How Winning Changes Motivation in Multiphase Competitions

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Abstract

What drives motivation in multiphase competitions? Adopting a dynamic approach, this research examines how temporary standing—being ahead of (vs. behind) one's opponent—in a multiphase competition shapes subsequent motivation. Six competitions conducted in the lab and in the field demonstrate that the impact of being ahead on contestants' motivation depends on when (i.e., in which phase of the competition) contestants learn they are in the lead. In the early phase, contestants are concerned about whether they can win; being ahead increases motivation by making winning seem more attainable. In the later phase, however, contestants are instead driven by how much additional effort they believe they need to invest; being ahead decreases motivation by reducing contestants' estimate of the remaining effort needed to win. Temporary standing thus has divergent effects on motivation in multiphase competitions, driven by a shift in contestants' main concern from the early to the later phase and thus the meaning they derive from being ahead of their opponent. By leveraging insights gained from approaching individuals' self-regulation as a dynamic process, this research advances understanding of how motivation evolves in a unique interdependent self-regulatory context.

Key words: competition, motivation, dynamic self-regulation, temporary standing

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Rafael Nadal played his first five-set Grand Slam tournament match in the 2004 U.S. Open. Just 18 years old at the time and new to the tour, Nadal faced off against a much more experienced Ivo Heuberger in the round of 128. Nadal started the match strong: after winning the first set six games to zero, he went on to win the second set six games to two. Nadal lost the third and fourth sets (four games to six and two games to six, respectively), before coming back to win the fifth and final set six games to three. Game, set, match—Nadal.

In addition to launching one of the greatest of careers in tennis history, the match reveals an interesting and dynamic pattern of motivation. Tennis matches, like other multiphase competitions, constitute a dynamic goal-pursuit environment. Contestants have a clear goal—to win—and they invest effort toward achieving this goal throughout the course of the competition (Deutsch, 1949, 1962; Johnson & Johnson, 1974; Kelley & Thibaut, 1969; Locke, Shaw, Saari, & Latham, 1981). However, unlike in individual goal-pursuit contexts, where goal attainment depends solely on one's personal performance, in competitive contexts, goal attainment is interdependent: achieving the goal to win depends on whether the contestant outperforms an opponent by the end of the competition. Contestants' temporary standing—whether they are currently ahead of (vs. behind) the opponent—thus provides important information that may affect their motivation in the next round of the competition.

This paper investigates how temporary standing impacts motivation in multiphase competitions, defined as competitions with multiple distinct periods. We ask the following three questions: (1) How does being ahead of (vs. behind) one's opponent in a multiphase competition affect contestants' subsequent motivation? (2) Might the effect differ between the early and the later phase of the competition? (3) What psychological processes drive these effect(s)?

Following emerging research on the longitudinal dynamics of individuals' self-regulatory processes (Amir & Ariely, 2008; Etkin & Ratner, 2012; Fishbach, Dhar, & Zhang, 2006; Fishbach & Zhang, 2008; Fitzsimons & Fishbach, 2010; Huang, Zhang, & Broniarczyk, 2012; Koo & Fishbach, 2008; Louro, Pieters, & Zeelenberg, 2007), we adopt a dynamic perspective to conceptualize the motivational consequences of temporary standing in multiphase competitions. We propose that how being ahead of one's opponent impacts a contestant's motivation depends on when (i.e., in which phase of the competition) the contestant learns he or she is in the lead. In the early phase of the competition, contestants are concerned about whether they can win; being ahead makes winning seem more attainable, which increases motivation. In the later phase, contestants instead focus on the effort they still need to invest in order to win; being ahead of one's opponent suggests that less effort is required, which decreases motivation. Temporary standing thus has divergent effects on motivation in multiphase competitions, driven by a shift in contestants' main concern from the early to the later phase and thus the meaning they derive from being in the lead.

Motivation in Competitions

Competition—defined as contexts where an individual can attain his or her ends only at the expense of others not attaining theirs (Deutsch, 1949, 1962; Johnson & Johnson, 1974)—is pervasive in everyday life. As children, we compete for better grades in school and starting roles on sports teams; in business, colleagues compete for promotions, teams compete for bonuses, and firms enter bidding wars to earn lucrative contracts. Even among recreational activities, competition is routinely sought out (e.g., playing intramural sports, board games, and online poker). Competition is so deeply ingrained in Western culture that the very language of business, politics, and education is filled with "win-lose" terms. A person "wins" a promotion, "beats" the

other candidate, and "outsmarts" his or her peers (Stanne, Johnson, & Johnson, 1999).

Competition has important implications for motivation (Berger & Pope, 2011; Bloom, 1999; DeVaro 2006; Erev, Bornstein, & Galil, 1993; Lazear & Rosen, 1981; Murayama, & Elliot, 2012; Zajonc, 1965). Goals drive people to achieve (Lewin, 1946); in competitive goal-pursuit contexts, the goal is to win, and contestants invest effort throughout the competition to achieve this goal (Deutsch, 1962; Kelley & Thibaut, 1969; Kilduff, 2014; Locke et al., 1981).

Competition has been linked to both positive and negative goal-related outcomes. On one hand, compared to noncompetitive contexts, competition can engender a sense of challenge and excitement, and increase contestants' desire to do well (Epstein & Harackiewicz, 1992; Harackiewicz, Abrahams, & Wageman, 1987; Harackiewicz & Manderlink, 1984; Hollenbeck & Klein, 1987; Reeve & Deci, 1996; Reeve, Olson, & Cole, 1985; Scott & Cherrington, 1974; Tauer & Harackiewicz, 1999). On the other hand, competition can create anxiety, reduced concentration, and heightened distractibility (Brooks, 2014; Eysenck, 1982), which can undermine intrinsic motivation (Deci, Betley, Kahle, Abrams, & Porac, 1981) and impair performance (Campbell & Furrer, 1995; Steigleder, Weiss, Cramer, & Feinberg, 1978).

The Role of Temporary Standing

Over the course of a multiphase competition, contestants' temporary standing, i.e., being ahead of (vs. behind) the opponent, conveys important information—it informs contestants whether the goal of winning can be attained, and what needs to be done in order to attain it. In individual goal-pursuit contexts, goal attainment depends solely on personal performance (e.g., the number of points earned). People thus evaluate their likelihood of goal attainment by comparing their current status to their desired end-state (i.e., the goal objective); being closer to the goal objective makes it more likely that people will achieve their goal (Carver & Scheier,

1981; Heath, Larrick, & Wu, 1999; Locke & Latham, 1990). In interdependent goal-pursuit contexts such as multiphase competitions, however, achieving the goal of winning depends on whether contestants have outperformed the opponent by the end of the competition (e.g., the number of points earned relative to one's opponent; Deutsch, 1962; Johnson & Johnson, 1974; Kelley & Thibaut, 1969). This makes assessing one's performance during the competition inherently comparative (Fishbach, Eyal, & Finkelstein 2010; Mussweiler, 2003; Tesser, 1988). Indeed, a recent fMRI investigation into the neurological effects of competition found evidence for brain activation in areas linked to monitoring the self in relation to others (Decety, Jackson, Sommerville, Chaminade, & Meltzoff, 2004).

Contestants in multiphase competitions thus evaluate their likelihood of goal attainment by comparing where they stand relative to the opponent—a dynamic (rather than static) goal objective (Deutsch, 1962; Johnson & Johnson, 1989; Reeve & Deci, 1996; Reeve et al., 1985); being ahead of (vs. behind) one's opponent indicates that winning is more likely (Atkinson, 1964; Deci & Ryan, 1985; Shapira, 1976).

How will contestants' temporary standing influence their subsequent motivation in a multiphase competition? Being ahead of an opponent may indicate that contestants are performing well and can obtain the win, but how this information impacts their motivation is less clear. Popular expressions convey different naïve ideas. On one hand, players who are ahead may be "on a roll" or have "a hot hand" (Bar-Eli, Avugos, & Raab, 2006; Koehler & Conley, 2003), suggesting that being ahead may increase motivation. On the other hand, players who are ahead may "coast" or "rest on their laurels" (Amir & Ariely, 2008), suggesting that being ahead may demotivate contestants.

A Dynamic Perspective on Motivation in Multiphase Competitions

We adopt a dynamic self-regulatory perspective (Etkin & Ratner, 2012; Fishbach et al., 2006; Fishbach & Zhang, 2008; Huang et al., 2012; Huang & Zhang, 2013; Koo & Fishbach, 2008; Louro et al., 2007) to address this question. A dynamic perspective is particularly relevant since multiphase competitions are a dynamic goal-pursuit process that develops over multiple distinct periods. Research in the areas of sports and education has adopted similar perspectives. Sport competitions, for example, are usually divided into multiple phases (Cerin, Szabo, Hunt, & Williams, 2000; Hanin, 2000), and researchers have explored differences in athletes' affect, engagement, effort, and coping across phases (Cerin & Barnett, 2006; Gaudreau, Blondin, & Lapierre, 2002; Wilson & Kerr, 1999). Public performances and academic examinations also often comprise multiple phases, and researchers have explored implications for coping and emotion regulation across them (Folkman & Lazarus, 1985).

We propose that how temporary standing impacts motivation depends on the phase of the competition contestants are in when they learn they are in the lead. We distinguish between the early and the later phase of a multiphase competition, the early phase being the periods between the competition's inception and the mid-point, and the later phase being periods after the mid-point and before the end. Hence in a five-set tennis match, our framework considers the first two sets as the early phase and the last two sets the later phase. We suggest that contestants' main concern about the competition changes from the early to the later phase, influencing the meaning they derive from being ahead of their opponent and hence the impact on motivation.

Early Phase of Competition—Winning is Attainable

In the early phase of a multiphase competition, we argue contestants' main concern should be whether they can win. At the onset of a competition, especially one that involves an

element of novelty (e.g., a new opponent, a new field or court, a new technique or play), uncertainty is often high; contestants may have little information about their opponent's abilities and potentially even their own, which makes their chance of winning unclear. Past research in individual goal-pursuit contexts finds that goal expectancy (i.e., the attainability of a goal) is often the primary determinant of motivation (e.g., social-cognitive theory, Bandura, 1986, 1997; control theory, Carver & Scheier, 1981; valence-instrumentality-expectancy theory, Vroom, 1964). More recent work on the dynamics of individuals' self-regulation processes also finds that when goal attainability is uncertain, determining whether a goal can be achieved is the primary driver of motivation (e.g., Huang et al., 2012; Huang & Zhang, 2013; Koo & Fishbach, 2008; 2012). Consequently, when contestants are uncertain about whether they can win, as is the case in the early phase of a new competition, they should focus on assessing the attainability of the win to determine motivation.

We propose that when contestants' main concern is whether they can win, learning they are ahead of the opponent will make winning seem more attainable and thus increase their motivation. Prior work on motivation in individual goal-pursuit contexts documents that the relationship between expectancy and motivation follows an inverted U-shaped pattern. Motivation initially increases and then decreases with a rise in expectancy, such that motivation is the highest when a goal is perceived as moderately challenging as opposed to very easy or impossible (Brehm, 1979; Brehm, Wright, Solomon, Silka, & Greenberg, 1983; Erez & Zidon, 1984; Louro, Pieters, & Zeelenberg, 2007; Locke & Latham, 1990; 2002; Wright et al., 1986). Given the high degree of uncertainty in the early phase of the competition, coupled with the dynamic nature of the goal objective, being ahead early on should signal that the win is attainable without making it seem too easy; accordingly, it should make contestants more

motivated than those who are behind. Indeed, recent work on the dynamics of individuals' self-regulation processes finds that when goal attainment is uncertain (e.g., when progress toward a personal goal is low), factors that make achieving the goal appear more attainable lead to greater motivation. For instance, Huang et al. (2012) found that when students had just started a task (and felt uncertain whether they could achieve the goal of the task), they exaggerated the number of points accumulated so far to make the goal seem within reach.

While the theories discussed above focus on contexts where individuals pursue goals in social isolation, similar insights have emerged from the competition literature. Being ahead of one's opponent makes winning seem more likely (Atkinson, 1964; Deci & Ryan, 1985; Shapira, 1976). As a result, when contestants are ahead of an opponent, they tend to have more positive expectations of success, which can increase their intrinsic motivation to win (Reeve & Deci, 1996; Reeve et al., 1985; Tauer & Harackiewicz, 1999; Vallerand & Reid, 1984) as well as the amount of effort they invest in the competition (Nelson & Furst, 1972; Weinberg, Yukelson, & Jackson, 1980). In competitive sports, for example, teams that are ahead early in the game win more than two-thirds of the time (Cooper, DeNeve, & Mosteller, 1992) and teams that are further ahead tend to win more often (Berger & Pope, 2011; Stern, 1994).

