

5-2015

# The Effects of Anticipated Feedback Proximity on Performance: Exploring the Moderating Role of Self-Efficacy and Task Type

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THE EFFECTS OF ANTICIPATED FEEDBACK PROXIMITY ON PERFORMANCE:  
EXPLORING THE MODERATING ROLE OF SELF-EFFICACY AND TASK TYPE

A Thesis  
Presented to  
The Faculty of the Department of Psychological Sciences  
Western Kentucky University  
Bowling Green, Kentucky

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Science

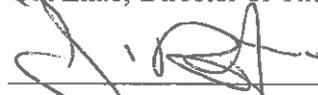
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May 2015

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AND TASK TYPE

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## ACKNOWLEDGMENTS

First and foremost, I would like to offer my sincerest gratitude to my advisor, Dr. Qin Zhao for her continuous assistance and dedicated involvement in my research and my Master's study. I would like to thank her very much for the support, patience and encouragement.

Further gratitude is extended to Dr. Jenni Redifer and Dr. Andrew Mienaltowski for serving as thesis committee members, as well as their insightful comments, professional suggestions and encouragement. I would also have to acknowledge Dr. Elizabeth Lemerise and Dr. Aaron Wichman, who motivated and supported me to chase my academic dream. To other faculty, Dr. Steve R. Wininger, Dr. Anthony Paquin and Dr. Reagan Brown, I would like to express gratitude to their enlightenment and assistance. Thanks also goes out to Battogtokh Zagdsuren for her help in data grading, and to Casey Fortney for his assistance in programming Media Lab software.

A special thanks to my family for the support they provided me and in particular, I must acknowledge my husband and best friend, Lianqi Wang, without whose love, encouragement and assistance, I would not have accomplished this thesis.

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May 2015

33 Pages

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The present study investigated the effect of anticipated feedback proximity (immediately after completing the task or one week later) on performance and the moderating role of self-efficacy and task types (analytical or creative). I hypothesized that expecting rapid feedback should yield better performance than expecting delayed feedback, for people with high self-efficacy or those who receive analytical tasks. For those who receive creative tasks or have low self-efficacy, expecting rapid feedback may produce negative impact on performance. The results indicated a trend of main effect of anticipated feedback proximity. Specifically, participants performed better when they expected immediate feedback relative to expecting delayed feedback, regardless of the task type. There was also a main effect of task type. Performance on the analytical tasks was better than performance on the creative tasks. However, neither self-efficacy nor task type moderated the effects of anticipated feedback proximity. The implications for these findings are discussed herein.

## **Introduction**

In learning settings, people often receive feedback on their performance, and this feedback plays an important role in helping people to reflect and improve. Feedback can be understood as a process which provides information in response to one's behaviour while completing tasks. The extensive study of feedback in research indicates its important role in learning (Schmidt & Bjork, 1992). Researchers have also started to study some extended features of feedback, such as anticipated feedback proximity. Anticipated feedback proximity refers to how quickly people expect to receive feedback on their performance.

### **Anticipated Feedback Proximity**

The earliest evidence for a relationship between anticipated feedback proximity and performance is from the research conducted by Nisan (1976), who reported that the expectation of immediate feedback led participants to have lower task performance than those who expected delayed feedback (1 week delay). Ninety-six boys in three seventh-grade classes from a school in Jerusalem were the participants. Two tasks in this study included constructing a word from six letters and an instruction test (Burt, 1927). The author gave example of the instruction test: "If you have already eaten supper today write here M, and if not write S."

Surprisingly, no research has been published about anticipated feedback proximity since Nisan (1976) until recently. Kettle and Häubl (2010) conducted a field experiment to explore the effects of anticipated feedback proximity on both actual and predicted performance on an individual oral presentation task. They obtained the opposite results to Nisan's (1976) experiment. Kettle and Häubl (2010) randomly assigned

participants to a presentation date, varying the date at which participants expected to receive their presentation grades (i.e., delay ranging from 0 to 17 days). Presentations were peer graded on a scale from 0 (poor) to 10 (excellent), and participants also made rank predictions (1 to 10) of their own performance. The results showed that anticipating more rapid feedback improved performance on the oral presentation task, and yet lowered performance prediction. The reported effects of anticipated feedback proximity were attributed to the desire to avoid disappointment (Kettle & Häubl, 2010). van Dijk, Zeelenberg, and Van der Pligt (2003) have suggested that the more proximate the anticipated feedback is, the more easily people feel the threat of disappointment. One way to avoid the negative feelings of disappointment is for the individual who is receiving feedback to lower their expectations while also working hard to perform well (Shepperd & McNulty, 2002).

