning goal and a performance goal \[ F(1, 56) = 4.28, p < .05, \eta^2 = .07 \]. Results from a series of 2 x 2 ANOVAs (pre-test performance on the practice trial as a covariate) for each trial show that the interaction effect between both primed goals was only significant on the last trial \[ F(1, 56) = 5.12, p = .03, \eta^2 = .08 \]. Therefore, hypothesis 2 was partially supported.

To further determine the differences in overall performance across conditions, a series of planned independent-sample two-tailed t-tests were conducted. The results show that participants primed with The Thinker \( (M = 9.42, SD = 3.36) \) generated significantly more accurate schedules than those primed with the racer photograph \( (M = 6.38, SD = 3.32) \) \( t(26) = 2.39, p < .05, d = .91 \), and those in the control condition \( (M = 5.80, SD = 4.97) \) \( t(27) = 2.19, p < .05, d = .85 \). The difference in performance between participants primed with The Thinker alone \( (M = 9.42, SD = 3.36) \) and those primed with both the Thinker and the racer photographs \( (M = 7.04, SD = 3.04) \) was marginally significant \( t(26) = 1.96, p = .06, d = .74 \). No other significant difference in performance across conditions was found.

These findings, consistent with the first experiment and consistent with findings obtained with consciously set goals, suggest that priming a learning goal alone increased performance on a complex task, but priming a performance goal alone did not do so. The finding that the interaction effect between a primed learning and a performance goal was significant on the last trial after learning had occurred supports goal systems theory. People with both primed goals appeared to have automatically utilized the primed learning goal (focal/facilitative) initially by inhibiting the performance goal (background/non-facilitative) to perform this complex task. Nevertheless, the highest performance occurred when only the learning goal was primed.
Need for achievement

Consistent with experiment 1, the stories written about the photographs in the PSE were analyzed using the LIWC program. Specifically, the number of $n_{Ach}$ words relative to the total word count of the PSE stories was assessed across the four conditions. A 2 x 2 ANOVA revealed a statistically significant main effect for priming a performance goal on need for achievement [$F(3, 57) = 4.70, p < .05, \eta^2 = .08$]. This finding is consistent with Shantz and Latham (2009) and Latham and Piccolo (2012), as well as Experiment 1’s findings that priming a performance goal increased the implicit motive of need for achievement. Neither the main effect for the primed learning goal nor the interaction effect was significant. Hence, hypothesis 3 was partially supported, and hypothesis 4 was rejected.

Self-efficacy

The means and standard deviations for self-efficacy in completing class schedules across trials are shown in Table 3. The correlation between self-efficacy magnitude and self-efficacy strength was .74 ($p < .001$), .83 ($p < .001$), and .87 ($p < .001$), for trials 1, 2, and 3, respectively. The standardized scores for self-efficacy magnitude and strength were combined additively to yield a composite measure. The coefficient alphas for the self-efficacy were .85, .91, and .93 for trials 1, 2, and 3, respectively. The correlation between self-efficacy and performance on the scheduling task was .10 ($p > .05$), .21 ($p > .05$), and .03 ($p > .05$) for trials 1, 2, and 3, respectively.

A 2 x 2 x 3 repeated measures ANOVA with primed goals as between-group factors and trials as a within-group factor did not indicate any significant difference in self-efficacy across trials or conditions. Neither did one-way ANOVAs indicate any significant differences in self-efficacy across conditions during trials 1, 2, or 3. However, the self-efficacy of participants
primed with both a performance and a learning goal had a significant increase from trial 2 ($M = .03, S.D. = 1.63$) to trial 3 ($M = .51, S.D. = 1.87$) ($t (15) = .23, p < .05$).

**Strategy**

The means and standard deviations for strategy implemented across trials are shown in Table 3. The correlation between the composite score of strategies and performance was .43 ($p < .005$), .34 ($p < .01$), and .36 ($p < .01$), for trials 1, 2, and 3, respectively. The first strategy, repeatedly scheduling the same subject, was implemented by 63.6%, 92.4%, 93.9%, and 98.5% of the participants on the practice trial, trials 1, 2, and 3 respectively. The second strategy, repeatedly scheduling the same class section, was implemented by 25.8%, 69.7%, 78.8%, and 80.3% of the participants on the practice trial, trials 1, 2, and 3 respectively. The third strategy, scheduling night classes, was implemented by 16.7, 53.0%, 62.1%, and 66.7% of the participants on the practice trial, trials 1, 2, and 3 respectively. Finally, the fourth strategy, recording the class names and times chronologically, was implemented by 80.3%, 89.4%, 87.9%, and 90.9% of the participants on the practice trial, trials 1, 2, and 3 respectively.