Consequently, we hypothesize that in the early phase of a multiphase competition, when contestants' main concern is whether they can win, being ahead of one's opponent increases motivation by making winning seem more attainable.

Later Phase of Competition—Winning Requires Little Effort

As the competition advances from the early to the later phase, we argue that contestants' main concern about the competition should shift, and the meaning they derive from their temporary standing changes accordingly. This hypothesized shift is driven by a change in the

primary question contestants ask. Rather than questioning *whether* they can win, we expect contestants in the later phase of a multiphase competition to focus on *how much additional effort* they need to invest in order to win. Prior work on the dynamics of individuals' self-regulation processes finds that as individuals approach the ideal end-state of a personal goal, their motivation is driven by a perceived lack of goal progress (e.g., Huang et al., 2012; Koo & Fishbach, 2008; 2012). This is because uncertainty about whether the goal can be achieved is often alleviated once individuals near the end of a personal goal-pursuit, rendering the initial concern about attainability less relevant. Extending this finding to a competitive goal-pursuit context, we propose that when contestants enter the later phase of a multiphase competition and the attainability of the win becomes less of a concern, they should shift from assessing their chance of winning to focusing on what still needs to be done; motivation in this phase should thus depend on how much more effort contestants think they need to invest.

We argue that this shift in focus makes being ahead of one's opponent counterproductive in the later phase of the competition. Specifically, when contestants' main focus is how much additional effort is required in order to win, being ahead may lead contestants to relax and reduce their efforts. In individual goal-pursuit contexts, control theory (Carver & Scheier, 1981) asserts that motivation is driven by a negative feedback loop that seeks to eliminate goal-performance discrepancies. While performance below the goal standard motivates subsequent effort, performance equal to or above the goal standard leads to a reduction of effort (Carver, 2003; Koo & Fishbach, 2008; Zhang, Fishbach, & Dhar, 2007). In competitive goal-pursuit contexts, the opponent's performance serves as the goal standard for comparison (Deutsch, 1962; Johnson & Johnson, 1974; Kelley & Thibaut, 1969), and contestants' temporary standing against the opponent reflects the goal-performance discrepancy. As a result, when contestants' main concern

is how much additional effort to invest, being ahead of the opponent should signal that little additional effort is needed in order to win, resulting in a premature reduction in effort—premature because, unlike in individual goal-pursuit contexts where the goal standard is static (e.g., score 100 points), in competitions it is dynamic and relative (score more points than an opponent). Even if a contestant is in the lead, so long as there is time remaining in the competition and the size of the discrepancy is not overly large, the final outcome could still change, and additional effort is warranted to secure the win.

Consequently, we hypothesize that in the later phase of a multiphase competition, when contestants' focus shifts from questioning the overall attainability of the win to focusing on the remaining effort required, being ahead of one's opponent decreases motivation by reducing the perceived amount of effort required in the remaining round(s).

Hypotheses and Study Overview

In summary, we propose that temporary standing has divergent effects on motivation in multiphase competitions, caused by a shift in contestants' main concern about the competition from the early to the later phase, and therefore in the signal they derive from being in the lead.

Six studies tested our hypotheses. Each study involved a multiphase competition between two players: the contestant (i.e., the participant) and an opponent. Study 1 varied contestants' temporary standing (ahead vs. behind) and the phase in which they received this information (early vs. later phase of the competition), then measured motivation. Study 2 examined the proposed underlying mechanisms: being ahead made winning seem more attainable and also reduced the estimated remaining effort needed to win; the phase of the competition determined contestants' main concern and thus which factor drove their motivation. Studies 3a–5 further explored the proposed underlying processes through mediation and moderation. Studies 3a and

3b directly manipulated the meaning contestants derived from being in the lead: Study 3a examined the early phase of the competition and varied whether being ahead signaled that winning was attainable; Study 3b examined the later phase and varied whether being ahead signaled that little effort was needed in order to win. Study 4 further tested the role of attainability in the early phase of competition: alleviating contestants' concern about whether they could win before beginning the competition caused a switch from being motivated by attainability to being demotivated by a lower estimated effort requirement. Finally, Study 5 focused on the later phase and demonstrated one way that the premature reduction in effort can be overridden to enhance the motivation of late-phase leaders: by introducing a new negative discrepancy. We implemented this negative-discrepancy intervention in a large-scale six-day cross-campus book donation competition.[1]

Three points merit further clarification. First, in our theorizing and empirical investigation, we focused on one-on-one competitions with moderate performance discrepancies. Contestants were not so far ahead or behind the opponent as to make a change in relative position impossible, but also not so close (e.g., a single point discrepancy; Berger & Pope, 2011) as to preclude temporary standing from providing meaningful signals that determine motivation. A follow-up to Study 1 verified that contestants viewed the performance discrepancies in that study as moderate and believed the final outcome of the competition could still change. We discuss other types of competitions and performance discrepancies in the General Discussion.

Second, we focused on one-shot, novel competitions in which contestants did not have much prior knowledge about their chance of beating the opponent. This allowed us to fully test

[1] Target sample sizes for individual experiments were determined in advance of data collection based on consideration of participant availability, study design, and collection method. We report all data exclusions, manipulations, and measures for each study.

our proposed underlying processes (i.e., that contestants would assess their chance of winning in the early phase of competition and would shift to focus on the remaining effort required to win in the later phase). When contestants' concern about whether they can win is reduced prior to the start of the competition, their motivation should depend on the amount of effort they believe to be required (i.e., the secondary signal that would not naturally be derived until the later phase). We test this possibility in Study 4, and discuss the applicability of our framework to other types of competitions (such as familiar ones) in the General Discussion.

Third, we emphasized the role of being ahead in driving contestants' subsequent motivation. In two studies (a follow-up to Study 1 and Study 4), we included a control group in which contestants received no information about their temporary standing; results showed that the perceptions and motivation of contestants who were ahead of their opponent differed significantly from those of control participants, whereas those of contestants who were behind did not. Moreover, in Study 3a (3b) we found that changing the meaning of the temporary standing feedback influenced only those contestants who were ahead of their opponent, and in Study 4 we found that reducing concerns about whether one could win influenced only how the leading contestants interpreted their temporary standing. Together, these studies underscored that in the current context, being ahead of one's opponent is what informs contestants' primary concern about the competition, which impacts subsequent motivation. We discuss implications for the losing counterpart and how being behind can affect motivation (e.g., the "back-to-the-wall effect" where teams on the verge of losing work harder to stay in the competition, Simon, 1971; see also Berger & Pope, 2011) in the General Discussion.

Study 1: Dice Competition

Study 1 examined how temporary standing impacts motivation in the early versus later

phase of a multiphase competition. Contestants competed in a five-round dice competition, with the chance to win a cash bonus for accumulating more points than an opponent by the end of the game. We manipulated temporary standing (ahead vs. behind) in the early versus later phase of the competition, then measured subsequent motivation. In addition, to examine the robustness of the effects, we varied how far ahead contestants were relative to the opponent. We predicted that, regardless of the (moderate) performance discrepancy, being ahead would increase motivation early on in the competition, but later on, being ahead would decrease motivation.

Method

Participants. A total of 304 Mechanical Turk panelists consented to take part in the study in exchange for $1 and the chance to win a $25 prize. Participants were randomly assigned to a condition in a 2 (temporary standing: ahead vs. behind) × 2 (competition phase: early vs. later) × 2 (discrepancy: 30 points vs. 60 points) between-subjects design. Ten individuals failed to complete the survey after being randomly assigned to a condition, leaving a sample of 294 (40.8% female, 59.2% male; ages 18–65, mean age = 33.21, *SD* = 9.87). The rate of attrition did not differ across conditions (χ^2's < 1).

Procedure. Contestants competed in a virtual dice game. They read that they would be competing against another person (the opponent) who was taking this study at the same time, and that if they earned more points than the opponent by the end of the competition, they would be entered in a $25 bonus prize lottery.[2]

Contestants read that the virtual dice game would have five rounds, and that in each round they would roll a pair of dice four times. At the beginning of each roll, we told contestants

[2] We told contestants that we would draw eight winners, but did not provide additional information on the odds of winning (because it depended on whether they beat their opponent).

that a pair of dice would be displayed on the screen, and they would be instructed to click the button on the screen to roll the dice. To calculate their total points each round, we told contestants, "We will sum the points from your four throws and multiply this sum by a predetermined constant. We will then add your points from each successive round to calculate your total points for the game." This setup allowed contestants to see the result of each roll, while also maintaining the credibility of the temporary-standing report. Contestants read that the computer would keep track of their score and provide feedback about their performance during the game.

After reading these instructions, contestants were asked to wait while they were matched with an opponent. After 10 seconds, contestants read that they had been successfully paired, and the first round of the dice game began.

Contestants proceeded through the competition,[3] and after either the second round (early phase) or fourth round (later phase), they received information about their temporary standing. To ensure the credibility of the report, contestants were asked to wait for a few seconds while the computer accessed their current score and the opponent's current score. All contestants received the same information about their own performance—that they had earned 150 points so far—while the opponent's performance varied by condition. In the ahead condition, the opponent's score was given as 90 or 120 points, putting the contestant ahead by either 60 or 30 points with three rounds (early phase) or one round (later phase) to go. In the behind condition, the opponent's score was given as 180 or 210 points, putting the contestant behind by either 30 or 60

[3] The outcome of each roll (e.g., the number displayed on each die) was held constant across contestants and conditions; but because the score calculation involved an unknown constant, and because contestants were told the computer would keep track of their score, contestants were unable (and unlikely to try) to monitor their accumulated score, so had to rely on the feedback provided by the computer to determine their temporary standing.

points with three rounds (early phase) or one round (later phase) to go. We conducted a follow-up study (summarized after Study 1) to verify that both the 30-point and 60-point discrepancies were perceived as moderate and as providing meaningful signals about the attainability of winning and the remaining effort needed to win without predetermining the final outcome of the competition. The size of the discrepancy did not influence the focal temporary standing × competition phase interaction (three way interaction: $F(1, 280) = 2.49$, $p = .116$) and will not be discussed further.

Then we measured motivation. Contestants entered a bonus round of the competition in which they could roll a pair of dice with a greater number of sides (8, 10, 12, 24, or 30), enabling them to earn more points per roll.[4] We told them the longer they waited before rolling (i.e., before clicking the on-screen "roll" button) the more sides these dice would have, and the greater the number of additional points they could potentially earn. This bonus round with special dice enabled us to control for any potential differences in perceived skill or luck from the prior rounds; time spent waiting in the bonus rounds was thus a direct result of the temporary-standing information contestants had just received. Contestants each got two bonus rolls, and as our measure of motivation we summed the time they spent waiting (in seconds).[5]

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[4] To explain the bonus round, contestants read: "In order to help you gain more points, we'll let you use bonus dice for additional rolls. The bonus dice have more faces than the traditional 6-sided dice you have been using. You have the option to use 8-, 10-, 12-, 20-, 24-, or even 30-sided dice (pictured below) for these extra throws. However, you have to wait for each of these options to become available to you. That is, the longer you wait before each roll, the more faces your dice could have, and the more likely you would be to gain additional points toward your goal to beat your opponent." We did not provide information about whether the opponent also received these bonus rolls; however, we made it clear that the time spent waiting would affect only the number of sides on contestants' dice. In addition, participants did not see each new side appear on the dice as they waited; the sides of both dice were revealed simultaneously for each bonus roll after participants clicked the "roll" button.

[5] Time spent (i.e., persistence) is commonly used as a proxy for motivation in settings where individuals' performance cannot be improved through working more quickly or efficiently (Bargh & Chartrand, 1999; Baumeister et al., 1998).

After this bonus round, contestants completed the game and we entered half of them in the $25 bonus lottery. Finally, they completed demographic questions and were thanked and debriefed. See Appendix A for a list of the measures collected in this and each subsequent study.