A recent lab experiment involving a verbal aptitude task replicated the main findings of Kettle and Häubl (2010): anticipated feedback proximity had a significant effect on actual and judged performance, and expecting more proximate feedback caused people to perform better (Fajfar, Campitelli, & Labollita, 2012). One important difference between the two studies was that Kettle and Häubl (2010) examined predictions of future performance, whereas Fajfar et al. (2012) studied post-test estimation of performance. Fajfar et al. (2012) randomly assigned participants to one of two feedback proximity conditions: immediate versus delayed (after a week). They were asked to finish the BAIRE test of verbal aptitude (Cortada de Kohan, 2003), which asked participants to judge the definitions and synonyms of nouns. One dollar was rewarded for every correct answer, providing an incentive to motivate thoughtful and accurate performance. In

addition to actual test performance, the researchers examined participants' post-test estimation of performance (how many correct items they think they achieved), estimation of others' performance (the average number of others' correct responses), etc. The main findings were that the group expecting immediate feedback had better performance than the group expecting delayed feedback. The immediate feedback group underestimated their performance, whereas the delayed feedback group was fairly accurate and showed no significant bias in their judgment. Explanation for this finding was defensive pessimism: when the feedback was close, people were apt to have a pessimistic attitude about performance, and they worked hard to avoid negative feedback. Therefore, performance would be improved by working harder.

In addition to the main effects of anticipated feedback proximity on actual and judged performance, researchers have recently explored individual differences in response to anticipated feedback proximity, for example, the moderating role of metacognitive beliefs about intelligence (Zhao, Zhang, & Vance, 2013). Research suggests that there are two main types of metacognitive beliefs (or implicit theories) about intelligence: incremental theory and entity theory (Dweck, 1999; Dweck & Leggett, 1988; Molden & Dweck, 2006). Incremental theorists believe that intelligence is malleable and can be developed with effort. People with this belief tend to perceive feedback as useful information to improve their abilities (Dweck & Leggett, 1988; Molden & Dweck, 2006). However, entity theorists believe that intelligence is largely stable or fixed. People with this belief tend to perceive feedback as evaluative judgments on their abilities and are more likely to admit they have reached their ability's limits (Dweck & Leggett, 1988). Zhao et al. (2013) hypothesized that expecting rapid (versus

delayed) feedback would motivate better performance, particularly for people with an incremental view of intelligence who embrace feedback. Participants recruited from an introductory psychology course were randomly assigned to one of the four conditions resulting from a 2 x 2 between-subjects design: (anticipated feedback proximity: same day vs. 3 days later; beliefs about intelligence: incremental vs. entity). Prior to the exam, participants read one of the two versions of the article named “The Origins of Intelligence: Is the Nature-Nurture Controversy Resolved,” which was adopted to manipulate incremental or entity beliefs about intelligence (Miele, Finn, & Molden, 2011). Participants also received instructions about when they would likely know their test grades, on the same day or 3 days later. The main results showed that anticipation of rapid feedback improved performance in the incremental group but reduced performance in the entity group. It thus seems that anticipating rapid feedback can be motivating or detrimental, depending on individuals’ beliefs about ability (Zhao et al., 2013).

In summary, research on the effects of anticipated feedback proximity on judged and actual performance has important practical implications but is surprisingly scarce. The available evidence thus far demonstrates the significant effect of anticipated feedback proximity (rapid versus delayed) on people’s performance. In addition, individual differences may exist in response to anticipated feedback proximity. Overall, the main purpose of the current research is to extend past work by exploring additional moderating variables, including individual and task factors.

### **Self-Efficacy**

Self-efficacy is a kind of strong personal belief about oneself. In social cognitive theory, Albert Bandura first introduced self-efficacy as an important concept in 1977.

Self-efficacy refers to people's beliefs about the personal capabilities that they possess and implement in future situations (Bandura, 1994). It is a task-specific belief (Bandura, 1986) which focuses on performance capabilities and varies according to personal experience, psychological status, verbal persuasion, and so on (Bandura, 1977). People show different levels of self-efficacy on different kinds of tasks, such as mathematics, reading, or exercise, as well as on different experiences, such as driving or teaching (Bandura, 2006).