A 2 x 2 x 3 repeated measures ANCOVA with primed goals as between-group factors, trials as a within-group factor, and strategies used on the pre-test as a covariate indicated a significant within-effect for trials [$F (2, 122) = 4.86, p < .01, \eta^2 = .07$]. A series of paired sample two-tailed $t$-tests indicated that the number of strategies implemented on trials 2 ($t (65) = 3.54, p < .001$) and 3 ($t (65) = 7.08, p < .001$) was significantly higher than performance on trial 1. Moreover, participants implemented significantly more strategies on trial 3 than on trail 2; $t (65) = 3.44, p < .001$. This suggests that the number of strategies implemented increased across trials. A 2 x 2 x 3 repeated measures ANOVA with primed goals as between-group factors and trials as
a within-group factor, however, did not indicate any significant difference in strategies implemented across trials or goal priming conditions.

**Mediator analyses**

Consistent with the first experiment, priming a learning goal did not arouse the implicit need for achievement. Thus no mediator analyses on need for achievement were conducted. Hence, hypothesis 5 was rejected. In addition, there were no significant differences in self-efficacy and strategies detected among goal priming conditions. Consequently, no mediator analyses on self-efficacy or strategies were conducted. Therefore, hypotheses 6 and 7 were rejected.

Goal priming did lead to a change in affective arousal. Thus mediator analyses were conducted to test for affective arousal as a potential mediator that explains the effect of primed goals on task performance.

Based on the manipulation check showing the significant main effect for priming a learning goal on energetic arousal, a mediation analysis controlling for pre-test performance was conducted to determine whether participants’ energetic arousal mediated the relationship between priming a learning goal and task performance (measured by the total number of correct schedules produced across three trials). Baron and Kenny’s (1986) approach was followed: (1) regressing energetic arousal (mediator) on a primed learning goal (independent variable) (Equation 1), (2) regressing performance (dependent variable) on a primed learning goal (Equation 2), (3) regressing performance on both a primed learning goal and energetic arousal (Equation 3) (see Table 5a). The results showed that priming a learning goal affected energetic arousal ($\beta = 1.14, p = .05$) and performance ($\beta = 2.00, p < .05$). The effect of priming a learning goal on performance did not drop ($\beta = 2.01, p < .05$) when energetic arousal ($\beta = -.01, n.s.$) was
controlled for. Preacher and Hayes’ (2004) bootstrapping procedure showed a point estimate of -.01 for the indirect effect of priming a learning goal on task performance through energetic arousal (95% CI [-.76, .50]). Thus, energetic arousal did not mediate the relationship between priming a learning goal and task performance.

Based on the manipulation check showing that participants primed with both goals were significantly less *tense* than those in the control condition, the same procedures were applied to determine whether tension mediated the relationship between priming both goals and task performance of trial 3 controlling for pre-test performance. The results showed that priming both goals affected tension ($\beta = -1.72$, $p < .005$), but did not affect performance ($\beta = 2.05$, $p < .10$). The effect of priming both goals on performance did not drop ($\beta = 2.57$, $p < .10$) when tension ($\beta = .30$, *n.s.*) was controlled for (see Table 5b). The bootstrapping procedure showed a point estimate of -.52 for the indirect effect of priming both goals on task performance through tense arousal (95% CI [-2.17, .63]). Thus, tension arousal did not mediate the relationship between priming both goals and task performance.

Taken together, these results do not support the overarching hypothesis that affective arousal mediates the subconscious goal-task performance relationship. Therefore, hypothesis 8 was rejected.
Chapter 6

General Discussion

This dissertation integrates four important fields of literature in HRM, I-O, OB and social psychology, namely, goal setting theory (Locke & Latham, 1990, 2002), automaticity theory (Bargh & Chartrand, 1997, 1999), goal systems theory (Kruglanski et al., 2002), and implicit motives theory (McClelland, 1987; Schultheiss, 2008). The purpose of this dissertation was primarily two-fold: (1) to examine the effects of subconscious goals on performance on a task that people have yet to acquire the requisite knowledge or skill to perform effectively, and (2) to discover the underlying psychological mechanism that explains the subconscious goal-task performance relationship. Significant theoretical contributions to each literature are described below.

Theoretical contribution

Goal setting theory

The present research is the first to demonstrate that a learning goal can be primed to increase performance on tasks that require people to generate or acquire knowledge. In doing so, it extends the emergent subconscious goal research on organizationally related behavior, as well as previous social psychology experiments that had only focused on the effect of a primed performance goal on increasing performance on tasks that people already knew how to perform effectively (e.g., Shantz and Latham, 2009, 2011; Latham & Piccolo, 2012). In addition, the present findings extend the generalizability of automaticity theory by showing the similarity of the present findings with those of goal setting theory regarding the differential effects of conscious learning versus performance goals on task performance.
The first hypothesis was that on a task that is complex for people, there is a significant main effect for a primed learning goal on performance. This hypothesis was supported. The results from two laboratory experiments involving two different performance measures show that a learning goal can be primed via an individual’s mere exposure to a photograph of Rodin, “The Thinker”. Consistent across the two experiments, priming a learning goal significantly increased performance on tasks that are complex for people relative to priming a performance goal, or priming no goal (control group).