Results and Discussion

We log-transformed the total time contestants spent waiting in the bonus rounds to stabilize for non-normality in its distribution (Kolmogorov-Smirnov test statistic = .202, $p < .001$; non-transformed means and standard deviations reported). There were six extreme outliers (three standard deviations above the mean). The results reported below excluded these outliers to ensure that they did not drive the effects we observed; all results were consistent and remained significant when these outliers were included.

A 2 (temporary standing: ahead vs. behind) × 2 (competition phase: early vs. later) ANOVA on time spent on the bonus round revealed only the predicted temporary standing × competition phase interaction, $F(1, 284) = 10.17$, $p = .002$, $\eta^2 = .035$, with no main effects; see Figure 1. Supporting our predictions, in the early phase of the competition, being ahead increased subsequent motivation. Contestants invested greater effort (i.e., spent more time on the bonus rolls) after learning they were ahead ($M = 69.41$ seconds, $SD = 75.24$) versus behind the opponent ($M = 47.62$ seconds, $SD = 58.76$), $F(1, 284) = 4.68$, $p = .031$, $\eta^2 = .016$. In the later phase of the competition, however, the opposite pattern emerged. Contestants invested less effort after learning they were ahead ($M = 55.45$ seconds, $SD = 65.59$) versus behind the opponent ($M = 85.80$ seconds, $SD = 90.44$), $F(1, 284) = 5.50$, $p = .020$, $\eta^2 = .019$.

Study 1 provides initial evidence that temporary standing has a dynamic impact on motivation in multiphase competitions. How being ahead of one's opponent influenced subsequent motivation depended on when (i.e., in which phase of the competition) contestants

learned they were in the lead. In the early phase of the competition, being ahead increased motivation. In the later phase, in contrast, being ahead reduced motivation.

To strengthen these findings, we conducted two follow-up studies. The first study (N = 547, 40.7% female, 59.3% male; ages 18–74, mean age = 34.48, SD = 10.83) confirmed that the 30-point and 60-point performance discrepancies used in our main study were perceived as moderate (i.e., large enough to provide meaningful signals but small enough to allow the outcome of the game to still change). Participants imagined competing in the same dice competition as described in the main study, and that after completing either two (early phase) or four (later phase) out of five rounds, they had earned 150 points and were either ahead or behind their opponent by 5, 30, 60, or 95 points (all factors manipulated between-subjects). We included the 5-point discrepancy condition to illustrate that being ahead by just a small amount does not provide a meaningful signal of attainability or remaining effort required, and the 95-point discrepancy condition to show that being ahead by a larger amount makes the final outcome seem less likely to change.

Participants then reported the perceived size of the discrepancy ("How big is the difference between your current score and your opponent's score?" 1 = *Very small* to 7 = *Very large*) and whether they believed the final outcome of the competition could still change with three items (α = .79), which we combined: "At this point, do you believe the final outcome of the game (i.e., whether you win or lose) can still change? (1 = *Not at all* to 7 = *Very much*)" "How likely is it that the final outcome of the game (i.e., whether you win or lose) will change? (1 = *Very unlikely* to 7 = *Very likely*) "How certain are you that the final outcome of the game (i.e., whether you win or lose) can still change? (1 = *Very uncertain* to 7 = *Very certain*)." We also measured the proposed underlying mechanisms—the two inferences that participants could make

based on their temporary standing—the perceived attainability of the win ("How difficult would it be for you to win the dice game?" 1 = *Very easy* to 7 = *Very difficult*) and the estimated amount of additional effort needed to win with two items ($r = .24$, $p < .001$), which we standardized and combined: "How much more effort would you need to invest in order to win the dice game?" (0 = *No additional effort* to 100 = *Much additional effort*) and "How many more points would you need to earn in order to win the dice game?" (open-ended and log-transformed to stabilize for non-normality in its distribution, Kolmogorov-Smirnov test: .213, $p < .001$).

To test for the expected differences across discrepancy conditions, we assigned three orthogonal planned contrast codes to the four discrepancy conditions and then constructed regression models using the contrast codes, temporary standing, competition phase, and all two-way and three-way interactions as predictors (see Appendix B for full analyses). Results supported our use of the 30-point and 60-point discrepancies in Study 1. These discrepancies were perceived to be larger ($M_{30\text{-point discrepancy}} = 4.02$ and $M_{60\text{-point discrepancy}} = 5.03$) than the 5-point discrepancy ($M = 2.05$), $\beta = -.70$, $t(530) = -24.02$, $p < .001$, and smaller than the 95-point discrepancy ($M = 5.53$), $\beta = .49$, $t(530) = 16.75$, $p < .001$. The 30- and 60-point discrepancies were also perceived to be less likely to change ($M_{30\text{-point discrepancy}} = 4.45$ and $M_{60\text{-point discrepancy}} = 4.04$) than the 5-point discrepancy ($M = 5.29$), $\beta = .36$, $t(530) = 9.04$, $p < .001$, and more likely to change than 95-point discrepancy ($M = 3.97$), $\beta = -.217$, $t(530) = -5.40$, $p < .001$.

Further, what being ahead meant depended on the size of the discrepancy. Being ahead (vs. behind) made winning seem more attainable (i.e., less difficult) in the 30-point ($M_{\text{ahead}} = 3.22$ vs. $M_{\text{behind}} = 4.68$, $t(129) = 6.93$, $p < .001$), 60-point ($M_{\text{ahead}} = 2.85$ vs. $M_{\text{behind}} = 5.03$, $t(130) = 9.39$, $p < .001$), and 95-point conditions ($M_{\text{ahead}} = 2.75$ vs. $M_{\text{behind}} = 5.43$, $t(159) = 12.50$, $p < .001$), but not in the 5-point condition (and in fact, the pattern unexpectedly reversed in this

case: M_{ahead} = 4.03 vs. M_{behind} = 3.53, $t(131) = -2.50$, $p < .05$). Being ahead (vs. behind) also decreased the estimated effort needed to win in the 30-point (M_{ahead} = -.19 vs. M_{behind} = .18, $t(126) = 3.24$, $p < .01$), 60-point (M_{ahead} = -.18 vs. M_{behind} = .37, $t(129) = 4.26$, $p < .001$), and 95-point conditions (M_{ahead} = -.34 vs. M_{behind} = .54, $t(156) = 6.87$, $p < .001$), but not in the 5-point condition (M_{ahead} = -.08 vs. M_{behind} = -.32, $t(128) = -1.96$, *ns*). These results provide preliminary support for the proposed signals that contestants derive from being ahead; in Study 2, we directly test the role of these two mechanisms in driving motivation across the early versus later phase of the competition.

The second follow-up study (N = 268, 45.1% female, 54.9% male; ages 19–76, mean age = 33.96, SD = 9.94) assessed whether the proposed effects were indeed driven by contestants who were ahead of (rather than behind) their opponent. We used the same paradigm as Study 1, except that rather than telling half of contestants they were behind the opponent, we only told them how many points they personally had earned. This constituted a 2 (temporary standing: ahead vs. control) × 2 (competition phase: early vs. later) between-subjects design, allowing us to compare the motivation of contestants who were ahead (by 30 points) to that of a control group that received no information on temporary standing. As in Study 1, we log-transformed time spent on the bonus rounds to stabilize for non-normality in its distribution (Kolmogorov-Smirnov test statistic = .296, $p < .001$; non-transformed means reported).

Replicating the results of Study 1, a 2 (temporary standing: ahead vs. control) × 2 (competition phase: early vs. later) ANOVA on time spent on the bonus round revealed the predicted temporary standing × competition phase interaction, $F(1, 264) = 8.22$, $p = .004$, $\eta^2 = .030$, with no main effects. In the early phase of the competition, contestants invested greater effort after learning they were ahead (M = 162.51 seconds) relative to the control (M = 91.87

seconds, $F(1, 264) = 4.38$, $p = .037$, $\eta^2 = .016$. In the later phase however, contestants invested less effort after learning they were ahead ($M = 70.45$ seconds) relative to the control ($M = 95.05$ seconds, $F(1, 264) = 3.86$, $p = .051$, $\eta^2 = .014$. We provide direct support for our effects being driven by contestants who are ahead (rather than behind) in Studies 3a-4.

Study 2: Color Recognition Competition and the Underlying Mechanisms

Study 2 examined the processes underlying the divergent effects of temporary standing on motivation in the early versus later phase of a multiphase competition. Contestants competed in a five-round color recognition competition in the lab, with the chance to win a cash bonus for accumulating more points than an opponent by the end of the game. We manipulated temporary standing (ahead vs. behind) in the early versus later phase of the competition, then measured motivation as well as the proposed underlying processes. We hypothesized that in the early phase, being ahead of one's opponent increases motivation by making winning seem more attainable. In the later phase, we expected that being ahead would instead decrease motivation by reducing the perceived remaining effort needed in order to win. Being in the lead thus enhances the attainability of the win *and* reduces the estimated amount of effort needed to win; while the first mechanism should be the primary driver (and increase motivation) early on in the competition, the second mechanism should be the main driver (and decrease motivation) later on.

Method

Participants. A total of 136 undergraduate students (49.3% female, 50.7% male) at a southwestern university participated in exchange for partial course credit. Contestants were randomly assigned to a condition in a 2 (temporary standing: ahead vs. behind) × 2 (competition phase: early vs. later) between-subjects design.

Procedure. Contestants competed in a color recognition contest. They read that they

would be competing against another student currently in the lab (the opponent), chosen at random, and if they earned more points than the opponent by the end of the competition, they would be entered in a $15 bonus prize lottery.

We told contestants that the color recognition competition would have five rounds, and that each round would require them to memorize a list of 20 colors and answer 20 color-recognition questions. For each list, the computer would show five colors at a time, and contestants would have 10 seconds to memorize these colors before the next set of five colors appeared. After viewing all 20 colors, contestants would view a different set of 20 colors, one at a time, and be asked to identify whether each was present in the list they had just memorized (yes-no). They read that the points earned for each answer would be based on question difficulty, and the computer would track their responses and total number of points earned.

After receiving these instructions, contestants advanced to a screen that asked them to wait while they were matched with an opponent. After 10 seconds had elapsed, contestants read that they had been successfully paired and to reinforce the cover story, we informed them of the opponent's computer station number (e.g., "Your opponent is computer #12 in the room"). We ensured that the opponent was seated far away from the contestant, with dividers between all seats. The first round of the color-recognition competition then began.

Contestants proceeded through the competition, and after the second (early phase) or fourth (later phase) list of colors, they received information about their temporary standing. Following the procedure in the prior study, contestants were asked to wait while the computer accessed their current score and the opponent's current score. Unlike in Study 1, where we held contestants' scores constant and varied only the opponent's score, in this study we counterbalanced both scores. In the ahead condition, the contestant's score was given as 260

points and the opponent's as 210 points, putting contestants ahead by 50 points with three rounds (early phase) or one round (later phase) to go. In the behind condition, the contestant's score was given as 210 points and the opponent's as 260 points, putting contestants behind by 50 points with three rounds (early phase) or one round (later phase) to go.

Then we measured the proposed underlying mechanisms. Contestants answered several questions ostensibly intended to assess their opinion of the competition's design. Among filler questions, we asked contestants to judge the attainability of the win: "How difficult will it be for you to win?" on a 10-point scale (1 = *Not at all difficult* to 10 = *Very difficult*). We also asked contestants to estimate how much remaining effort was needed to win the competition: "How many more points do you think you need to earn in order to win?" (open-ended).[6] This measure was log-transformed to stabilize for non-normality in its distribution (Kolmogorov-Smirnov test statistic = .190, $p < .001$; non-transformed means reported).

After these questions, the competition resumed, and we measured motivation. Contestants advanced to the next color list and were told that in this round, they could have as much time as they wanted to memorize the 20 colors. As our measure of motivation, we recorded the time participants spent memorizing the list (in seconds)[7]. After this memorization task, we

[6] The follow-up to Study 1 demonstrated that the open-ended point estimate and the subjective measure of perceived remaining effort were significantly correlated but could also represent slightly different constructs; we thus used the point estimate measure to capture the underlying process in Studies 2 and 3b and tested the subjective measure in Study 4 to enhance the generalizability of our proposed mechanism.