Researchers have examined the role of self-efficacy in academic settings and found that self-efficacy significantly influences students' motivation and performance, such as their mastery experiences about specific domain knowledge, their judgment about one's capabilities in specific tasks, how much effort people would put forth, and how long people would maintain their behaviour (e.g., Bandura, 1994; Pajares, 2003). Research on self-efficacy in specific academic domains, like writing, mathematics, and science, has demonstrated that self-efficacy is an important determinant in learning and performance (Pajares, 1996, 1997; Pajares & Schunk, 2001). Bandura believed that the most important source of self-efficacy is mastery experience. If a student has had successful past experiences in performing a task, they will strengthen and enhance his/her self-efficacy. These experiences are an important source for one's confidence and success in performance (Bandura, 1994; Pajares, 2003).

Given the important role of self-efficacy in motivation related to learning and performance, it would be worthwhile to investigate whether and how learners with varying levels of self-efficacy would respond to feedback proximity instructions. Like the incremental theorists in Zhao et al. (2013), high self-efficacy individuals are expected to

show a more positive attitude toward immediate feedback because of their mastery experience and belief in ability, compared to low self-efficacy individuals. Based on Zhao et al.'s (2013) finding and the literature on self-efficacy, the hypothesis is thus that people with higher levels of self-efficacy may welcome feedback more and thus be positively motivated by the anticipation of more immediate feedback, whereas people with lower self-efficacy may have a less welcoming or even avoidant attitude toward feedback and thus be less motivated or even be distracted by the anticipation of more immediate feedback.

### **Task Type: Analytical versus Creative Tasks**

Another moderating variable to be examined in the current research is the task type. The tasks used in research investigating the impact of anticipated feedback proximity on performance are mostly academic or analytical types of tasks, such as oral presentation tasks, tests of verbal aptitude, or course exams. No evidence is available as to whether the effects of anticipated feedback proximity on performance depend on task type. The current study will explore the impact that anticipated feedback proximity has on performance on creative versus analytical tasks.

Creativity is defined as a novel production of useful ideas in any domain of human life (Amabile, 1996). Creative thinking is how people solve problems and find solutions using a novel or original way (Amabile, 1998). In addition, creativity contains features of imagination (Gundogan, Ari, & Gonen, 2013). As suggested by some studies, compared to creative tasks, analytical tasks involve more systematic planning and processing (Lavric, Forstmeier, & Rippon, 2000). Specifically, analytical tasks emphasize effective information processing (i.e., comparing, contrasting, evaluating and analysing),

as well as organized and logical thinking. On the other hand, creative tasks emphasize generating novel ideas.

Creative tasks involve three cognitive processes: divergent thinking, convergent thinking, and associative fluency (Lee & Therriault, 2013). Divergent thinking and convergent thinking are the two main processes of creativity. Researchers have made a distinction between these two thinking processes. Divergent thinking leads to originality, which is the primary feature of creativity (Runco, 2007). Creative thinking tasks, such as the Torrance Tests of Creative Thinking (TTCT; Torrance, 1966), the Abbreviated Torrance Tests for Adults (ATTA; Goff & Torrance, 2002) and Guilford's Unusual Uses Tests (Guilford, Merrifield & Wilson, 1958), require participants to find as many solutions for open-ended questions as possible. On the other hand, convergent thinking is closely related to people's deductive reasoning ability (Runco, 2007), which requires people to produce the "correct" answers to questions. Well-known creative tasks for convergent thinking include the Remote Associates Test (RAT; Mednick, 1962; Mednick & Mednick, 1967) and insight problems. These tasks require participants to generate correct solutions (Brophy, 1998; Runco, 2007). The third thinking process in creativity, associate fluency, can be explained as shared associative processing of divergent and convergent thinking (Lee & Therriault, 2013). For example, the Letter Fluency Task (Borkowski, Benton, & Spreen, 1967) and Category Fluency Task (Benton & Hamsher, 1978) not only require divergent thinking processing to activate remote associates, but also call for convergent thinking processing to identify correct answers.

How does expecting rapid (versus delayed) feedback impact creative performance? In the current study, feedback could be provided in terms of participants'

performance scores and thus should be considered as an extrinsic (rather than intrinsic) source of motivation. Extrinsic motivation takes place when people are largely motivated by environmental reinforcements or punishments. In contrast, intrinsic motivation refers to the idea that people's behaviours are produced from internal desires and are fulfilled for their own sake (Ryan & Deci, 2000). Amabile (1998) summarized her work on creativity and motivation, and reported that, in general, extrinsic motivation leads to less creativity, whereas intrinsic motivation yields more creativity. She also pointed out that, when people are motivated by their interests and challenges, they will show more creativity, whereas external pressures lead to less creativity. Other researchers have also shown that extrinsic motivation (e.g., rewards) decreases people's freedom in their actions and constrains their behaviour to reward seeking (Cooper & Jayatilaka, 2006). As a result, individuals' creativity will be hurt.