Based on extant goal setting research that consistently demonstrates the mediating mechanisms of task-related self-efficacy and implementation of strategies (Winters & Latham, 1996; Seijts & Latham, 2001), the second experiment also tested the hypothesis that self-efficacy and strategy mediate the effect of a primed learning goal on performance of a complex task. No support was found for the hypotheses that these two variables mediate the subconscious learning goal – performance relationship.

A self-report questionnaire may not be a reliable and valid measure to test the effect of self-efficacy and strategy on a primed goal within the current implicit and subconscious research paradigm. Bandura (2012) argued that “efficacy beliefs are strengthened by reducing anxiety…” (p. 13). The second experiment found that priming a learning goal and/or a performance goal leads to an increase in energy and a decrease in tension. Priming a performance goal reduced tension and priming a learning goal energized people. It may not be surprising that people across conditions did not differ in self-efficacy due to the goal priming manipulations.

Despite its significant effect on performing the scheduling task, priming a learning goal did not affect the implementation of task-related strategies identified previously by Seijts and Latham (2001) in their conscious learning goal study. A possible explanation could be that
strategies detectable consciously may not be the same as those implemented by people implicitly. Given the manipulation check results for changes in affective arousal due to goal priming, affect may be the mediator that explains the goal priming effect on accomplishing the scheduling task. In fact, Custers and Aarts (2010) suggested such a mechanism for explaining subconscious goal pursuit. They argued that a primed goal is “immediately followed by the activation of an associated positive affective tag, which acts as a reward signal for pursuing the primed goal” (p. 49). Since self-efficacy and strategy have a reciprocal relationship (Seijts & Latham, 2001), again it may not be surprising that no significant difference in either self-efficacy or strategy among conditions was found. These results, nonetheless, seem to refute Bargh and colleagues’ assertion that subconscious goals operate in the same fashion as conscious goals in affecting behavior.

That priming a learning and/or a performance goal leads to a change in an individual’s affective arousal is consistent with Forster et al.’s (2007) argument that goals involve energy mobilization. This finding is also consistent with Custers and Aarts’ (2007) study that showed that people pursue a primed goal only to the extent that it pre-exists in their minds as a desired state. Indeed, emerging evidence suggests that onscious goal setting not only increases performance, it also enhances an overall sense of well-being such as positive affect (Latham, 2012). Koestner, Lekes, Powers, and Chicoine’s (2002) meta-analytic results, for example, revealed that goal attainment is associated with higher positive and lower negative affect. Such a tendency is even more pronounced when people have difficult goals.

Latham (2012) argued for a theoretical framework of motivation that integrates human emotion with cognition and behavior (also see Seo, Barrett, & Bartunek, 2004). Locke (2003) conceptualized emotion/affect as an automatic human experience whereby people undergo
subconscious value appraisals. Given the current results that primed goals led to a change in affective arousal, the present research also suggests affect as a promising underlying mechanism that may explain the primed goal-task performance relationship. Future research on subconscious goals may benefit from perspectives informed by the “affective revolution” (Barsade, Brief, & Spataro, 2003).

**Automaticity theory**

The finding that a primed learning goal increased performance outside an individual’s awareness supports automaticity theory (Bargh et al., 1996; Bargh, 1994). As noted in chapter 5, Forster and colleagues (2007) criticized the literature on primed goals for lack of evidence that a goal was actually activated. Hence, the second experiment implemented procedures to test the rival hypothesis that a change in task performance was due to other automatic, activation-based phenomena.

Were goals primed via showing an image of a woman winning a race and/or Rodin, The Thinker? The present research provides a positive answer. First, unlike typical social psychological studies of automaticity where priming experiments occur in only a few minutes, the priming effects in this research lasted for a longer time-period (Experiment 1: 35 minutes until the end of the brainstorming; Experiment 2: 30, 40, and 50 minutes until the end of trials 1, 2, and 3, respectively). The prime was only present for 75 seconds at the beginning of each experiment. Such lasting effects provide a temporal marker of goal pursuit (Forster et al., 2007). Second, consistent with Forster et al.’s suggestion, Experiment 2 implemented a novel manipulation check by testing participants’ affective arousal before and after goal priming. Consistent with Forster et al.’s argument that goals involve energy mobilization, the results of the second experiment suggest that exposing participants to a goal prime made them more
vigorous and less tense relative to those in the control group. These results, in addition to the
temporal marker noted above, jointly suggest that goals were indeed primed in the present
research. This finding addresses a key limitation of automaticity theory where the research on
which it is based utilized only a check for awareness, rather than an actual manipulation check
for goal activation.

