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Motivated or paralyzed? Individuals' beliefs about intelligence influence performance outcome of expecting rapid feedback

Qin Zhao *, Jie Zhang, Kaleigh Vance

Western Kentucky University, United States

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ABSTRACT

The current research examines whether and how beliefs about intelligence moderate the effects of expecting rapid feedback on exam performance. Thirty-six undergraduates participated in a field experiment with two between-subjects independent variables: anticipated feedback proximity and beliefs about intelligence. The results show that expecting same-day feedback significantly lowered exam performance of students who were primed with an entity belief about intelligence, compared to a 3-day delay. However, students who were primed with an incremental belief about intelligence showed an enhancement trend in exam performance in anticipation of same-day feedback, relative to a 3-day delay. The findings contribute to our understanding of individual differences in performance outcome of expecting rapid feedback and have significant educational implications.

1. Introduction

It is well recognized that feedback is very important in learning and performance (e.g., Schmidt & Bjork, 1992). Recent research suggests that anticipated feedback proximity, i.e., when people expect to receive feedback, also has a significant impact on performance (Fajfar, Campitelli, & Labollita, 2012; Kettle & Häubl, 2010). Kettle and Häubl (2010) provided the first empirical evidence that the mere anticipation of rapid feedback causes people to perform better. In a field experiment involving individual oral presentations in a university course, participants were randomly assigned to a presentation date and anticipated receiving feedback on their presentations on different dates, with feedback delays ranging from 0 to 17 days. Participants who anticipated more proximate feedback received higher grades on their presentations than did those who anticipated more delayed feedback. The results were attributed to the more salient threat of disappointment when anticipated feedback is more proximate (van Dijk, Zeelenberg, & van der Pligt, 2003). The desire to avoid disappointment might have motivated people to work hard to perform well (Kettle & Häubl, 2010). More recently, the performance-enhancing effect of anticipating rapid feedback was replicated by Fajfar et al. (2012), in which participants who expected immediate feedback showed better performance on a test of verbal aptitude, relative to those who expected to receive feedback a week after taking the test.

The purpose of the current research is to extend the findings on anticipated feedback proximity by examining the possible moderating role of beliefs about intelligence. People's beliefs about intelligence, or naïve theories of intelligence, have been studied in a variety of domains, particularly in academic achievement. According to Dweck (e.g., Dweck, 1999; Dweck & Leggett, 1988; Molden & Dweck, 2006), some people believe that intelligence is malleable and develops incrementally through effort (incremental theory); whereas others believe that intelligence is a fixed and stable entity (entity theory). Research has shown significant differences between incremental and entity theorists in motivational orientation (e.g., Dweck, 1999; Dweck & Leggett, 1988; Hong, Chiu, Dweck, Lin, & Wan, 1999; Molden & Dweck, 2006). People with an incremental view of intelligence are more motivated to learn and to develop their abilities. In contrast, people with an entity view of intelligence are more motivated to maintain a positive self-view of intelligence.

Of greatest relevance to the present study, research evidence suggests that incremental and entity theorists interpret feedback differently and respond differently to negative feedback. Incremental theorists tend to interpret feedback as useful information that can be used to develop their abilities. In contrast, entity theorists interpret feedback as an assessment of their stable abilities (Dweck, 1999; Molden & Dweck, 2006). Incremental theorists put forth more effort on a task after receiving negative feedback. Entity theorists, however, tend to disengage from a task after receiving negative feedback (e.g., Dweck & Leggett, 1988; Hong et al., 1999). For example, Hong et al. (1999) asked participants to take an intelligence test and then gave them positive or negative feedback about their performance. The results showed that incremental theorists were likely to complete a remedial task to improve their performance on the intelligence test regardless of the type of feedback they received, whereas entity theorists were much

* Corresponding author at: Department of Psychology, Western Kentucky University, 1906 College Heights Blvd., Bowling Green, KY 42101, United States. Tel.: +1 270 745 5023; fax: +1 270 745 6934.
E-mail address: qin.zhao@wku.edu (Q. Zhao).

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less likely to complete the remedial task when they had received negative feedback as opposed to positive feedback. Given that incremental and entity theorists interpret feedback very differently, it stands to reason that these two groups of individuals will show different responses in anticipation of rapid feedback. Incremental theorists might show a positive response to message about rapid feedback since they interpret feedback as useful information for improving abilities. In contrast, entity theorists might show a negative response to message about rapid feedback since they perceive feedback as a potential threat to their self views of abilities.

We conducted a field experiment involving a high-stakes exam in a university course and experimentally manipulated[1] beliefs about intelligence in order to demonstrate the causal relationship between beliefs about intelligence and responses to anticipated feedback proximity. Our hypothesis was that participants who were manipulated to hold incremental belief and entity belief might show different responses to anticipated proximate feedback and result in different exam performance. Expecting rapid feedback might energize and motivate people in the incremental belief condition to perform well on their exams. In contrast, expecting rapid feedback might present a paralyzing threat for people in the entity belief condition and, consequentially, impair their exam performance.