Anticipating immediate feedback is expected to yield higher extrinsic motivation than anticipating delayed feedback. Therefore, based on the reviewed literature on extrinsic motivation and creativity, the main hypothesis is that, on creative tasks, participants may perform more poorly in anticipation of immediate (versus delayed) feedback, whereas, on analytical tasks, they may generally perform better in anticipation of immediate (versus delayed) feedback.

## **Method**

### **Participants and Design**

One hundred and fifty six students (97 female) between the ages of 19 and 29 ( $M=19.69$ ) from Western Kentucky University were recruited as participants through Study Board, an automated online system for students to schedule their research

participation voluntarily in the Departments of Psychology and Psychological Sciences. Participants were awarded two Study Board credits for their participation. This study was approved by the Human Subjects Review Board of Western Kentucky University.

The two independent variables in the study were anticipated feedback proximity and task type. Feedback proximity (i.e., immediately vs. a week delayed) and task type (i.e., analytical vs. creative task) were manipulated as between-subjects variables. Self-efficacy for each task type was measured and participants' ACT scores were also accessed to control for academic ability. The dependent variables included the actual performance on both analytical and creative tasks.

## **Materials**

The creative task materials included two tasks for measuring the important thinking processes of creativity, which were convergent thinking and divergent thinking. For assessing convergent thinking ability, the current study used the Remote Associates Test (RAT; Mednick, 1962; Mednick & Mednick, 1967). The RAT requires participants to generate a word that is associated with a set of three compound words. The difficulty level of RAT questions can be manipulated, such as the different time limits for solving each problem. The reason for choosing RAT as creative tasks was that convergent thinking was crucial for reaching the solution of these problems. For measuring divergent thinking ability, the current study used the Abbreviated Torrance Test for Adults (ATTA; Goff & Torrance, 2002), which was a shortened version of Torrance Tests of Creative Thinking (TTCT; Torrance, 1966). The ATTA tests creativity as a norm-referenced measure by quantifying figural and verbal creative ability through norms of fluency, originality, elaboration and flexibility (Goff & Torrance, 2002). Participants have to get a

solution by using divergent thinking (see Appendices A and B for sample RAT and ATTA problems, respectively).

The analytical task materials included sample math and verbal questions from the American College Testing (ACT). ACT is a standardized test for examining students' control of knowledge, independent thinking ability, and judgment. *McGraw-Hill's 10 ACT Practice Tests (2<sup>nd</sup> Edition*; Dulan, 2008) were used in the study (see the Appendices C & D for sample questions).

A self-efficacy scale named Problem-Solving Self-Efficacy (Bandura, 2006) was used as a measurement of self-efficacy in the current study. The current study involved two types of tasks, analytical tasks (i.e., ACT math and verbal sample problems) and creative tasks (i.e., the RAT and ATTA). After seeing an example problem for each task, the participants were instructed to assess their own analytical and creative problem-solving self-efficacy, respectively: "Next, you will be given problems similar to the examples to solve. Please rate how certain you are that you can solve this kind of problems at each of the levels (10% to 100%) described below." The degree of confidence varies from 0 to 100 (see Appendix E for the Problem-Solving Self-Efficacy scale).

The post-performance measures of task involvement, effort, and enjoyment (Elliot & Harackiewicz, 1996) were also used, which can be considered as a measure of participants' intrinsic motivation. The participants rated their levels of agreement with statements concerning task involvement, effort, and enjoyment on a six-point scale ranging from "disagree very much (1)" to "agree very much (6)" (see Appendix F for sample questions from the questionnaire).

## **Procedures**

All participants read and signed a consent form prior to the experiment.

Participants also provided an additional signature if they permitted the researcher to access their ACT scores. The entire experiment was programmed and administered with Media Lab software.