**Goal systems theory**

The present research examined the interaction effect between priming a learning and a
performance goal on performance on two tasks that are complex for people. This interaction
hypothesis was based on goal systems theory (Kruglanski et al., 2002; Shah et al., 2003). This
theory states that different goal systems can be activated through priming. Depending on the
strength of activation, some goals in a goal system become consciously registered as *focal* goals;
others remain in the subconscious as *background* goals. As noted in chapter 2, goal systems
theory’s shielding principle states that an individual with multiple goals tend to pursue a
facilitative goal (focal) which automatically inhibits a background goal in order to increase
performance. The same phenomenon appears to occur when the two different types of goals are
primed. This is the first experiment to test this phenomenon.

Priming both a learning and a performance goal, relative to the control group, led to
significantly higher performance in the brainstorming task in Experiment 1. In experiment 2,
despite the significant interaction effect on the third trial, priming both goals did not appear to be
superior to priming only a priming goal. These results may be due to the different magnitudes of
inter-goal inhibition given the divergent nature of the two tasks. Whereas brainstorming involved
creativity, making schedules required knowledge acquisition. Shah et al. (2002) found that
inhibition of alternative goals tends to be more pronounced when they “serve the same
overarching purpose as the focal goal, but lessened when the alternative goals facilitate focal goal attainment” (p. 1261). The brainstorming task only involved one trial for generating ideas; the scheduling task involved four (including the practice trial). Given a relatively shorter time-frame for brainstorming than scheduling, it is possible that the participants in the first experiment automatically appraised the two goals as *substitutive* in that both goals served the same overarching purpose of generating ideas. The woman racer photograph cued them to perform fast, Rodin cued them to think hard. Under this circumstance, consistent with Shah et al.’s argument, inhibition of the performance goal was pronounced, thereby making the primed learning goal initially the focal goal to increase performance. Therefore, priming both goals relative to the control group led to significantly higher performance.

Given the multi-trial design of the scheduling task and its multi-dimensional complexity, it appears that participants first automatically appraised the learning goal as facilitative. As learning occurred across trials, participants became more knowledgeable about the task, and thereby gradually appraised the performance goal as facilitative. Under this circumstance, consistent with Shah et al.’s argument, inhibition of either goal was lessened.

In summary, both experiments provide modest support for goal systems theory and contribute knowledge to goal setting theory in terms of the potential interaction (and sometimes beneficial) effect of priming both a learning and a performance goal on performance of a task that requires the acquisition of knowledge. As noted earlier in chapter 2, consciously setting a learning and a performance goal simultaneously over taxes cognitive resources and therefore decreases task performance. As priming both goals consumes less (if any) cognitive resources, due to the goal shielding mechanism, a learning goal and a performance goal, when primed simultaneously, can operate interactively to facilitate each other’s role in increasing performance.
where people initially lack the knowledge to perform effectively. Further research is needed to corroborate this conclusion.

**Implicit motives theory**

As noted earlier, the voluminous experiments in social psychology on primed goals have not investigated whether they affect an implicit motive. The investigators only show that a primed goal affects behavior in the absence of an individual’s awareness of the goal-performance relationship. To address this gap, this dissertation utilized implicit motives theory as a theoretical framework for conducting the two experiments. Specifically, the Picture Story Exercise (PSE) was administered accompanied by the primed stimuli. The results indicate that priming a performance goal increases the implicit motive of need for achievement. This finding is consistent with Schultheiss’ (2008) argument that an implicit motive responds to non-verbal cues and can be aroused by environmental stimuli. The present finding, consistent with Shantz and Latham (2009) and Latham and Piccolo (2012), suggests that priming a performance goal affects the subconscious.

The present study, however, did not find support for the hypothesis that a primed learning goal can arouse the need for achievement. As Schultheiss (2008) and his colleagues (Schultheiss et al., in-press) noted, implicit motives tend to have an effect only on non-declarative measures of performance. A primed learning goal diverts people’s attention to formulating task-related procedures or processes to perform effectively. The need to achieve in terms of task accomplishment is not a priority.

Another possible explanation for the lack of support for implicit motives theory is that the present study did not distinguish between the active, *approach*-oriented components of need for achievement (*hope of success*, HS) and the anxiety-based, *avoidance*-oriented aspects of need for
achievement (fear of failure, FF) (Schultheiss, 2008). It is possible that on a task that is novel and requires knowledge generation or acquisition, priming a performance goal leads to FF, while priming a learning goal leads to HS.

Finally, priming a learning goal is likely to activate the need for cognition, namely, “the tendency for an individual to engage in and enjoy thinking” (Cacioppo & Petty, 1982, p. 116). This may be a potential mediator underlying the primed learning goal-task performance relationship. The Multi-Motive Grid (MMG) technique incorporating the PSE and self-report measures of motivation (Sokolowski, Schmalt, Langens, & Puca, 2000) may be a useful measurement instrument to test for this possibility in future research. The sense of learning scale (Porath et al., 2012) used in the second experiment may not have been an appropriate measure.