[7] To maintain the cover story, we gave participants 20 color recognition questions after they finished memorizing the color list. We created a performance measure (i.e., how many questions the participant answered correctly) for exploratory purposes. The accuracy rate ($M = 69.9\%$, $SD = 0.082$) for these 20 color recognition questions did not correlate with the motivation (i.e., effort invested) measure ($r = 0.04$, $p = 0.66$). Interestingly, a measure of participants' innate ability to memorize colors ("In daily life, what is your ability to memorize colors?" on a 10-point scale) served as the sole predictor for their performance ($r = 0.14$, $p < .1$). In light of this finding, in Studies 3a/3b and 4 we used a task in which performance could be improved through greater effort (i.e., identifying provinces or countries in an

concluded the competition and entered half of contestants in the $15 bonus lottery. Contestants completed demographic questions and were thanked and debriefed.

Results and Discussion

Motivation. A 2 (temporary standing) × 2 (competition phase) ANOVA on the total time spent memorizing the focal color list revealed the predicted temporary standing × competition phase interaction, $F(1, 132) = 8.05$, $p = .005$, $\eta_p^2 = .057$, with no main effects; see Figure 2a.

Supporting our predictions, in the early phase of the competition, being ahead increased subsequent motivation. Contestants spent more time memorizing the colors after learning they were ahead ($M = 82.68$ seconds, $SD = 60.87$) versus behind the opponent ($M = 60.94$ seconds, $SD = 39.56$), $F(1, 132) = 4.13$, $p = .055$, $\eta^2 = .028$. In the later phase of the competition, however, the opposite pattern emerged. In this case, contestants spent less time memorizing the colors after learning they were ahead ($M = 61.22$ seconds, $SD = 25.09$) versus behind the opponent ($M = 84.94$ seconds, $SD = 54.15$), $F(1, 132) = 4.32$, $p = .040$, $\eta^2 = .032$.

Attainability. We hypothesized that being ahead of one's opponent makes winning the competition seem more attainable. In support, a 2 (temporary standing) × 2 (competition phase) ANOVA on the perceived difficulty of winning revealed a main effect of temporary standing, $F(1, 132) = 19.39$, $p < .001$, $\eta_p^2 = .128$. Contestants viewed winning as less difficult (i.e., more attainable) when they were ahead ($M = 4.86$, $SD = 1.83$) versus behind the opponent ($M = 6.07$, $SD = 1.43$). This analysis also revealed a temporary standing × competition phase interaction, $F(1, 132) = 3.74$, $p = .055$, $\eta_p^2 = .028$, such that temporary standing had a bigger impact on how difficult winning seemed in the early phase of the competition ($M_{ahead} = 4.38$, $SD = 1.88$ vs.

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unfamiliar geographic region), and ensured that participants' knowledge about the content prior to the competition was minimal.

M_{behind} = 6.14, *SD* = 1.31; *F*(1, 132) = 20.40, *p* < .001, η_p^2 = .134) compared to the later phase (M_{ahead} = 5.31, *SD* = 1.68 vs. M_{behind} = 6.00, *SD* = 1.57; *F*(1, 132) = 3.00, *p* = .086, η_p^2 = .022)[8]. The main effect of competition phase was not significant, *F*(1, 132) = 2.02, *p* = .158.

Estimated remaining effort. We hypothesized that being ahead of one's opponent reduces the estimated remaining effort needed to win the competition. A 2 (temporary standing) × 2 (competition phase) ANOVA on the estimated remaining effort required to win revealed a main effect of competition phase, *F*(1, 132) = 26.30, *p* < .001, η_p^2 = .166. Contestants thought they needed more points to win in the early phase (*M* = 300.96 points, *SD* = 176.85) versus the later phase of the competition (*M* = 120.75 points, *SD* = 68.15). Importantly, this analysis revealed the predicted main effect of temporary standing, *F*(1, 132) = 3.50, *p* = .064, η_p^2 = .026. Contestants estimated needing fewer additional points to win when they were ahead (*M* = 199.22 points, *SD* = 167.40) versus behind the opponent (*M* = 225.52 points, *SD* = 156.09). The interaction was not significant, *F* < 1.

Underlying processes. To test the proposed underlying roles of the perceived attainability of winning and the estimated remaining effort needed to win, we conducted a bias-corrected moderated mediation analysis with both factors entered as simultaneous mediators (model 14; Hayes, 2013). In this moderated mediation model, temporary standing predicted the perceived attainability of winning and the estimated effort needed to realize the win[9], and competition phase moderated the effect of these two mechanisms on motivation.

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[8] Although not expected a priori, participants reported that winning would be more difficult when they were ahead in the later (*M* = 5.31, *SD* = 1.68) versus earlier phase of the competition (*M* = 4.38, *SD* = 1.88), *t*(67) = 2.18, *p* = .033. This could be because when the competition neared the end and the losing counterpart was still close, those who were ahead potentially felt the contest was still challenging (even though winning remained likely). Note that we did not observe this difference in the follow-up to Study 1, hence the generality of this result warrants future testing.

[9] These two mediators were not correlated, *p* = .68.

Results supported our predictions (see Figure 2b for the moderated mediation model, and Figures 2c and 2d for illustrations of the two interaction terms). Being ahead of one's opponent made winning seem more attainable, $\beta = -0.61$, $t(136) = -4.33$, $p < .001$; being ahead also reduced the estimated remaining effort needed to realize the win, $\beta = -0.06$, $t(136) = -1.86$, $p = .066$. However, which of these two mechanisms determined contestants' motivation depended on competition phase: conditional indirect effects showed that perceiving winning as attainable increased motivation only in the early phase of the competition (early-phase: $b = 8.27$, 95% CI [3.70 to 14.86]; later-phase: $b = -1.01$, 95% CI [-4.00 to 1.92]), whereas estimating that less additional effort was needed to secure the win decreased motivation only in the later phase (later-phase: $b = -7.78$, 95% CI [-19.54 to -.28]; early-phase: $b = -.65$, 95% CI [-2.87 to .56]).

Study 2 further supports the predicted effects of temporary standing on motivation in multiphase competitions and demonstrates the underlying processes. In the early phase of the competition, contestants were more concerned about the overall attainability of the win; being ahead made winning seem more attainable and increased motivation. In the later phase, however, contestants were driven instead by the amount of effort they believed to be required to win; being ahead reduced the estimated amount of remaining effort needed and decreased motivation. Being ahead thus enhanced the perceived attainability of the win and reduced the estimated amount of effort needed to win, but which of these mechanisms drove contestants' motivation depended on when (i.e., in what phase of the competition) they learned they were in the lead (see Figure 2b).

Study 3a: Geography Bee and the Early Phase Signal

Study 3a further explores how temporary standing impacts subsequent motivation in the early phase of a multiphase competition. We argued (and Study 2 showed) that early on in a competition, being ahead of one's opponent increases motivation by making winning seem more

attainable. Hence if being ahead no longer suggested that winning was attainable, its positive impact on motivation should be attenuated, and contestants' motivation should remain low (like that of those who are behind).

To test this reasoning, we informed half of contestants that whether they could win did not depend on their position relative to the opponent at this stage. We expected that when contestants did not receive this information, being ahead would increase motivation, as in the prior studies; but when they did, the motivating effect of being ahead early on would be reduced.

In addition, Study 3a extended the prior studies by examining the effect of temporary standing on both motivation and actual performance.

Method

Participants. A total of 212 undergraduate students (64.2% female, 35.8% male) at an eastern university were recruited to participate in exchange for $5. Because of the nature of the competition (described below), individuals who had previously lived in China were ineligible to participate (n = 27), leaving a sample of 185. Contestants were randomly assigned to a condition in a 2 (temporary standing: ahead vs. behind) × 2 (attainability signal: natural vs. attenuated) between-subjects design. All contestants received temporary-standing information in the early phase of the competition.

Procedure. Contestants competed in a geography bee contest. They read that they would be competing against another student currently in the lab, chosen at random, and if they earned more points than the opponent by the end of the competition, they would be entered in a $30 bonus prize lottery.

We told contestants that the geography bee would have five rounds, with each round requiring them to identify 10 states or provinces. Contestants read that for each question, the

computer would present an image of a state or province with four potential answers, and they would be asked to identify the correct one. We told them that they would be awarded 10 points for each correct answer, and that the computer would keep track of correct responses and the number of points earned. As in Study 2, contestants read that they had been matched with an opponent, and the geography bee began.

The first two rounds of the competition required contestants to identify images of 10 US states. After completing the second round (i.e., the early phase of the competition), all contestants received information about their temporary standing. To ensure the report's credibility, contestants were asked to wait while the computer accessed their current score and the opponent's current score. In the ahead condition, the contestant's score was given as 150 points and the opponent's as 110 points, putting contestant ahead by 40 points with three rounds to go. In the behind condition, the contestant's score was given as 110 points and the opponent's as 150 points, putting contestant behind by 40 points with three rounds to go. Note that (here and in the next two studies) holding the point spread constant and manipulating only the signal contestants derived from their temporary standing rules out a potential concern with Study 2 that a difference in the relative advantage across phases might have led to different signals.

In addition, we manipulated whether being ahead signaled that winning was attainable. In the signal-attenuated condition, contestants read, "Based on prior experience with this game, your likelihood of winning does not depend on whether you are ahead or behind at this early stage." In the signal-natural condition, contestants proceeded directly to the next part of the study without receiving this information.

Then (among filler and exploratory items, see Appendix A) we measured the proposed driver of the early-phase effect, the perceived attainability of winning: "How difficult will it be

for you to win?" (1 = *Not at all* to 7 = *Very much*). After this, the competition resumed and we measured contestants' motivation. Contestants read that the next two rounds of the geography bee would ask them to identify various provinces in China. We told them that because people in the United States tend to be less familiar with Chinese provinces, they would get a chance to study a map of China before beginning the next round. Contestants could spend as much time studying the map as they liked, and we measured motivation by recording the time spent studying (in seconds).

After studying the map, contestants proceeded to the third round and were asked to identify 10 images of Chinese provinces. We measured performance by recording the number of provinces identified correctly. Note that in contrast to Studies 1 and 2, in which contestants' performance was driven by chance and their general ability to remember color, respectively, in the context of memorizing a foreign map, increased motivation (i.e., effort) should improve subsequent performance (i.e., accuracy); in addition to affecting motivation (time spent studying the map), we thus expected temporary standing to also influence performance in this case.

We then concluded the competition and entered half the contestants in the $30 bonus lottery. Contestants completed demographic questions and were thanked and debriefed.

Results and Discussion

Motivation. A 2 (temporary standing) × 2 (attainability signal) ANOVA on the total time spent studying the map of China revealed a significant main effect of temporary standing, $F(1, 181) = 3.65$, $p = .058$, $\eta_p^2 = .020$, qualified by the predicted temporary standing × attainability signal interaction, $F(1, 181) = 5.01$, $p = .026$, $\eta_p^2 = .027$; see Figure 3a.

Consistent with Studies 1 and 2, in the signal-natural condition, being ahead in the early phase of the competition increased subsequent motivation. Contestants spent more time studying

the China map after learning they were ahead (M = 48.45 seconds, SD = 51.22) versus behind the opponent (M = 27.45 seconds, SD = 28.75), $F(1, 181) = 8.90$, $p = .003$, $\eta^2 = .047$. In the signal-attenuated condition, however, this effect was reduced. As expected, when we told contestants their temporary standing did not suggest that winning was attainable, being ahead no longer increased subsequent motivation (M_{ahead} = 33.20 seconds, SD = 21.82 vs. M_{behind} = 34.85 seconds, SD = 25.95), $F < 1$.

Further, supporting our reasoning, this effect was driven by contestants who were ahead of the opponent. Among these contestants, undermining the attainability signal reduced their motivation (M = 33.20 seconds, SD = 21.82) relative to the signal-natural condition (M = 48.45 seconds, SD = 51.22), $F(1, 181) = 4.31$, $p = .039$, $\eta^2 = .023$. Undermining this signal had no such effect, however, among contestants who were behind ($M_{signal\text{-}attenuated}$ = 34.85 seconds, SD = 25.95 vs. $M_{signal\text{-}natural}$ = 27.45 seconds, SD = 28.75), $F(1, 181) = 1.13$, $p > .290$.