Participants were randomly assigned to one of four conditions resulting in a 2 (feedback: immediate or delayed) x 2 (task type: analytical or creative) between-subjects design. Prior to completing the task, participants were given instructions based on their condition. All of the participants read the instructions about the purpose of the study, importance of the tasks, and when they would receive their feedback: “Immediately (or one week later) after the study has been completed, you will be provided with information regarding how you did on today’s tasks.” The following manipulation check questions tested whether the participants understood the study. It included two questions: (1) According to the instructions you read earlier, what was the purpose of the study? (You may go back to reread the instructions); (2) When will you receive feedback on the upcoming task? (You may go back to reread the instructions)

Next, participants were given sample problems to read and then their self-efficacy was measured with the Problem-Solving Self-Efficacy Scale. The instructions were modified for the analytical and creative tasks. The instructions for the analytical task group were: “Now, you will see some sample questions of analytical tasks. The analytical questions include verbal questions and mathematical questions, which require basic analyzing and reasoning ability to tackle them. Please rate how certain you are that you can solve these types of analytical problems at each of the levels described below.” The

instructions for the creative task group were: “Now, you will see the sample questions of creativity tasks. Please rate how certain you are that you can solve these types of creativity problems at each of the levels described below.” There was an error in programming this scale in Media Lab such that participants only rated the specific percentage (10% to 100%) of the problems they thought they could solve, rather than their confidence level (0 to 100) at EACH of these levels (10% to 100%). I will further address this limitation in the discussion section.

Participants then completed analytical or creative tasks. The study attempted to randomize the task order within the task groups. However, one of the creative tasks, ATTA, required the experimenter to read instructions for all three questions, which might bother the other participants if they were assigned to complete the RAT at the same time. Therefore, the current study gave up the idea of randomizing task order. In the analytical task group, the order of task was math and verbal; in the creative task group, the task order was RAT and ATTA. The analytical tasks had verbal (15 questions) and math (12 questions) sections. Participants were tested on each of the sections within 15 minutes; the participants in the creative task group completed 18 questions of the RAT within 20 minutes and completed each of the three parts of the ATTA in three minutes. The experimenter controlled the test time using a timer.

Participants then completed the task involvement, effort, and enjoyment questionnaire on six-point scales ranging from “disagree very much (1)” to “agree very much (6).” Next, a demographic questionnaire including gender, age, major, ethnicity, and ACT scores was completed by participants. At the end of the task, participants were debriefed about the experiment.

## Results

### Manipulation Check

The manipulation check was to confirm whether the participants understood when they would receive the performance feedback, immediately after completing the tasks or one week later. Effective manipulation was the important precondition to discuss the effect of anticipated feedback proximity. Among the original 166 participants, 94% of participants knew the correct time for receiving feedback, and 6% participants gave incorrect (e.g., two months) or unclear answers (e.g., yes) to the manipulation check questions. Therefore, I excluded 6% of the data, and the resulting final sample consisted of participants who had a correct understanding of their feedback time ( $N=156$ ; Females=97, Males=59).

### Task Performance

To test the hypotheses regarding the effects of anticipated feedback proximity on performance and the moderating role of task type and self-efficacy, a mixed-design analysis of covariance (mixed ANCOVA) was used. Anticipated feedback proximity (immediate versus a week later) and task type (analytical versus creative) were between-subjects variables. Because each participant completed two tests (ACT math and verbal; or RAT and ATTA), I created a within-subjects variable of TEST 1 versus TEST 2. For the analytical-task group, TEST 1 was ACT math and TEST 2 was ACT verbal. For the creative-task group, TEST 1 was RAT and TEST 2 was ATTA. All performance scores were converted to percentage accuracy scores. ACT and self-efficacy scores were controlled for as covariates. I initially used a median split to change self-efficacy from a continuous variable to a categorical variable (lower level of self-efficacy=0; higher level

of self-efficacy=1). However, the size of the low self-efficacy (e.g.,  $N=13$ ) and high self-efficacy (e.g.,  $N=58$ ) groups was extremely uneven. Thus, self-efficacy was used as a continuous covariate in the data analysis.

Based on the results of tests of between-subjects effects, there was a marginally significant main effect of anticipated feedback proximity,  $F(1,132)=3.18, p=.08$ . Although the effect of anticipated feedback proximity did not reach statistical significance, this marginal effect indicated the trend that participants who expected immediate feedback ( $M=52.12\%, SE=1.73\%$ ) performed better than participants who anticipated delayed feedback ( $M=47.67\%, SE=1.79\%$ ). Besides, a significant main effect of task type was observed,  $F(1,132)=5.60, p=.02$ , suggesting that participants performed better on analytical tasks ( $M=52.84\%, SE=1.79\%$ ) than on creative tasks ( $M=46.95\%, SE=1.73\%$ ). However, the interaction between anticipated feedback proximity and task type was not significant,  $F(1, 132)=1.85, p=.18$ . In addition, ACT score predicted analytical and creative task performance significantly,  $F(1,132)=82.12, p=.00$ . Self-efficacy, however, did not significantly predict task performance,  $F(1,132)=.46, p=.50$ .