**Limitations and future directions**

The two experiments were conducted in a laboratory setting. In general, laboratory experiments tend to have high internal validity due to precise manipulation of the independent variable(s). As noted in chapter 2, results of laboratory experiments of goals that are consciously set typically generalize to field settings (Latham & Lee, 1986; O'Leary-Kelly, Martocchio, & Frink, 1994). To ensure generalizability of the present results pertaining to the beneficial effect of priming a learning goal, future research should be conducted in field settings to further test the hypothesis that priming a learning goal is beneficial to tasks that require the acquisition of knowledge. Start-up organizations or organizations characterized by a large population of inexperienced employees may be an ideal site for this type of research.

A second limitation of this research is that the discovery of mediating variables of the primed goal-performance relationship remains elusive. As noted earlier, future research can examine the role other specific components and/or configurations of implicit motives play in
affecting the subconscious goal-performance relationship. Assessing affective arousal over time may also help to further test the role affective arousal plays in affecting the primed goal-performance link.

A third limitation pertains to the issue of boundary conditions in inductively building a robust theory of subconscious goals. To date, few if any moderators of the primed goal-performance relationship have been investigated. Societal culture may be a moderator variable (Latham & Pinder, 2005). The extant research used photographs of Western cultural origins to prime goals. Cultural priming research (e.g., Oyserman & Lee, 2007) may suggest alternative images reflective of ‘cultural thickness’ for priming a performance or a learning goal. It is possible that an image of a woman winning a race (alone), relative to an image showing the same racer, but with significant others surrounding her to celebrate and share her achievement, may be less effective in arousing need for achievement among East Asians than their Western counterparts. Past research on bicultural individuals has shown that Japanese individuals pay more attention than Americans to the context rather than the focal object of a photograph (Masuda & Nisbett, 2001). It is possible that a Rodin/Thinker image, with a background characterized by additional cues for thinking and discovery, may be more effective than a photograph of only the Thinker in priming a learning goal among East Asians.

A fourth limitation may be ecological validity of goal existence and activation in daily life. Unlike previous subconscious goal research in HRM, I-O, and OB (e.g., Stajkovic et al., 2006; Shantz & Latham, 2009) that examined the additive effects of primed goals and consciously set goals, the present research only focused on primed goals. As multiple goals, both conscious and subconscious, usually co-exist, they may either align or be in conflict (Kleiman & Hassin, 2011). Schultheiss and Brunstein (1999) showed that when implicit motives and explicit
goals are congruent, a goal can become “an outlet” for implicit motives to enhance an individual’s performance and well-being. Future research can examine the effects of combinations of conscious and subconscious goals. Of particular relevance to learning goals is the possibility that when people are self learning task-related knowledge, while performing the task, the conscious goal of performing well becomes salient. And yet, in order to make them committed to performing the task, a learning goal should be primed in the subconscious. As noted earlier in chapter 2, Kruglanski and colleague’s goal systems theory offers insights into this hypothesis, in that performance and learning goals may operate alternately as either a focal (conscious) or a background (subconscious) goal. This research direction can overcome the pitfalls of previous research which found that consciously setting both a performance and a learning goal is detrimental to performance due to their competition for cognitive resources (Anderson, 1985; Noel, 1997). Overall, when conscious and subconscious goals are combined to complement each other, performance should be optimal, yet contingent upon task knowledge and skill. The results of experiment 2 suggest that this is the case for primed learning and performance goals.

A fifth limitation is that the scheduling task was static and only involved three trials. Had a (more) dynamic task been used, as was the case with the simulation used by Seijts et al. (2004), with 13 trials, stronger support might have been obtained for the goal systems hypotheses.

A sixth limitation is concerned with the determinants or antecedents of goal activation. To date, subconscious goals research in HRM, I-O, and OB has only started to examine the effect of visual stimuli, through presenting photographs, on activating a goal to affect behavior. Implicit motives theory states that implicit motives respond preferentially to non-verbal cues to affect subsequent behavior. George (2009) suggested that environmental cues in job design and
characteristics can subconsciously affect behavior in work settings. Hence future research is needed to assess other operationalizations of job characteristics that prime goals.

One potential candidate of priming a goal in work settings is background music played for an organization’s employees and customers. For example, in the call-centre context, what type of music should be played to both call centre employees and customers during wait time? Is there any musical genre that can prime a goal such that employees are more efficient (performance), strategic and thus effective (learning) to enhance or dampen service quality? In fact, there is a small but rich tradition of academic research that explores the connections between music and the management of work (Prichard, Korcznski, & Elmes, 2007). Levitin, a two-time winning author of New York Times Bestseller, also a musician, psychologist, and neuroscientist uncovered fundamental ways that music as “an information-bearing medium” can prime not only emotion but also knowledge via learning and memory activation (Levitin, 2006; 2008). Shek and Schubert (2009) reviewed the literature on background music in the workplace and proposed that music can either increase or reduce work productivity through affective (mood-arousal) and/or cognitive (distraction) mechanisms. Yet, there is no guiding theoretical framework to explain such effects. There is also no theoretical framework for making predictions regarding the effectiveness of priming a goal using two modalities, sight and sound.