2. Method

2.1. Participants and design

Thirty-six undergraduates enrolled in an introductory psychology course (PSY 100) were recruited during a fall semester at a southern university. Ages of the participants ranged from 18 to 26 years (M = 19.03). About 72% of the sample was female (26). All participants were native English speakers. Participants received two course credits and $10 for completing the study.

Participants were randomly assigned to one of four experimental conditions in a 2×2 between-subjects factorial design: anticipated feedback proximity (same day vs. 3 days later) and beliefs about intelligence (incremental or entity). Upon the agreement of the instructor, the anticipated feedback proximity was manipulated to match the PSY 100 course schedule (Monday, Wednesday, and Friday). According to the instructor, multiple-choice exams with scantron were used in the large-section PSY 100 course, so same-day feedback was possible and would be considered as rapid feedback; and a delay of 3 days would be considered normal.

2.2. Materials and procedures

The experiment involved Exam I[2] of the course. Experimental manipulations were administered in the PSY 100 classroom two days before Exam I. Participants first filled out a demographic information sheet that included gender, age, academic major, ethnicity, and ACT scores (American College Testing; a standardized college admission test in the United States). Then, they completed the eight-item "Ideas about Intelligence" questionnaire (Dweck, 1999), which assessed people's *current* beliefs about intelligence being fixed or malleable. Participants rated their level of agreement on a 1–6 scale with statements such as "*No matter who you are, you can significantly change your intelligence level (malleable)*" and "*You have a certain amount of intelligence, and you really cannot do much to change it (fixed)*". The questionnaire is a valid and reliable measure of beliefs about intelligence. The internal consistency reliability estimates, Cronbach's alpha coefficients, ranged from .94 to .98 (Dweck, 1999; Dweck et al., 1995).

After completing the questionnaire, participants received either the *incremental* or the *entity* version of the article named "The Origins of Intelligence: Is the Nature–Nurture Controversy Resolved?" The article served as a manipulation of belief about intelligence. Edited and used by Miele and Molden (2010), the article looked like it had originally been published in the November 2007 issue of *Psychology Today*. The incremental and entity versions described scientific "evidence" that supported the idea that intelligence was environmentally determined and could be improved over time, or that intelligence was genetically determined and remained stable over time. Upon finishing reading the article, participants responded to the following open-ended items designed by Miele and Molden (2010): (a) briefly summarize the main point of the article; (b) describe the evidence from the article that you find most convincing; and (c) describe an example from your own experience that fits with the main point of the article. These items were used to increase the effectiveness of the manipulation. Next, participants completed the same "Ideas about Intelligence" questionnaire to reassess their beliefs about intelligence. The Cronbach's alpha coefficients of the questionnaires used before and after the manipulation are .95 and .96, respectively.

Next, participants received written instruction about the date on which they would learn their exam grade — the manipulation of anticipated feedback proximity. Those in the *same day* condition read the following instruction with key information highlighted in bold and capitalized,

> "As you know, you will take PSY 100 Exam I on September 23rd (Friday). The research assistants of the study will help your instructor with grading Exam I so that **you will be able to learn your test score by the end of September 23rd (Friday)**. That is, you will be able to know your test score **on the SAME day** of your test."

Those in the *3-day* delay condition read the same instruction except that they were told, "**you will be able to learn your test score on September 26th (Monday)**. That is, you will be able to know your test score **in THREE days after your test**."

After the exam on Friday, each participant was debriefed about the purpose of the study. Although participants expected different feedback delays, they were told during debriefing that everyone would be able to learn their exam grade via Blackboard (a web-based course management system) on the same day of the exam. Participants were also instructed that intelligence is, in fact, malleable and can be improved over time. No participants indicated any awareness or suspicion of the manipulations used in the study when prompted during debriefing.

3. Results

3.1. Manipulation checks

To determine whether the manipulation of theories of intelligence was effective, we compared participants' views of intelligence before and after the manipulation. We reverse coded the entity items of the 8-item "Ideas about Intelligence" questionnaires and then averaged across the eight responses for each participant. Next, the incremental scores were submitted to a 2 (manipulated theory: incremental vs. entity) × 2 (time: before vs. after the manipulation) repeated measures analysis of variance (ANOVA). The results showed a main effect of manipulated theory, $F(1, 33) = 15.00$, $p < .001$, $\eta_p^2 = .31$, a main effect of time, $F(1, 33) = 12.85$, $p = .001$, $\eta_p^2 = .28$, and a significant interaction between manipulated theory and time, $F(1, 33) = 77.97$, $p < .001$, $\eta_p^2 = .70$. An analysis of the interaction revealed that those who read the *incremental* article showed higher incremental score after reading the article ($M = 4.91$, $SD = .93$) than before reading it ($M = 4.29$, $SD = 1.10$), $t(16) = -5.10$,

[1] Research on beliefs about intelligence has either measured participants' beliefs as an individual-difference variable (e.g., Dweck, 1999; Dweck, Chiu, & Hong, 1995) or experimentally manipulated them (e.g., Hong et al., 1999; Miele & Molden, 2010).

[2] There were a total of three multiple-choice exams in the course and students had 55 minutes for each exam. Exam I was given in late September — approximately a month into the semester.