The tests of within-subjects effects showed a significant interaction between the within-subjects variable of TEST1 versus TEST2 and task type,  $F(1,132)=4.33, p=.04$ , partial  $\eta^2=.03$ . A further investigation of this interaction indicated that on the analytical tasks, TEST 1 (math) performance ( $M=54.14\%, SE=2.90\%$ ) did not differ significantly from TEST 2 (verbal) performance, ( $M=51.54\%, SE=2.47\%$ ),  $p=.29$ . However, on the creative tasks, TEST 1 (RAT) performance ( $M=42.45\%, SE=2.79\%$ ) was poorer than TEST 2 (ATTA) performance ( $M=51.45\%, SE=2.37\%$ ),  $p=.01$ .

To further explore the relationships among task performance, self-efficacy and ACT score, I also conducted a correlation analysis in SPSS. The results showed that in terms of the analytical task, math performance was positively correlated with self-efficacy,  $r=.28, p=.01$  and ACT score,  $r=.59, p=.00$ ; verbal performance was also positively correlated with self-efficacy,  $r=.33, p=.00$  and ACT score,  $r=.61, p=.00$ . Math and verbal performance were positively correlated as well,  $r=.33, p=.00$ . ACT score was positively correlated with self-efficacy on the analytical task,  $r=.34, p=.00$ . However, there was no significant relationship between RAT performance and self-efficacy,  $r=.03, p=.80$ , or between ATTA and self-efficacy,  $r=-.06, p=.59$ . ACT score showed a significant positive relationship with RAT performance,  $r=.49, p=.00$ , and ATTA performance,  $r=.27, p=.02$ . There was no significant relationship between RAT performance and ATTA performance,  $r=.11, p=.33$ . ACT score did not demonstrate a significant correlation with self-efficacy on creative tasks,  $r=.11, p=.36$ .

### **Task Involvement, Effort, and Enjoyment**

The multivariate analysis of covariance (MANCOVA) was used to examine the task involvement, effort, and enjoyment considering the effects of anticipated feedback proximity and task types, after controlling for self-efficacy and ACT scores. According to the results, task type played a significant role in the responses of task enjoyment,  $F(1,132)=22.16, p=.00$ , partial  $\eta^2=.14$ , and task effort,  $F(1,132)=4.74, p=.03$ , partial  $\eta^2=.04$ . Specifically, participants enjoyed creative tasks ( $M=13.70, SE=.39$ ) more than analytical tasks ( $M=11.08, SE=.40$ ), and reported greater effort on creative tasks ( $M=10.64, SE=.18$ ) than on analytical tasks ( $M=10.06, SE=.19$ ). Moreover, ACT scores significantly predicted task involvement,  $F(1,132)=4.49, p=.04$ , partial  $\eta^2=.03$ , effort,

$F(1,132)=5.43, p=.02$ , partial  $\eta^2=.04$ , and enjoyment,  $F(1,132)=6.93, p=.01$ , partial  $\eta^2=.05$ . No other effects were significant,  $p >.05$ . Additionally, in terms of overall task engagement in the study, participants reported good levels of involvement, 73.14% ( $M=26.33$  out of 36), effort, 86.25% ( $M=10.35$  out of 12), and enjoyment, 68.83% ( $M=12.39$  out of 18) on the lab tasks.

## **Discussion**

Previous research has demonstrated the significant effect of anticipated feedback proximity on judged and actual performance, although there are some discrepant findings. Moreover, individual differences have been observed to moderate the effect of anticipated feedback proximity. The current study was conducted to extend this line of research on anticipated feedback proximity by exploring two possible moderating variables, self-efficacy and task type (analytical and creative). One of the hypotheses was that people who expected to receive feedback immediately would perform better on analytical tasks (i.e., math and verbal), but would perform more poorly on creative tasks (i.e., RAT and ATTA), relative to people who expected to receive feedback one week later.