A seventh possible limitation of the present two experiments is that the PSE itself might have diluted the effectiveness of the manipulation of the independent variable, namely, the photograph of Rodin of the racer. The participants may have been primed in different ways as a result of being exposed to the PSE. Future replications of these results should include an experimental condition where the PSE is not administered.
Finally, future research should examine how individuals can subconsciously motivate or demotivate team members to affect team effectiveness (Locke & Latham, 2004; Latham & Locke, 2007; Latham, 2012). As the dynamics within a team often introduce complexities not found when an individual performs job tasks, a wide range of rich environmental cues can naturally occur in a diverse work team. Subconscious goals activated in team settings therefore warrant research. Ultimately, when subconscious goal research advances to a cross-/multi-cultural level, future research can investigate how different cultural values, norms, and intellectual traditions activate goals similarly or differently to affect similar or different behaviors in work settings to inform novel human resource practices.
References


motivation on performance. Symposium at the annual meeting of the Society for Industrial and Organizational Psychology, Los Angeles.


List of Tables

Table 1: Pilot Study 3 - Independent t-tests of word imagery

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<th>LIWC dimension</th>
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<td>Racer</td>
<td>Thinker</td>
<td>Racer &amp; thinker</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>4.68 (3.27)</td>
<td>2.62 (1.94)</td>
<td>2.72*</td>
<td>4.68 (3.27)</td>
<td>4.96 (2.84)</td>
</tr>
<tr>
<td>2.62 (1.94)</td>
<td>4.96 (2.84)</td>
<td>-3.42**</td>
<td>2.62 (1.94)</td>
<td>2.30 (1.47)</td>
</tr>
</tbody>
</table>

Note. **p < .005, * p < .01,
Table 2: Experiment 1 - Observed means and standard errors on task performance

<table>
<thead>
<tr>
<th>Condition</th>
<th>Observed mean</th>
<th>SE</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Descriptive statistics for the main effect of priming a performance goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Priming a performance goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime</td>
<td>13.78</td>
<td>.59</td>
<td>12.62</td>
</tr>
<tr>
<td>No prime</td>
<td>12.37</td>
<td>.58</td>
<td>11.21</td>
</tr>
<tr>
<td><strong>Descriptive statistics for the main effect of priming a learning goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Priming a learning goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime</td>
<td>14.16</td>
<td>.58</td>
<td>13.02</td>
</tr>
<tr>
<td>No prime</td>
<td>11.99</td>
<td>.60</td>
<td>10.81</td>
</tr>
<tr>
<td><strong>Descriptive statistics for the interaction effect of priming both a performance goal and a learning goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Priming both a performance goal and a learning goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming a performance goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime</td>
<td>15.16</td>
<td>.83</td>
<td>13.52</td>
</tr>
<tr>
<td>No prime</td>
<td>12.41</td>
<td>.84</td>
<td>10.75</td>
</tr>
<tr>
<td>Priming a learning goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime</td>
<td>13.16</td>
<td>.81</td>
<td>11.57</td>
</tr>
<tr>
<td>No prime</td>
<td>11.57</td>
<td>.86</td>
<td>9.88</td>
</tr>
</tbody>
</table>
Table 3a. Experiment 1 – Mediation analysis: Priming a performance goal, need for achievement, and task performance (controlling for year of study)

<table>
<thead>
<tr>
<th>Variable</th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct and total effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = $n\text{ Ach}$</td>
<td>1.22</td>
<td>.62</td>
<td>1.97</td>
<td>.05*</td>
</tr>
<tr>
<td>Independent variable = Priming a PG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = Task performance</td>
<td>1.39</td>
<td>.84</td>
<td>1.65</td>
<td>.10</td>
</tr>
<tr>
<td>Independent variable = Priming a PG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = Task performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent variable = $n\text{ Ach}$</td>
<td>-.21</td>
<td>.11</td>
<td>-1.97</td>
<td>.05*</td>
</tr>
<tr>
<td>Independent variable = Priming a PG</td>
<td>1.64</td>
<td>.84</td>
<td>1.95</td>
<td>.05*</td>
</tr>
<tr>
<td><strong>Partial effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control variable = Year of study</td>
<td>1.50</td>
<td>.39</td>
<td>3.87</td>
<td>.0002**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect</th>
<th>M</th>
<th>SE</th>
<th>LL 95% CI</th>
<th>UL 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bootstrap results for indirect effect</td>
<td>-.25</td>
<td>.19</td>
<td>-.76</td>
<td>-.0003</td>
</tr>
</tbody>
</table>

Note. N =164. Bootstrap sample size = 1,000. PG = performance goal; LL = lower limit; UL = upper limit; CI = confidence interval.

