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Adding nuance to the challenge-skill relationship: The interaction of perceived and actual skill

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ABSTRACT

Optimal motivation occurs when there is a balance between perceived challenge and perceived skill. The challenge-skill relationship has been studied extensively with regard to perceived skill, with limited attention given to *actual* (i.e., domain-specific) skill. The present study investigated the role of actual skill within the perceived difficulty × perceived skill relationship. Consistent with our predictions, actual skill moderated the perceived difficulty × perceived skill relationship for the outcomes of intrinsic motivation, boredom, and persistence during a mathematics task. Furthermore, those with high perceived skill and low actual skill reported the most advantageous motivational outcomes. Together, these findings indicate that the challenge-skill relationship is more complex than we had previously thought once we consider both perceived and actual skill.

1. Introduction

Learners frequently confront challenges and setbacks. In these moments, learners assess whether they are capable of continuing with the task and achieving a successful outcome. Thus, how learners perceive their own abilities relative to the difficulty of the task has a considerable impact on their motivation and learning. Theories of motivation have discussed this relationship between perceived challenge and perceived skill, also referred to as the challenge-skill relationship or challenge-skill balance (Csikszentmihalyi, 1997; Engeser & Rheinberg, 2008). These theories propose that motivation and learning are supported when individuals perceive the activities as challenging and also believe they have the skills to achieve success (Csikszentmihalyi, 1997; Deci & Ryan, 1985; Wigfield & Eccles, 2002). In other words, optimal motivation and learning occur when perceived challenge and perceived skill are balanced and high. An imbalance between perceived challenge and skill can lead to decreased motivation, such as boredom when skills exceed challenge, or anxiety when challenge is higher than skill (Csikszentmihalyi, 1997). As a result, when assessing the impact of perceived challenge on motivation and learning, it is critical to also assess perceived skill.

Research suggests that both perceived and actual skill are key predictors of motivation and learning (Elliot & Dweck, 2007; Pajares & Kranzler, 1995). However, research on the challenge-skill relationship has focused predominantly on *perceived* skill, giving little attention to the role of *actual* skill (i.e., domain-specific ability). The goal of the present study was to broaden our conceptualization of the challenge-skill relationship by simultaneously investigating both perceived and actual skill. While it is plausible that actual and perceived skill are both advantageous when perceived challenge is high, we

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were interested in the possibility that actual skill moderates the perceived challenge × perceived skill relationship. We investigated these relationships with respect to motivational and performance outcomes for middle school students who were engaging in a difficult mathematics task. In the following section, we discuss the motivational value of both perceived and actual skill, findings about their respective interactions with perceived challenge, and our rationale for the hypothesis that actual skill moderates the perceived challenge × perceived skill relationship.

1.1. A summary of skill, challenge/difficulty, and their relationship

To this point, we have used the term *perceived challenge* to describe learners' perceptions of task difficulty. Csikszentmihalyi (1997) used the term *perceived challenge* when theorizing and studying the challenge-skill relationship. In this study, we assessed learners' *perceived difficulty* of the task. Although one study found similar outcomes when comparing perceived challenge and perceived difficulty (Pfister, 2002), it has yet to be determined whether challenge and difficulty have the same meaning to learners at this age (Engeser & Rheinberg, 2008). This question is beyond the scope of this paper, though certainly worthy of further investigation. For the purpose of this paper, we use the term *perceived difficulty* when discussing the present study. We use *perceived challenge* and the *challenge-skill* relationship when discussing previous research and the broader implications of the present study for theory and research on this relationship.

1.1.1. Independent influences of perceived and actual skill

High levels of both perceived and actual skill are generally advantageous for motivation and learning in the domain of mathematics. For example, higher perceived skill is related to increased effort after failure (Meyer, Turner, & Spencer, 1997), higher intrinsic motivation (Bandura & Schunk, 1981; Skaalvik & Rankin, 1995), and higher enjoyment in math (Goetz, Frenzel, Hall, & Pekrun, 2008; Goetz, Pekrun, Hall, & Haag, 2006). Higher mathematics ability is also related to a greater willingness to try hard in mathematics (Reynolds & Walberg, 1992), and higher enjoyment of mathematics (Goetz et al., 2004), including during a mathematics test (Goetz et al., 2007). Conversely, other studies have found that mathematics ability is unrelated to affect and intrinsic motivation while in mathematics class, after taking into account the role of interest (Schiefele & Csikszentmihalyi, 1995). With respect to performance, higher perceived skill is positively related to math achievement in middle and high school (Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Niemivirta & Tapola, 2007; Skaalvik & Rankin, 1995; Spinath, Spinath, Harlaar, & Plomin, 2006; Wilkins & Ma, 2002). The same is true for the relationship between mathematics ability and achievement (Schiefele & Csikszentmihalyi, 1995).

1.1.2. Perceived and actual skill: their independent interactions with perceived challenge

High perceived skill is especially advantageous when perceived difficulty is high. Learners who perceive that their skills are high and matched with the level of challenge report higher enjoyment, interest, and positive affect (Csikszentmihalyi & LeFevre, 1989; Moneta & Csikszentmihalyi, 1996; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003), and are more likely to persist or wish to continue with a task (Csikszentmihalyi & LeFevre, 1989; Csikszentmihalyi, Rathunde, & Whalen, 1993). Specific to the context of mathematics, Schweinle, Turner, and Meyer (2008) found that the interaction between perceived challenge and perceived skill predicted positive affect in math class for fifth and sixth grade students (feelings of excitement, pride, happiness, and cheerfulness). In particular, when perceived challenge was high, positive affect was higher for those with high, compared to low, perceived skill. Conversely, when perceived challenge was low, positive affect did not differ across levels of perceived skill.

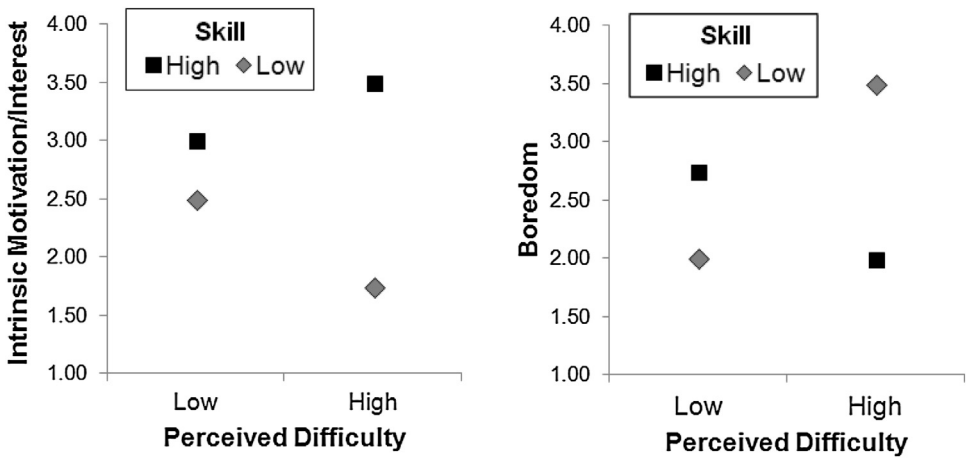

Fig. 1. Sample data showing the interaction between challenge and skill for the outcomes of intrinsic motivation or interest (left pane) and boredom (right pane).