According to the results, there was a marginal main effect of anticipated feedback proximity. Although the effect did not approach statistical significance, it indicated a trend that people performed better when they received immediate feedback than delayed feedback. The result did not support the original hypothesis about the feedback proximity by task type interaction effect, but the main effect was consistent with the findings from two recent studies (i.e., Fajfar et al., 2012; Kettle & Häubl, 2010).

In previous research demonstrating significant effects for anticipated feedback proximity on task performance, most of the tasks were analytical tasks, such as verbal aptitude test and the exam of a psychology course (Fajfar et al., 2012; Zhao et al., 2013). The current study showed that regardless of the task type (analytical versus creative), expecting immediate feedback tends to enhance performance. Why did previous studies find significant effects for expecting immediate feedback whereas the current study just demonstrated a trend? One explanation is that participants in my study had relatively low concern for performance feedback. The previous studies either used high-stakes course exams (Zhao et al., 2013) and an oral presentation test (Kettle & Häubl, 2010) as experimental tasks, or used financial incentives to enhance task extrinsic motivation on a verbal aptitude test (Fajfar et al., 2012). In the current study, participants just received research participation credits for completing the experimental tasks, which were not contingent upon their performance levels, so participants' extrinsic motivation to do well on these tasks might have been relatively low. The post-performance measure of task involvement, effort, and enjoyment showed that participants reported good intrinsic motivation on the tasks. However, having a decent level of task engagement and enjoyment may be different from having strong extrinsic motivation to obtain high test scores. To find strong effects of anticipated feedback proximity, researchers have to find ways to make participants care deeply about the performance feedback (i.e., test scores).

I also hypothesized that people with different levels of self-efficacy would respond differently to feedback proximity instructions. Self-efficacy did not show a significant moderating effect in response to anticipated feedback proximity. The negative finding was difficult to interpret due to several limitations in using the self-efficacy scale

in the current study. First, in the current study, participants rated their overall analytical self-efficacy and overall creative self-efficacy. However, a better measure should have assessed self-efficacy in each of these specific task domains: math, verbal, convergent, and divergent thinking tasks. The measure in the current study was not entirely task-specific, which made it hard to interpret what their reported self-efficacy was for.

Secondly, the measurement was not properly used. The measurement has two parts: the first part showed participants the degree of confidence in solving problems from 0 (can not do at all) to 100 (highly certain can do); the second part required participants to rate their confidence on each of the 10 levels, from "can solve 10% of the problems" to "can solve 100% of the problems" using the confidence degree from the first part. However, in the current study, participants were only instructed to select one of the ten levels: from 10% of the problems they can solve to 100% of problems they can solve. Given these problems with the use of the self-efficacy scale, it is difficult to interpret the findings regarding self-efficacy. Future investigation is thus required to examine the moderating role of self-efficacy in the effect of anticipated feedback proximity.

Besides, self-efficacy was positively correlated with math and verbal performance, but not correlated with RAT and ATTA performance. This finding may suggest that participants have had more experience with ACT types of tasks than with tasks like RAT and thus are more able to predict their performance on the ACT. The ACT was used to control participants' academic ability. However, it showed more powerful influences. First of all, ACT score predicted all four tasks' performance. ACT score also correlated with participants' intrinsic motivation, which was reflected by the measure of task involvement, effort and enjoyment.

To conclude, the marginal effect of anticipated feedback proximity in the current study indicated a trend that people performed better when they received immediate feedback than delayed feedback, regardless of the task type. The current study did not find significant moderating effects for self-efficacy or task type. Future studies on the topic should adopt more effective methods of increasing task extrinsic motivation in a lab setting. It is also necessary for future studies to further explore the role of self-efficacy in response to the effect of feedback proximity.

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## Appendix A

### Remote Associate Test (RAT)

Please come up with a word which connects with all the listed three words.

Example question: Birthday, Light, Stick;

Answer: Candle.

Question:	Answer:
Cottage/Swiss/ Cake	_____
Cream/Skate/ Water	_____
Loser/Throat/Spot	_____
Show/Life/Row	_____

(Bowden & Jung-Beeman, 2003; Mednick, 1962)

## **Appendix B**

### **The Abbreviated Torrance Test for Adults (ATTA)**

Instructions: the test you are about to take involves 3 activities. One calls for verbal responses and the other two call for figural responses. The activities will give you a chance to see how good you are at thinking up new ideas and solving problems. They will call for all of the imagination and thinking ability you have. For each of the three activities, you will read the directions. After this, you will be given for each activity 3 minutes to respond.