**p < .0005; *p < .10.**
Table 3b. Experiment 1 – Mediation analysis: Priming a learning goal, need for achievement, and task performance (controlling for year of study)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( b )</th>
<th>( SE )</th>
<th>( t )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct and total effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 1</strong>&lt;br&gt;Dependent variable = ( n \ Ach )</td>
<td>( .03 )</td>
<td>( .63 )</td>
<td>( .05 )</td>
<td>( .96 )</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 2</strong>&lt;br&gt;Dependent variable = Task performance</td>
<td>( 2.14 )</td>
<td>( .84 )</td>
<td>( 2.56 )</td>
<td>( .01^{**} )</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 3</strong>&lt;br&gt;Dependent variable = Task performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent variable = ( n \ Ach )</td>
<td>( -.18 )</td>
<td>( .10 )</td>
<td>( -1.71 )</td>
<td>( .09^{*} )</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td>( 2.15 )</td>
<td>( .83 )</td>
<td>( 2.58 )</td>
<td>( .01^{**} )</td>
</tr>
<tr>
<td><strong>Partial effect</strong></td>
<td>( 1.38 )</td>
<td>( .39 )</td>
<td>( 3.57 )</td>
<td>( .0005^{***} )</td>
</tr>
<tr>
<td>Control variable = Year of study</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( M )</th>
<th>( SE )</th>
<th>LL 95% CI</th>
<th>UL 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bootstrap results for indirect effect</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect</td>
<td>(-.01)</td>
<td>(.13)</td>
<td>(-.34)</td>
</tr>
</tbody>
</table>

*Note. N = 164. Bootstrap sample size = 1,000. LG = learning goal; LL = lower limit; UL = upper limit; CI = confidence interval.*

***\( p < .001 \); **\( p < .05 \); *\( p < .10 \).
Table 4. Experiment 2 - Means and standard deviations of performance, self-efficacy, and strategy during trials 1, 2, and 3

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trials</th>
<th>Performance</th>
<th>Self-efficacy</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PG</td>
<td>M.</td>
<td>1.67</td>
<td>2.29</td>
<td>2.41</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>1.16</td>
<td>1.33</td>
<td>1.19</td>
</tr>
<tr>
<td>LG</td>
<td>M.</td>
<td>2.72</td>
<td>3.07</td>
<td>3.63</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>1.04</td>
<td>1.37</td>
<td>1.32</td>
</tr>
<tr>
<td>PG &amp; LG</td>
<td>M.</td>
<td>1.85</td>
<td>2.49</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>0.95</td>
<td>0.99</td>
<td>1.28</td>
</tr>
<tr>
<td>Control</td>
<td>M.</td>
<td>1.69</td>
<td>2.06</td>
<td>2.05</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>1.41</td>
<td>1.76</td>
<td>1.93</td>
</tr>
</tbody>
</table>
Table 5a. Experiment 2 – Mediation analysis: Priming a learning goal, energetic arousal, and task performance (controlling for pre-test performance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct and total effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = Energetic arousal</td>
<td>1.14</td>
<td>.58</td>
<td>1.97</td>
<td>.054*</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = Task performance</td>
<td>2.00</td>
<td>.75</td>
<td>2.66</td>
<td>.010**</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable = Task performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent variable = Energetic arousal</td>
<td>-.01</td>
<td>.17</td>
<td>-.04</td>
<td>.971</td>
</tr>
<tr>
<td>Independent variable = Priming a LG</td>
<td>2.01</td>
<td>.78</td>
<td>2.57</td>
<td>.013**</td>
</tr>
<tr>
<td><strong>Partial effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control variable = Pre-test performance</td>
<td>4.25</td>
<td>.67</td>
<td>6.36</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Control variable = Pre-test performance

<table>
<thead>
<tr>
<th>Effect</th>
<th>M</th>
<th>SE</th>
<th>95% CI</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bootstrap results for indirect effect</td>
<td>-.01</td>
<td>.29</td>
<td>-.76</td>
<td>.50</td>
</tr>
</tbody>
</table>

*Note. N = 61. Bootstrap sample size = 1,000. LG = learning goal; LL = lower limit; UL = upper limit; CI = confidence interval.

*** p < .0001; ** p < .05; * p < .10.
### Table 5b. Experiment 2 – Mediation analysis: Priming a learning and a performance goal, tense arousal, and task performance (controlling for pre-test performance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( b )</th>
<th>( SE )</th>
<th>( t )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct and total effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 1</strong></td>
<td>Dependent variable = Tense arousal</td>
<td>-1.72</td>
<td>.48</td>
<td>-3.55</td>
</tr>
<tr>
<td>Independent variable = Priming LG x PG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 2</strong></td>
<td>Dependent variable = Task performance</td>
<td>2.05</td>
<td>1.09</td>
<td>1.89</td>
</tr>
<tr>
<td>Independent variable = Priming LG x PG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equation 3</strong></td>
<td>Dependent variable = Task performance</td>
<td>.30</td>
<td>.41</td>
<td>.73</td>
</tr>
<tr>
<td>Independent variable = Tense arousal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial effect</td>
<td>4.16</td>
<td>.83</td>
<td>4.99</td>
<td>.000***</td>
</tr>
<tr>
<td>Control variable = Pre-test performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bootstrap results for indirect effect</th>
<th>( M )</th>
<th>( SE )</th>
<th>LL 95% CI</th>
<th>UL 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
<td>-.52</td>
<td>.70</td>
<td>-2.17</td>
<td>.63</td>
</tr>
</tbody>
</table>

Note. \( N = 33 \). Bootstrap sample size = 1,000. LG x PG = a learning and a performance goal; LL = lower limit; UL = upper limit; CI = confidence interval. 