Performance. Analyzing contestants' performance revealed the same pattern of results. A 2 (temporary standing) × 2 (attainability signal) ANOVA on the number of correctly identified Chinese provinces revealed a marginal main effect of temporary standing, $F(1, 181) = 2.97$, $p = .087$, $\eta_p^2 = .016$, qualified by the predicted interaction, $F(1, 181) = 5.61$, $p = .019$, $\eta_p^2 = .030$; see Figure 3b. As expected, in the signal-natural condition, being ahead in the early phase of the competition improved subsequent performance. Contestants correctly identified a greater number of Chinese provinces after learning they were ahead (M = 5.46, SD = 2.07) versus behind the opponent (M = 4.26, SD = 1.93), $F(1, 181) = 8.66$, $p = .004$, $\eta^2 = .046$. In the signal-attenuated condition, however, this effect was reduced. When we told contestants their temporary standing did not suggest that winning is attainable, being ahead no longer improved performance (M_{ahead} = 4.45, SD = 2.05 vs. M_{behind} = 4.64, SD = 1.92), $F < 1$.

Further, as predicted, this effect was driven by contestants who were ahead of the opponent. Among these contestants, undermining the attainability signal reduced their performance ($M = 4.45$, $SD = 2.05$) relative to the signal-natural condition ($M = 5.46$, $SD = 2.07$), $F(1, 181) = 5.59$, $p = .019$, $\eta^2 = .030$. Undermining this signal had no effect among contestants who were behind ($M_{\text{signal-attenuated}} = 4.64$, $SD = 1.92$ vs. $M_{\text{signal-natural}} = 4.26$, $SD = 1.93$), $F < 1$.

Attainability. A 2 (temporary standing) × 2 (attainability signal) ANOVA on the perceived attainability of the win revealed a significant main effect of temporary standing, $F(1, 181) = 9.32$, $p = .003$, $\eta_p^2 = .049$, qualified by the predicted interaction, $F(1, 181) = 7.06$, $p = .009$, $\eta_p^2 = .038$. Consistent with the early-phase results of Study 2, in the signal-natural condition, contestants viewed winning as less difficult (more attainable) after learning they were ahead ($M = 4.17$, $SD = 1.37$) versus behind the opponent ($M = 5.32$, $SD = 1.32$), $F(1, 181) = 16.86$, $p < .001$, $\eta^2 = .085$. In the signal-attenuated condition, however, this effect was reduced. As expected, when we told participants their temporary standing did not suggest that winning is attainable, being ahead no longer decreased the perceived attainability of winning ($M_{\text{ahead}} = 5.00$, $SD = 1.45$ vs. $M_{\text{behind}} = 5.08$, $SD = 1.34$), $F < 1$.

Further, as predicted, this effect was driven by contestants who were ahead. Among these contestants, undermining the attainability signal increased the perceived difficulty of winning ($M = 5.00$, $SD = 1.45$) relative to the signal-natural condition ($M = 4.17$, $SD = 1.37$), $F(1, 181) = 8.10$, $p = .005$, $\eta^2 = .043$. Undermining this signal had no effect, however, among those who were behind ($M_{\text{signal-attenuated}} = 5.08$, $SD = 1.34$ vs. $M_{\text{signal-natural}} = 5.32$, $SD = 1.32$), $F < 1$.

Underlying process. To examine the underlying process driving contestants' early-phase motivation, we conducted a bias-corrected moderated mediation analysis (model 7; Hayes, 2013). In this moderated mediation model, the attainability signal manipulation moderated (i.e.,

attenuated) the effect of temporary standing on participants' perceived attainability of winning, which then predicted motivation.

Results supported our theory. The signal-attenuation manipulation moderated the effect of being ahead of one's opponent on the perceived attainability of winning, $\beta = .54$, $t(181) = 2.66$, $p = .009$, which predicted subsequent motivation, $\beta = -5.57$, $t(183) = -3.16$, $p = .002$. As expected, being ahead increased motivation by making winning seem more attainable only in the signal-natural condition (signal-natural: $ab = 2.89$, 95% CI [.65 to 6.78]; signal-attenuated: $ab = .20$, 95% CI [-1.28 to 2.11]).

Study 3a further demonstrates the process underlying the motivating effect of being ahead in the early phase of a multiphase competition. Early on, contestants interpreted being ahead of an opponent as signaling the win is attainable, which increased their subsequent motivation and performance. Undermining this attainability signal attenuated these effects. When we told contestants that being ahead in the early phase had no bearing on their chance of winning, it no longer enhanced their motivation and performance. Importantly, this effect was driven by contestants who were ahead of the opponent, further highlighting that being ahead (rather than being behind) is what drives the present effects.

Study 3b: Geography Bee and the Later Phase Signal

Study 3b further explores how temporary standing impacts performance in the later phase of a multiphase competition. We argued (and Study 2 showed) that later on in a competition, being ahead of one's opponent decreases motivation by reducing the estimated effort needed to secure the win. Based on this underlying mechanism, if being ahead no longer signaled that one could expend less effort, then its negative impact on motivation should be attenuated, and contestants' motivation should remain high (like that of those who are behind).

To test this reasoning, we informed half the contestants that regardless of their current position relative to the opponent, the competition was not over and more work was required to win. When contestants did not receive this additional information, we expected that being ahead of the opponent would decrease motivation, as in Studies 1 and 2; but when they did, we expected the demotivating effect of being ahead later on to be reduced.

Method

Participants. A total of 177 undergraduate students (59.1% female, 40.9% male) at an eastern university were recruited to participate in exchange for $5. Because of the nature of the competition (described below), individuals who had previously lived in Africa were ineligible to participate (n = 7), leaving a sample of 170. Contestants were randomly assigned to a condition in a 2 (temporary standing: ahead vs. behind) × 2 (effort requirement signal: natural vs. attenuated) between-subjects design. All contestants received temporary-standing information in the later phase of the competition.

Procedure. We used the same procedure as in Study 3a to introduce a five-round geography bee and to match contestants with an opponent. In this competition, the first four rounds required contestants to identify images of 10 US states. After completing the fourth round (i.e., the later phase of the competition), all contestants received information about their temporary standing. In the ahead condition, the contestant's score was given as 300 points and the opponent's as 260 points, putting the contestant ahead by 40 points with one round to go. In the behind condition, contestant's score was given as 260 points and the opponent's as 300 points, putting the contestant behind by 40 points with one round to go.

In addition, we manipulated whether being ahead signaled that little effort was required to win. In the signal-attenuated condition, contestants read, "Keep in mind that the competition is

not over yet, and regardless of whether you are ahead or behind now, you still need more points to win." In the signal-natural condition, contestants proceeded directly to the next part of the study without receiving this information.[10]

Then (among filler items, see Appendix A) we measured the proposed driver of the later-phase effect, the estimated effort needed to win: "How many more points do you think you need to earn in order to win?" (open-ended). After this, the competition resumed, and we assessed subsequent performance. Contestants read that the next round of the geography bee would ask them to identify various countries in Africa. We told them that because people in the United States tend to be less familiar with African countries, they would get one minute to study a map of Africa before beginning the next round. Fixing the amount of time contestants had to review the African countries enabled us to isolate the effect of temporary standing on performance: a higher accuracy rate would be due to more efficient, rather than lengthier, studying.

After the minute had passed, contestants proceeded to the fifth and final round and were asked to identify 10 African countries. As in Study 3a, we measured performance by recording the number of countries identified correctly.

This concluded the competition and we entered half of the contestants in the $30 bonus lottery. Contestants completed demographic questions and were thanked and debriefed.

Results and Discussion

Performance. A 2 (temporary standing) × 2 (effort requirement signal) ANOVA on the number of correctly identified African countries revealed the predicted temporary standing ×

[10] Although one could potentially be concerned about a demand effect (i.e., the signal-attenuated condition made contestants work harder), this would presumably influence performance in both temporary-standing conditions. That we see an improvement in performance (and the hypothesized effect on estimated remaining effort) only among contestants who were ahead of their opponent suggests that the manipulation targeted the effort requirement signal as intended.

effort requirement signal interaction, $F(1, 166) = 4.97$, $p = .027$, $\eta_p^2 = .029$, with no main effects; see Figure 4.

Consistent with Studies 1 and 2, in the signal-natural condition, being ahead in the later phase of the competition reduced subsequent performance. Contestants identified fewer African countries after learning they were ahead ($M = 5.70$, $SD = 2.88$) versus behind the opponent ($M = 7.42$, $SD = 2.76$), $F(1, 166) = 7.26$, $p = .008$, $\eta^2 = .042$. In the signal-attenuated condition, however, this negative effect was reduced. As expected, when we told contestants their temporary standing did not signal they could reduce their effort, being ahead no longer decreased subsequent performance ($M_{ahead} = 7.43$, $SD = 2.97$ vs. $M_{behind} = 7.16$, $SD = 2.99$), $F < 1$.

Further, supporting our theorizing, this effect was driven by contestants who were ahead of the opponent. Among these contestants, undermining the effort requirement signal significantly improved performance ($M = 7.43$, $SD = 2.97$) relative to the signal-natural condition ($M = 5.70$, $SD = 2.88$), $F(1, 166) = 7.45$, $p = .007$, $\eta^2 = .043$. Undermining this signal had no such effect, however, among contestants who were behind ($M_{signal\text{-}attenuated} = 7.16$, $SD = 2.99$ vs. $M_{signal\text{-}natural} = 7.42$, $SD = 2.76$), $F < 1$.

Estimated remaining effort. A 2 (temporary standing) × 2 (effort requirement signal) ANOVA on the estimated remaining effort required to win revealed the predicted interaction, $F(1, 166) = 4.33$, $p = .039$, $\eta_p^2 = .025$, with no main effects, F's < 1. Consistent with the later-phase results of Study 2, in the signal-natural condition, contestants estimated needing fewer points to win after learning they were ahead ($M = 59.68$ points, $SD = 25.54$) versus behind the opponent ($M = 99.93$ points, $SD = 103.78$), $F(1, 166) = 5.48$, $p = .020$, $\eta^2 = .032$. In the signal-attenuated condition, however, this effect was reduced; being ahead no longer decreased the estimated number of points needed to win ($M_{ahead} = 94.20$ points, $SD = 95.63$ vs. $M_{behind} = 84.44$

points, $SD = 58.97$), $F < 1$.

Further, this effect was driven by contestants who were ahead of the opponent. Among these contestants, undermining the effort requirement signal increased the estimated number of points needed to win ($M = 94.20$ points, $SD = 95.63$) relative to the signal-natural condition ($M = 59.68$ points, $SD = 25.54$), $F(1, 166) = 4.08$, $p = .045$, $\eta^2 = .024$. Undermining this signal had no effect, however, among contestants who were behind ($M_{\text{signal-attenuated}} = 84.44$ points, $SD = 58.97$ vs. $M_{\text{signal-natural}} = 99.93$ points, $SD = 103.78$), $F < 1$.

Underlying process. To examine the underlying process driving contestants' later-phase performance, we conducted a bias-corrected moderated mediation analysis (model 7; Hayes, 2013). In this moderated mediation model, the effort requirement signal manipulation moderated (i.e., attenuated) the effect of temporary standing on participants' estimated remaining effort needed to win, which then predicted motivation.

Results supported our theory. The signal-attenuation manipulation moderated the effect of being ahead of one's opponent on the estimated effort needed to win, $\beta = 25.01$, $t(166) = 2.08$, $p = .039$, which predicted subsequent motivation, $\beta = .01$, $t(168) = 2.43$, $p = .016$. As expected, being ahead decreased performance by reducing the estimated remaining effort needed to win only in the signal-natural condition (signal-natural: $ab = -.13$, 95% CI [-.29 to -.03]; signal-attenuated: $ab = .03$, 95% CI [-.06 to .18]).

Study 3b further demonstrates the process underlying the demotivating effect of being ahead in the later phase of a multiphase competition. In this phase, contestants interpreted being ahead as a signal to reduce their effort, which worsened their performance. When contestants were reminded that despite their current lead, the final outcome could still change, being ahead no longer reduced the estimated number of points needed to win, and thus no longer impaired

performance. Further, as in Study 3a, this effect was driven by contestants who were ahead, with no comparable effects among contestants who were behind.

Study 4: Geography Bee and the Role of Early-Phase Attainability

Study 4 further explores when (and why) being ahead of one's opponent increases versus decreases motivation in multiphase competitions. We have argued that, particularly in novel competitions, where contestants' chance of winning starts out highly uncertain, being ahead of (vs. behind) one's opponent signals that winning is attainable, which increases motivation. Based on this logic, if contestants knew they could win prior to starting the competition, then they should no longer focus on assessing their chance of winning, and instead would shift their focus to assessing the remaining effort required; in this case, rather than signaling that winning is attainable, being ahead would thus signal that little effort is required to secure this win.