1. JUST SUPPOSE you could walk on air or fly without being in an airplane or similar vehicle. What problems might this create? List as many as you can. You have 3 minutes to respond to this activity.

2. Use the incomplete figures below to make some pictures. Try to make your pictures unusual. Your pictures should communicate as interesting and as complete a story as possible. Be sure to give each picture a title. No credit will be given for this activity unless the two incomplete figures are used. You have 3 minutes to respond to this activity.

3. See how many objects or pictures you can make from the triangles below, just as you did with the incomplete figures. Remember to create titles for your pictures.

No credit will be given for this activity unless the triangle figures are used.

You have 3 minutes to respond to this activity.

(Goff & Torrance, 2002)

## Appendix C

### Math Test

1. What two numbers should be placed in the blanks below so that the difference between the consecutive numbers is the same? 13, \_\_, \_\_, 34.

A. 19, 28

**B. 20, 27**

C. 21, 26

D. 23, 24

E. 24, 29

2. The larger of two numbers exceeds three times the smaller number by 4. The sum of twice the larger number and 4 times the smaller number is 58. If  $x$  is the smaller number, which equation below determines the correct value of  $x$ ?

A.  $3(2x + 4) + 4x = 58$

B.  $3(2x - 4) + 3x = 58$

C.  $2(3x + 4) + 2x = 58$

**D.  $2(3x + 4) + 4x = 58$**

E.  $2(2x - 4) + 4x = 58$

3. The ratio of the side lengths for a triangle is exactly 7:11:13. In a second triangle similar to the first, the shortest side is 9 inches long. To the nearest tenth of an inch, what is the length of the longest side of the second triangle?

A. 14.1

B. 15

C. 16.7

**Appendix C (continued)**

**D. 17.3**

**E.** Cannot be determined from the given information.

(Dulan, 2008)

## Appendix D

### Verbal Test

1. The strange signal detected by the radio telescope, rather than being taken as evidence of a new cosmological phenomenon, was instead treated as merely ----- of the equipment itself.

**(A) a malfunction**

(B) a bulwark

(C) an anthology

(D) a mutation

(E) a transfer

2. The long-standing divisions among the indigenous ethnic groups in the region have created an ----- problem that may never be solved without international intervention.

(A) impotent

**(B) intractable**

(C) evanescent

(D) irate

(E) insipid

3. The ease with which the army's defenses were breached surprised the opposing general, who expected resistance to be far more ----- than it was.

(A) ephemeral

(B) compatible

(C) egregious

(D) tolerable

**Appendix D (continued)**

**(E) imposing**

(Dulan, 2008)

## Appendix E

### Problem-Solving Self-Efficacy

Please rate how certain you are that you can solve the analytical (creative) problems at each of the levels described below.

*Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:*

0 10 20 30 40 50 60 70 80 90 100

Cannot	Moderately	Highly certain
do at all	can do	can do

#### Confidence

**(0-100)**

Can solve 10% of the problems \_\_\_\_\_

Can solve 20% of the problems \_\_\_\_\_

Can solve 30% of the problems \_\_\_\_\_

Can solve 40% of the problems \_\_\_\_\_

Can solve 50% of the problems \_\_\_\_\_

Can solve 60% of the problems \_\_\_\_\_

Can solve 70% of the problems \_\_\_\_\_

Can solve 80% of the problems \_\_\_\_\_

Can solve 90% of the problems \_\_\_\_\_

Can solve 100% of the problems \_\_\_\_\_

(Bandura, 2006)

## **Appendix F**

### **Task Involvement, Effort, and Enjoyment**

Read each of the following statements carefully and indicate your agreement with it using the scale below. There are no “right” or “wrong” answers. Answers in the way that is right for you, being as truthful as possible.

#### **Scale:**

Disagree very much

Disagree pretty much

Disagree a little

Agree a little

Agree pretty much

Agree very much

#### **Sample Question:**

##### **Involvement:**

1. While working on the tasks, I was totally absorbed in the tasks.
2. While working on the tasks, I lost track of time.
3. While working on the tasks, I thought about things unrelated to the tasks or the experiment.

##### **Efforts:**

1. I put a lot of effort into completing the tasks.

2. I tried very hard to complete the tasks.

### **Appendix F (continued)**

#### **Enjoyment:**

1. I enjoyed completing the tasks.
2. I think that completing the tasks was boring.
3. The tasks were fun.

(Elliot & Harackiewicz, 1996)