*** \( p < .001 \); ** \( p < .005 \); * \( p < .10 \).
List of Appendices

Appendix 1: Pilot Study 1 - The Choice of a Rodin Thinker photograph to prime a learning goal

Rodin – The Thinker
Please rank the order of the following 8 pictures from 1 (the most) to 8 (the least) in terms of which ones make you think. Please indicate your rankings below each picture. You should use each number between 1 and 8 ONLY ONCE. Thank you for your time!
Appendix 2: Pilot Study 3, Experiments 1 & 2 - Goal primes

- Priming a performance goal
- Control

Note: Primes (from left to right, top to bottom): priming, performance and a learning goal.
Appendix 3: Experiment 1 & 2 – Picture cues used in the Picture Story Exercise (PSE)

Note: Picture titles (from left to right, top to bottom): woman chemists in laboratory; female gymnast, male workers in workshop, boy at the desk, trapeze
Appendix 4: Experiment 2 - Scheduling task instructions

Introduction

School is about to start. The computer that schedules classes just broke down. Therefore the Office of the Registrar has requested you to complete class schedules. Previous studies have indicated that this assignment is a good indicator of a person’s problem solving abilities.

Task Instructions

This package contains a list of 12 courses (i.e., English as a second language, speech communications, business writing, introduction to organizational behavior, organizational behavior quiz, introduction to human resource management, human resource management quiz, business policy, Canadian taxation, accounting, finance, consumer behavior, marketing strategy, and marketing research), and each with 10 possible sections. Please take a moment to examine these materials.

(Note: M = Monday, T = Tuesday, W = Wednesday, TH = Thursday, and F = Friday).

In completing the class schedules, use the following rules:

1. A completed schedule will indicate (a) the course name, (b) its code, (c) meeting times, and (d) section;

2. Each schedule must have 5 different classes scheduled on the same day;

3. Each schedule must be unique; it cannot duplicate another schedule;

4. Any course with a quiz section must have the quiz section scheduled on the same day as the class;

5. No two marketing courses (i.e., consumer behavior, marketing strategy, and marketing research) can be scheduled within one hour of each other; and

6. Any speech communication lecture class must have a lab class scheduled as well.
An example of a **CORRECT** class schedule is:

<table>
<thead>
<tr>
<th>Course name</th>
<th>Course code</th>
<th>Time</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 English</td>
<td>E5430</td>
<td>W 8:00-9:20am</td>
<td>A</td>
</tr>
<tr>
<td>2 Accounting</td>
<td>S4510</td>
<td>W 9:30-10:50am</td>
<td>B</td>
</tr>
<tr>
<td>3 Business Policy</td>
<td>B6430</td>
<td>W11:00-11:50am</td>
<td>D</td>
</tr>
<tr>
<td>4 Finance</td>
<td>S5630</td>
<td>W12:00-12:50pm</td>
<td>E</td>
</tr>
<tr>
<td>5 Marketing research</td>
<td>L4530</td>
<td>W1:00-1:50pm</td>
<td>F</td>
</tr>
</tbody>
</table>

The classes are all on Wednesday and the class times do no conflict; this schedule meets all of the 6 criteria outlined on the previous page.

An example of an **INCORRECT** class schedule is:

<table>
<thead>
<tr>
<th>Course name</th>
<th>Course code</th>
<th>Time</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Marketing strategy</td>
<td>L3420</td>
<td>M 8:00-9:20am</td>
<td>A</td>
</tr>
<tr>
<td>2 Marketing research</td>
<td>L4530</td>
<td>M 9:00-9:50am</td>
<td>B</td>
</tr>
<tr>
<td>3 Accounting</td>
<td>S4510</td>
<td>W 9:30-10:50am</td>
<td>B</td>
</tr>
<tr>
<td>4 Finance</td>
<td>S5630</td>
<td>M 10:00-10:50am</td>
<td>C</td>
</tr>
<tr>
<td>5 Business policy</td>
<td>B6430</td>
<td>W 11:00-11:50am</td>
<td>D</td>
</tr>
</tbody>
</table>

This class schedule is incorrect for at least three reasons:

1. There are conflicts in class time (e.g., Marketing strategy and Marketing research, and Accounting and Finance);
2. Classes are *not* scheduled on the same day (e.g., Monday and Wednesday); and
3. The two marketing courses are schedules within one hour of each other.

[Course listings to follow]