To test this possibility, prior to beginning the competition we informed half the contestants that, based on their performance on a general knowledge quiz, they could expect to outperform a majority of their peers. When contestants did not receive this initial feedback, being ahead of the opponent should increase motivation, driven by perceiving winning as attainable, as in the prior studies. When contestants' early-phase attainability concern was alleviated prior to the start of the competition, however, we expected that being ahead would instead decrease motivation, driven by a reduced estimate of the remaining effort needed to win.

In addition, to further underscore the role of being ahead of (vs. behind) one's opponent in driving the present effects, we included a control condition in which participants did not receive information about their temporary standing.

Method

Participants. A total of 158 undergraduate students (68.4% female, 31.6% male) at an

eastern university were recruited to participate in exchange for $5. Because of the nature of the competition (described below), Canadian nationals (n = 8) were ineligible to participate, leaving a sample of 150. Contestants were randomly assigned to a condition in a 3 (temporary standing: ahead, behind, control) × 2 (early-phase attainability concern: natural vs. alleviated) between-subjects design. As in Study 3a, all contestants received temporary-standing information in the early phase of the competition.

Procedure. We used the same procedure as in Studies 3a and 3b to introduce a five-round geography bee and to match each contestant with an opponent. Before beginning the competition, we manipulated contestants' concern about whether they could win. All contestants were given a short quiz comprising a series of questions about North American geography (e.g., "How many countries are there in North America?" "How many states are there in the United States?"). We asked contestants in the attainability-concern-alleviated condition to wait while we calculated their score, then informed them: "Relative to a group of your peers who previously completed this baseline geography knowledge quiz, you scored in the 85th percentile. Based on this, you can expect to outperform 85% of your peers in the Geography Bee competition." Contestants in the attainability-concern-natural condition did not receive feedback on the quiz and hence remained uncertain of their ability to win.

All contestants then proceeded to the main competition. As in Study 3a, the first two rounds of this competition required contestants to identify images of 10 US states. After completing the second round (i.e., the early phase), contestants received information about their temporary standing. In the ahead condition, the contestant's score was given as 150 points and the opponent's as 110 points; in the behind condition, contestant's score was given as 110 points and the opponent's as 150 points; in the control condition, the contestant's score was given as

150 points, with no information provided about the opponent's score.

Following the procedure of Study 2, we then measured the perceived attainability of winning ("How difficult will it be for you to win?" 1 = *Not at all* to 7 = *Very much*) and the estimated additional effort needed to win ("How much more effort do you think you need to invest in order to win the competition?" 0 = *No additional effort* to 100 = *Much additional effort*). To enhance the generalizability of our mechanism results, we used the subjective measure of estimated effort (from the follow-up to Study 1) rather than the open-ended point estimate from Studies 2 and 3b.

Contestants read that the next two rounds of the geography bee would ask them to identify various provinces in Canada. We told them that because people in the United States tend to be less familiar with Canadian provinces, they would get a chance to study a map of Canada before beginning the next round. Contestants could spend as much time studying the map as they liked, and as our measure of motivation we recorded the time they spent studying (in seconds). We then concluded the competition and entered half the contestants in the $30 bonus lottery. Contestants completed demographic questions and were thanked and debriefed.

Results and Discussion

Motivation. A 3 (temporary standing) × 2 (early-phase attainability concern) ANOVA on the total time spent studying the map of Canada revealed only the predicted temporary standing × early-phase attainability concern interaction, $F(1, 144) = 4.40$, $p = .014$, $\eta_p^2 = .058$, with no main effects; see Figure 5. Consistent with the prior early-phase results, when contestants did not receive any information to alleviate concerns about whether they could win, being ahead increased subsequent motivation ($M = 49.40$ seconds, $SD = 39.46$) relative to being behind ($M = 33.14$ seconds, $SD = 22.20$), $t(78) = 2.01$, $p = .048$; being ahead also increased motivation

relative to the control (M = 34.88 seconds, SD = 25.45), $t(78) = 1.78$, $p = .079$, which did not differ from the behind condition, $p > .250$. When we alleviated contestants' attainability concerns prior to the start of the competition, however, the opposite occurred: being ahead of one's opponent decreased motivation (M = 31.36 seconds, SD = 22.19) relative to being behind (M = 51.18 seconds, SD = 52.35), $t(66) = -1.78$, $p = .080$, and to the control (M = 49.78 seconds, SD = 34.94), $t(66) = -1.69$, $p = .095$, which did not differ from the behind condition, $p > .250$.

Attainability. A 3 (temporary standing) × 2 (early-phase attainability concern) ANOVA on the perceived attainability of winning revealed only a main effect of temporary standing, $F(1, 144) = 3.95$, $p = .021$, $\eta_p^2 = .052$. Contestants viewed winning as more attainable (i.e., less difficult) when they were ahead of the opponent (M = 4.61, SD = 1.43) relative to behind (M = 5.38, SD = 1.29), $F(1, 95) = 7.76$, $p = .006$, $\eta_p^2 = .076$, and the control (M = 5.12, SD = 1.38), $F(1, 96) = 3.41$, $p = .068$, $\eta_p^2 = .034$; the behind and control conditions did not differ, $p > .250$.[11]

Estimated remaining effort. A 3 (temporary standing) × 2 (early-phase attainability concern) ANOVA on the estimated remaining effort needed to win revealed only a main effect of temporary standing, $F(1, 144) = 3.63$, $p = .029$, $\eta_p^2 = .048$. Contestants perceived that less additional effort was needed to win when they were ahead of the opponent (M = 57.10, SD = 28.74) relative to behind (M = 66.93, SD = 24.77), $F(1, 95) = 5.00$, $p = .028$, $\eta_p^2 = .050$, and the control (M = 72.00, SD = 23.76), $F(1, 96) = 5.52$, $p = .021$, $\eta_p^2 = .055$; the behind and control conditions did not differ, $p > .250$.

[11] We suspect that we did not obtain a main effect of the early-phase attainability concern manipulation on the difficulty measure because this manipulation merely reduced contestants' concerns about attainability (i.e., reduced its relevance as the key driver of early-phase motivation); it did not change the extent to which participants felt that attaining the win would be easy. It is interesting that a treatment which alters contestants' main concern about the competition may not at the same time produce an effect on their assessments of the competition (e.g., how likely they are to win, or how much additional effort they need to invest).

Underlying processes. To further examine the role of attainability concerns early on in a multiphase competition, we conducted a bias-corrected moderated mediation analysis with the perceived attainability of winning and the estimated remaining effort needed to win entered as simultaneous mediators (model 14; Hayes, 2013). In this moderated mediation model, temporary standing predicted the perceived attainability of winning and the estimated effort needed to realize the win, and the early-phase attainability concern manipulation (natural vs. alleviated) moderated the effect of these two perceptions on motivation (similar to the model in Study 2). Because we found no difference between the control and the behind condition, these were combined in this model (results held if each was separately compared to the ahead condition).

Results supported our reasoning. Being ahead of one's opponent made winning seem less difficult (more attainable), $\beta = -.38$, $t(97) = -2.81$, $p = .006$; being ahead also reduced the estimated amount of effort needed to win, $\beta = -6.07$, $t(97) = -2.19$, $p = .031$. However, which of these two mechanisms determined contestants' motivation depended on whether contestants were still worried about the attainability of the win: conditional indirect effects revealed that perceiving winning as attainable increased motivation only when contestants were uncertain about whether they could win (attainability-concern-natural: $b = -5.77$, 95% CI [-13.68 to -.20]; attainability-concern-alleviated: $b = -3.59$, 95% CI [-14.40 to .65]), whereas estimating less additional effort needed to win decreased motivation only when contestants knew they could win prior to the start of the competition (attainability-concern-alleviated: $b = -4.38$, 95% CI [-14.01 to -.25]; attainability-concern-natural: $b = -1.02$, 95% CI [-6.23 to 3.93]).

Study 4 sheds further light on when (and why) being ahead increases versus decreases motivation in multiphase competitions. When contestants did not know whether they could win prior to the start of the competition, being ahead of the opponent increased motivation by making

winning seem more attainable. When contestants already knew they could win, they focused instead on the remaining effort required and being ahead reduced motivation by decreasing contestants' perception of how much additional effort they needed to invest. Importantly, the motivation and perceptions of contestants who were ahead of their opponent differed from those who were behind *and* those who received no information about their temporary standing; being ahead of (rather than behind) one's opponent is thus what drives the present results.

Study 5: Book Donation Competition and Field Intervention

Building on these findings, we developed an intervention to enhance the motivation of contestants who were ahead in the later phase of a multiphase competition ("late-phase leaders"). In competitive goal-pursuit contexts, the opponent's performance, rather than a specific performance objective, serves as the goal standard against which contestants compare their own performance. As a result, we argued (and Studies 2 and 3b showed) that when contestants are ahead later on in a competition, comparisons to the opponent's performance fail to create a negative discrepancy (Carver, 2003; Carver & Scheier, 1990); the absence of which reduces the estimated additional effort needed to win (and thus dampens motivation). Based on this reasoning, rather than attenuating the effort requirement signal (as in Study 3b), another way to motivate late-phase leaders could be to encourage comparisons to a different reference point—one that creates a motivating negative performance discrepancy (Heath et al., 1999).

Study 5 tested this intervention through a large-scale field study: a cross-campus book donation competition. We used a collective goal context for three reasons. First, motivation in groups has long been a topic of interest in social psychology (Kerr & Tindale 2004; Tindale & Kluwe 2015). Extant research regarding collective goal pursuit has documented both group motivation gains (e.g., group members are more motivated than comparable individual

performers—the Köhler motivation gain effect; Hertel, Kerr, & Messé, 2000) and motivation losses (e.g., social-loafing effects; Harkins, 1987), and emphasized that the instrumentality of individuals' efforts toward a collective goal is an important factor in determining motivation (Karau & Kipling, 1993; Kerr, 1986). Extending our investigation from individual multiphase competitions to collective-goal competitions, and exploring the role of temporary standing in this context, would thus help bridge research on competition and motivation in group settings.

Second, the dynamic self-regulation literature (e.g., Huang et al., 2012; Koo & Fishbach, 2008) shows that collective goal pursuit follows similar motivational patterns to individual goal pursuit. Testing our hypotheses with a collective-goal competition (a donation drive) thus enhances the validity and generalizability of our findings. Third, keeping late leaders motivated is particularly important in this prosocial context, because doing so maximizes the benefits accrued to those in need. For these theoretical and practical reasons, a collective-goal competition offered a valuable context for our final empirical test.

All contestants in this book donation drive received temporary-standing information in the later phase of the competition. In addition, we gave half the students an additional reference point that created a negative performance discrepancy—comparing their campus' current number of donations to that of the best previous year. In the absence of this intervention, we expected students from the leading campus to be less motivated to donate, as shown in Studies 1, 2, and 3b. Encouraging these students to compare their current performance to the best year's (higher) performance, however, should attenuate this effect and increase late leaders' donations.

Method

Participants. A total of 2,543 undergraduate students from two campuses of a public university participated in this field study. The study employed a 2 (temporary standing: ahead vs.

behind) × 2 (discrepancy intervention: control vs. discrepancy) between-subjects design. As in Study 3b, all contestants received temporary-standing information in the later phase of the drive.

Procedure. In cooperation with the university's library, we organized a 6-day used-book donation competition across two campuses. A week before the event, we sent out an email to announce the competition to all first-year undergraduate students (N = 2609) at the two campuses (1303 in campus H and 1306 in campus J). Of the 2,609 students, 66 people did not open the email, leaving a sample of 2,543 (54.7% female, 45.3% male; mean age = 18.62, SD = 0.60).

The email explained that the university's library needed more books so was launching a used-book donation campaign in the coming week. Students could contribute to this campaign by donating their used books. The email further explained, "As an additional incentive, this year we are competing against a similar used-book donation drive taking place on another campus (H or J), to see which campus can recruit the most book donors. If our campus wins the competition, an outside sponsor has agreed to donate $500 to the library to buy new books on our behalf." The email then urged contestants to contribute and asked whether they would like to sign up to donate on the campaign website. Contestants who signed up were prompted to provide details about the books they planned to donate (e.g., book titles).

The competition then began and continued for six days (see Appendix C for pictures of the event and book donations). At the end of day four (two days prior to the end of the competition; i.e., the later phase), we emailed all contestants a report on the current status of the campaign. Because students within the same campus would likely compare notes, we could not randomly assign temporary standing within each campus; we thus adopted natural experiment methodology (e.g., DiNardo, 2008; Dunning, 2012) and used the actual donation amount on day four as the temporary-standing condition (ahead vs. behind). On day four, about 5% more

students had signed up to make a donation at campus H than campus J, so we sent the "ahead" update to contestants on the H campus and the "behind" update to those on the J campus; the email reported that their campus's signups were about 5% ahead (behind) the number of people who had committed to making a donation at the opponent campus.

Within each campus, we then randomly assigned students to an intervention condition (discrepancy intervention vs. no intervention control). In the discrepancy intervention condition, contestants read, "Signups at our campus are still 10% lower than our best year," which encouraged comparisons to a different reference point that created a motivating negative performance discrepancy. Note that the additional discrepancy information did not provide an additional reward (i.e., for beating the best year's performance); contestants' focal goal thus remained the same—to collect more books than the opponent campus to get the $500 sponsorship. In the no-intervention control condition, no additional information was provided.

At the end of the email, we again urged students to contribute and asked them to indicate whether they would like to sign up and donate more used books (and if so, to provide details about those books). As our measures of motivation, we recorded how many people signed up to donate (i.e., the participation rate) as well as how many books they actually donated.

Results and Discussion

Among the 2,543 students who received the campaign letter, a total of 356 signed up to donate by the end of the competition, and 842 books were collected for the university's library. More relevant to our hypotheses, after the temporary-standing update and discrepancy intervention, a total of 160 contestants signed up to donate a total of 387 books.

Participation rate. We first conducted a logistic regression on participation rate (following the temporary standing and discrepancy intervention manipulations) using temporary

standing, discrepancy intervention, and their interaction as predictors. The analysis revealed a main effect of discrepancy intervention, $\beta = -0.76$, Wald $\chi^2(1) = 9.25$, $p = .002$, qualified by the predicted temporary standing × discrepancy intervention interaction, $\beta = 0.94$, Wald $\chi^2(1) = 7.65$, $p = .006$; see Figure 6a.

Consistent with the prior studies, in the no-intervention control condition, being ahead in the later phase of the competition reduced subsequent motivation. The participation rate after day four was lower after contestants learned they were ahead ($P = 3.9\%$) versus behind the opponent campus ($P = 7.2\%$), $\beta = 0.65$, Wald $\chi^2(1) = 6.34$, $p < .05$. In the discrepancy intervention condition, however, this effect was attenuated. As expected, when an additional negative performance discrepancy was made salient, the participation rate after day four was comparable across campuses ($P_{ahead} = 8.0\%$ vs. $P_{behind} = 6.1\%$), $\beta = -0.29$, Wald $\chi^2(1) = 1.73$, $p = .190$.[12,13]

Further, supporting our reasoning, this attenuation was driven by contestants from the ahead campus. Among these contestants, providing a negative performance discrepancy increased the participation rate (8.0%) relative to the no-intervention control (3.9%), $\beta = 0.76$, Wald $\chi^2(1) = 9.25$, $p = .002$. The discrepancy intervention had no such effect, however, among contestants from the behind campus, $\beta = -0.17$, Wald $\chi^2(1) = 0.58$, $p = .45$. That the discrepancy intervention influenced only contestants from the ahead campus helps rule out the alternative that

[12] Only six students who had already donated books before day four donated again after receiving the experimental treatments; all were from the ahead campus and received the discrepancy intervention. Results held when controlling for participation rate before the temporary-standing information was received (i.e., before the end of day four), $\beta = 0.90$, Wald $\chi^2(1) = 7.03$, $p = .008$.

[13] An alternative way to analyze this dataset would be to separate participants who donated books before day four from those who had not and conduct a logistic regression within the latter group. This analysis revealed consistent results: among students who had not donated before day four ($n = 2341$), the participation rate (after receiving the temporary-standing update) in the no-intervention control condition was lower when contestants learned they were ahead ($P = 4.4\%$) versus behind ($P = 7.5\%$), $\chi^2(1) = 4.71$, $p < .05$. In the intervention condition, the participation rate was comparable between the two campuses ($P_{ahead} = 7.7\%$ vs. $P_{behind} = 6.6\%$), $\chi^2(1) = 0.59$, $p = .44$.

reminding contestants of last year's record simply enhanced all donors' motivation.

Number of books donated. Analyzing the number of books donated after contestants received the experimental treatments (i.e., among those who signed up to donate after day four) revealed the same pattern of results. A 2 (temporary standing) × 2 (discrepancy intervention) ANOVA on the number of books donated after day four revealed a main effect of discrepancy intervention, $F(1, 156) = 10.43$, $p < .01$, $\eta^2 = .063$, qualified by the predicted interaction, $F(1, 156) = 3.38$, $p = .068$, $\eta^2 = .021$; see Figure 6b. Consistent with the prior studies, in the no-intervention control condition, being ahead in the later phase of the competition lowered subsequent performance. Contestants donated fewer books after learning they were ahead ($M = 1.52$, $SD = .31$) versus behind the opponent campus ($M = 2.29$, $SD = .23$), $F(1, 156) = 3.98$, $p = .048$, $\eta^2 = .025$. In the discrepancy intervention condition, however, this effect was eliminated. As expected, when an additional negative performance discrepancy was made salient, book donation following the temporary-standing update was comparable across campuses ($M_{behind} = 2.64$, $SD = .25$ vs. $M_{ahead} = 2.80$, $SD = .22$), $F(1, 156) = 0.25$, $p = .62$, $\eta^2 = .002$.[14]

Further, this boost in book donation was driven by contestants from the ahead campus ($M_{discrepancy} = 2.80$, $SD = .22$ vs. $M_{no\text{-}intervention} = 1.52$, $SD = .31$), $F(1, 156) = 11.58$, $p = .001$, $\eta^2 = .069$. The discrepancy intervention had no such effect, however, among contestants from the behind campus, $F(1, 156) = 1.09$, $p = .30$, $\eta^2 = .007$, again ruling out the possibility that the additional negative discrepancy simply enhanced motivation for all donors.

Study 5 underscores the demotivating effect of being ahead later on in a multiphase competition and demonstrates an effective intervention to combat it. Being ahead renders no

[14] Results held when including all students and controlling for the number of books donated before the temporary-standing update (i.e., the control variable was the number of books donated before the end of day four), $F(1, 2538) = 8.31$, $p = .004$, $\eta^2 = .003$.

negative discrepancy to motivate late-leaders; hence their motivation is reduced. By providing the best year's performance as an additional point of comparison, we changed the reference point contestants used to determine the amount of effort they needed to invest (their main concern in the later phase); because this reference point created a negative performance discrepancy, it counteracted the demotivating effect of being ahead towards the end of the competition.

Further, we replicated the demotivating effect of being ahead later on with a collective-goal competition in a natural field setting. This underscores the generalizability and practical significance of our findings and connects our work with research on motivation in group settings. In addition, consistent with the prior studies, we found that being ahead (rather than being behind) was key to determining how contestants interpreted their temporary standing and thus their motivation and performance in multiphase competitions.

Note that the negative discrepancy intervention sustained late leaders' motivation even though no explicit incentive was attached to the additional reference point; the treatment thus did not alter the main goal of the donation drive—to collect more books than the opposing campus and win the matched cash donation, nor did it change the phase of the competition or contestants' temporary standing. Although reminding contestants of their best year's performance could potentially have introduced a "mere goal" in and of itself (contributing to the boost in motivation), because this intervention demonstrates a feasible way for pro-social organizations to sustain higher levels of motivation in the field, it is of high practical value.

General Discussion

Competitive goal pursuit shares many similarities with individual goal pursuit. There is a goal (to win) that individuals are motivated to achieve, there is a reward (e.g., a medal, a bonus) for goal attainment, and feedback is available to help gauge the attainability of that goal (Kelley

& Thibaut, 1969; Locke, Shaw, Saari, & Latham, 1981). Yet competitive goal-pursuit contexts differ from individual goal pursuit in a few important ways. In competitions, goal attainment depends not solely on an individual's personal performance, but also on that of the opponent. As a result, over the course of a multiphase competition, contestants' temporary standing provides valuable information (Deci & Ryan, 1985; Johnson & Johnson, 1989; Reeve & Deci, 1996; Reeve et al., 1985), making it a crucial determinant of motivation and performance. While the importance of this construct is reflected in sporting, academic, and business contexts as well as in our everyday language, how temporary standing impacts motivation across different phases of a multiphase competition had yet to be explored.

We adopted a dynamic approach to examine how temporary standing in a multiphase competition impacts motivation and performance in the early versus later phase of the competition. We found consistent support for our predictions across a variety of multiphase competitions, conducted online (dice game), in the lab (color-recognition contest and geography bee), and in the field (cross-campus book donation drive), and with measures of motivation (Studies 1, 2, 3a, 4, and 5) and performance (Studies 3a, 3b, and 5).

Study 1 provided an initial demonstration of the divergent effects of temporary standing on motivation in multiphase competitions. In the early phase of the competition, being ahead of one's opponent increased motivation, but in later phase, being ahead decreased motivation. Study 2 supported our hypotheses in a different competitive context and demonstrated the underlying processes. In the early phase of a competition, being ahead of one's opponent increased motivation by making winning seem more attainable. In the later phase, being ahead decreased motivation by reducing the estimated remaining effort needed to secure the win.

Studies 3a–4 provided additional support for the proposed underlying mechanisms

through mediation and moderation. Study 3a examined the early phase and demonstrated that undermining the attainability signal attenuated the positive effect of being ahead on motivation and performance. Study 3b examined the later phase and demonstrated that undermining the effort requirement signal attenuated the negative effect of being ahead on performance. Finally, in Study 4 we alleviated contestants' concern about whether they could win prior to beginning the competition, and observed a switch from being motivated by attainability to being demotivated by lower estimated remaining effort.

Based on these findings, we designed and tested an intervention to help late-phase leaders stay motivated. Study 5 employed a large-scale, multiday, cross-campus book donation competition in the field. Results showed that among contestants who were ahead in this later phase, providing an additional reference point that created a negative performance discrepancy helped sustain their motivation. Relative to late-phase leaders who did not receive the negative discrepancy intervention, those who did were 4.1% more likely to participate and contributed on average 1.28 more books to the drive.

Together, the studies underscored the impact of being ahead (rather than behind) on the signals contestants derived and their resulting motivation in multiphase competitions. The follow-up to Study 1 showed that being ahead increased motivation in the early phase and decreased it in the later phase relative to a control group that did not receive temporary-standing information. Study 4 demonstrated that compared to the control, being ahead increased motivation in the early phase of a multiphase competition when contestants did not know whether they could win but decreased motivation when they did. Further, Studies 3a and 3b showed that negating the meaning derived from contestants' temporary standing only influenced the motivation and performance of participants who were ahead, and Study 5 showed that only

late leaders' behavior was influenced by the negative discrepancy intervention.

Theoretical Implications

Interpersonal goal pursuit. This research contributes to the growing literature on interpersonal goal pursuit. Interpersonal relationships have been found to influence goal pursuit through goal activation and goal completion, as well as various processes during goal pursuit such as depleting or bolstering self-regulatory resources (e.g., Ackerman et al., 2009; Amodio, 2011; Knowles, Finkel, & Williams, 2007; Vohs, Finkenauer, & Baumeister, 2011; for a review, see Vohs & Finkel, 2006, and Fitzsimons & Finkel, 2010). In addition, power dynamics and satisfaction in a relationship can affect goal prioritization, contagion, and attainment (Hofmann, Finkel, & Fitzsimons, 2015; Laurin et al., forthcoming). Our work adds to this growing literature by exploring a unique type of interpersonal goal pursuit—multiphase competitions, in which not only the process of goal pursuit but also the ultimate attainment of the goal is interdependent.

Further, our findings contribute to discussion among psychologists and organizational behavior researchers regarding how competitions might enhance or hinder motivation (e.g., Campbell & Furrer, 1995; Chen, Kuo-Hsien, & Tsai 2007; Converse & Reinhard, 2015; Deci & Ryan, 1985; Epstein & Harackiewicz, 1992; Garcia, Tor, & Gonzalez, 2006; Porter, 1980). We approach competitions as interdependent goal-pursuit processes, and in line with prior research (e.g., Berger & Pope, 2011; Decety et al., 2004; Deutsch, 1962; Johnson & Johnson, 1974; Mussweiler, 2003), demonstrate the importance of temporary standing in determining subsequent motivation and performance (Cerin & Barnett, 2006; Gaudreau et al., 2002; Wilson & Kerr, 1999). Critically, we document the multifaceted impact this information has on contestants' motivation. Whether being ahead of an opponent increases or decreases subsequent motivation depends on when contestants learn they are ahead, due to a change in the signal this information

provides and the emphasis contestants put on these signals. The dynamic behavioral consequences we observed also echo the phase-based approach in various research streams spanning social, educational, and sports psychology (e.g., Cerin & Barnett, 2006; Cerin, Szabo, Hunt, & Williams, 2000; Folkman & Lazarus, 1985; Gaudreau et al., 2002; Hanin, 2000; Louro et al., 2007; Wilson & Kerr, 1999).

Dynamics of self-regulation. Our findings contribute to prior research on the dynamics of self-regulation (e.g., Converse & Fishbach, 2012; Etkin & Ratner 2012; Finkel, & van Dellen, 2015; Fishbach & Zhang, 2008; Fitzsimons, Fitzsimons & Fishbach, 2010; Huang et al., 2012; Huang & Zhang, 2013; Koo & Fishbach, 2008; Louro et al., 2007) in two key ways. First, we extend the dynamic self-regulation framework from individual to competitive goal-pursuit contexts, in which a contestant's likelihood of goal attainment is inextricably linked to that of an opponent (Johnson & Johnson, 1974). The contingent nature of goal attainment in competitions not only offers a novel context for theoretical development, but also highlights a construct that is uniquely relevant to multiphase competitions—temporary standing. While comparative feedback exists in individual goal-pursuit contexts, it is used merely as a reference point to infer goal commitment and progress and to facilitate personal improvement (e.g., Finkelstein & Fishbach, 2012; Fishbach et al., 2010). For instance, Finkelstein and Fishbach (2012) showed that while novices tended to seek positive performance feedback, such as a fast rate of progress, experts seek more negative performance feedback, such as a slow rate of progress. In contrast, in a dynamic zero-sum multiphase competition, temporary standing is more than a piece of information that can be selectively used to enhance self-regulation; it directly signals the likelihood of goal attainment, hence dictating contestants' motivation throughout the competition.

Second, we explore motivation in multiphase competitions along a temporal dimension

that is fundamentally different from that examined in the prior work (e.g., Etkin & Ratner, 2012; Fitzsimons & Fishbach, 2010; Huang et al., 2012; Huang & Zhang, 2010; Koo & Fishbach, 2008; Louro et al., 2007). In individual goal-pursuit contexts, the temporal dimension reflects how much progress individuals have made toward their goal (i.e., the distance between one's current status and the ideal end-state). For example, with a goal to score 100 points, having earned 20 points would be considered low goal progress and having earned 80 points would be considered high goal progress; goal progress starts low and increases over the course of individual goal pursuit. In contrast, in multiphase competitions, the goal objective is anchored by the opponent's current performance and thus remains dynamic; the discrepancy between a contestant's score and the opponent's score is not strictly decreasing over the course of the competition. A contestant could be ahead in one round (i.e., a positive discrepancy) and behind in the next (a negative discrepancy). Consequently, the temporal dimension of a multiphase competition is delineated by the distinct time periods that comprise it, rather than the individual's distance to a static goal objective, and contestants' motivation can vary depending on the time period they are in.

To illustrate, imagine that a goal typically pursued in an individual goal-pursuit context (e.g., weight loss) was made into a competition (e.g., "The Biggest Loser," a reality TV show). A contestant who had lost eight pounds so far (individual goal progress) and was in the lead (temporary standing) would behave very differently if this information were provided in episode 2 (the early phase of the competition) versus episode 15 (the later phase of the competition). Even though contestants' personal goal progress would remain the same (i.e., eight pounds lost so far), our findings suggest that the phase of the competition in which contestants learn their temporary standing determines how they subsequently behave.

Social comparison. The present findings also relate to the social comparison literature.

Festinger (1954) conceptualized social comparison as the processes of gathering information from and about other people for the purpose of self-evaluation. Subsequent work has argued that social comparison can be driven by both self-enhancement and self-improvement motives: whereas downward comparisons (i.e., comparing oneself to worse-performing others) help enhance or protect one's self-view (Suls, 1977; Wills, 1981), upward comparisons (comparing oneself to better-performing others) serve to improve performance (Lirgg & Feltz, 1991; Maddux, 1995; Taylor and Lobel 1989). Our findings suggest that in the early phase of a multiphase competition, self-enhancement feedback could lead to greater motivation and performance, whereas in the later phase, self-improvement feedback may lead to greater motivation and performance. Future research is needed to explore how these and other facets of social comparison theory (e.g., perceived closeness, domain importance) contribute to the motivational dynamics in multiphase competitions (e.g., Garcia, Tor, & Schiff, 2013).

Limitations and Future Research

As noted earlier, we focused our inquiry on novel, single-shot, one-on-one competitions where both the opponent and the competition itself were unfamiliar. This constraint allowed us to fully conceptualize and capture the motivational dynamics of multiphase competitions (i.e., the switch from concerns about attainability to how much additional effort is required) and provided methodological precision in our studies. However, in many contexts, competition occurs on a repeated basis among the same (or similar) contestants (e.g., Kilduff, Elfenbein, & Staw, 2010), in which case, attainability may be less of a concern. As Study 4 shows, in these situations, favored contestants may focus on the amount of effort needed to win from the outset of the competition. What if the competition occurs in a familiar domain with a known opponent, but there are novel factors (e.g., unfamiliar weather conditions or a recent recovery from injury)

that could affect how attainable winning seems? We encourage future research to explore these possibilities, to paint a complete picture of when (and in what situations) the two drivers identified in the current research determine subsequent motivation.

Team-on-team competitions are also quite common and may influence what signal is derived from temporary standing information. Because team-based play can obscure the connection between an individual's effort and the final outcome of the competition, these contestants may question whether they can win and interpret being ahead as a signal that winning is attainable throughout the competition. As a first step toward understanding competitive goal-pursuit contexts from a dynamic perspective, the present research raises a variety of interesting and important research questions for future exploration.

Moreover, we limited our examination to temporary standing that imposed a moderate discrepancy between contestants' score and the opponent's score, such that meaningful inferences could be derived from being ahead, yet the final outcome of the competition could still change (e.g., follow-up to Study 1). What if the difference between a contestant and the opponent was so small (e.g., a single-point difference; Berger & Pope, 2011) that it no longer provided a meaningful signal of the likelihood of winning? How would temporary standing impact motivation in this case? We speculate that when a lead (or deficit) is small, individual factors, such as differences in competitiveness (e.g., Brown, Cron, & Slocum, 1998) or beliefs in momentum (i.e., winning or losing streaks, Mack, Miller, Smith, Monaghan, & German, 2008; Vergin, 2000) may dominate and determine whether contestants are motivated or demotivated. Close games constitute an interesting avenue to test the impact of various lay beliefs and individual (or team) differences on the inferences that contestants draw from their temporary standing, and the resulting effects of these inferences on motivation.

Finally, our theorizing emphasized the role of being ahead of (rather than being behind) an opponent in driving contestants' motivation. The results of our studies supported this emphasis in several ways. First, we found the same pattern when comparing contestants who were ahead to a control group that did not receive temporary-standing information (follow-up to Study 1 and Study 4). Second, negating the attainability signal early on in a competition (Study 3a) and the effort requirement signal later on (Study 3b) only influenced the motivation of contestants who were ahead. Finally, the discrepancy intervention tested in Study 5 increased motivation only among contestants who were ahead (not those who were behind). Nevertheless, the patterns observed in Studies 1 and 2 suggested that while being ahead of one's opponent was motivating in the early phase of the competition, being behind may have in fact been motivating as the end of the competition approached.

Why might this be? One possibility is that when entering the later phase of a multiphase competition, the leading opponent represents a compelling "alternative" to a contestant's present losing status; much like getting the gold is a salient counterfactual for silver medalists (Medvec, Madey, & Gilovich, 1995). As the end of the competition approaches, contestants who are behind may go all-out in an attempt to reduce the discrepancy before the end of the game (e.g., the "back to the wall effect," Simon, 1971; see also Barankay, 2010; Fershtman & Gneezy, 2011). Indeed, Berger and Pope (2011) found that NBA teams behind by a point at half time were more likely to win than teams ahead by a point. Because temporary standing does not seem to provide the same signal to contestants who are behind as to those who are ahead, future research is encouraged to explore the role of being behind in multiphase competitions.

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Figure 1. Motivation (in seconds) as a function of temporary standing and competition phase (Study 1). Error bars represent ±1 standard error of the mean.

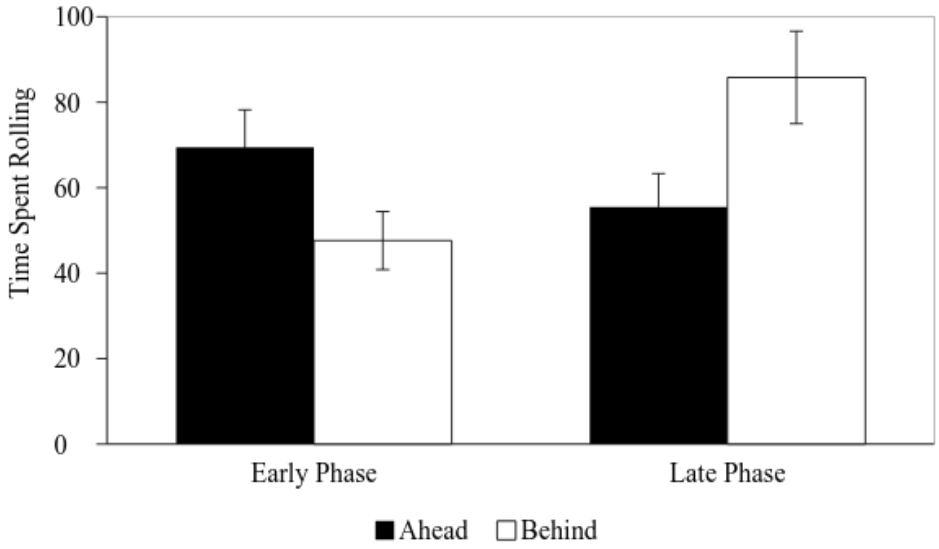


Figure 2a. Motivation (in seconds) as a function of temporary standing and competitive phase (Study 2). Error bars represent ±1 standard error of the mean.

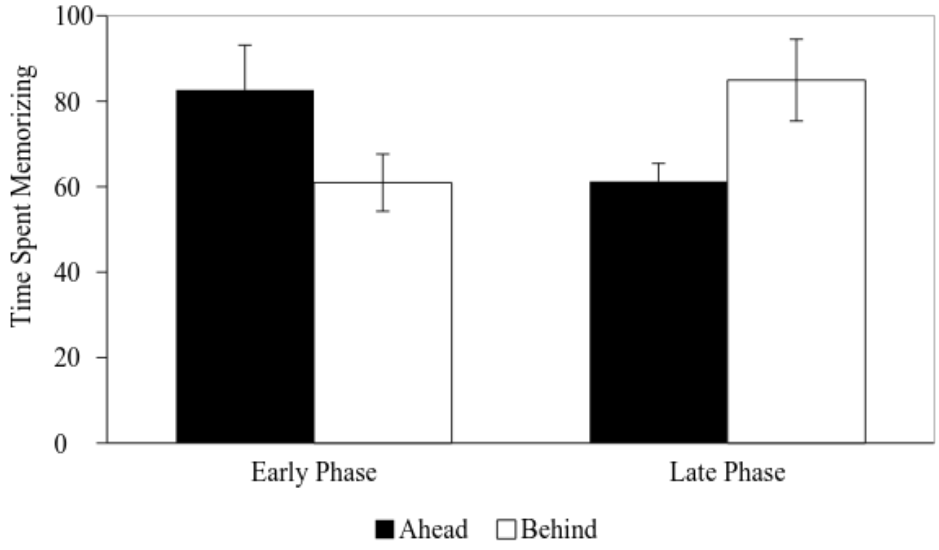
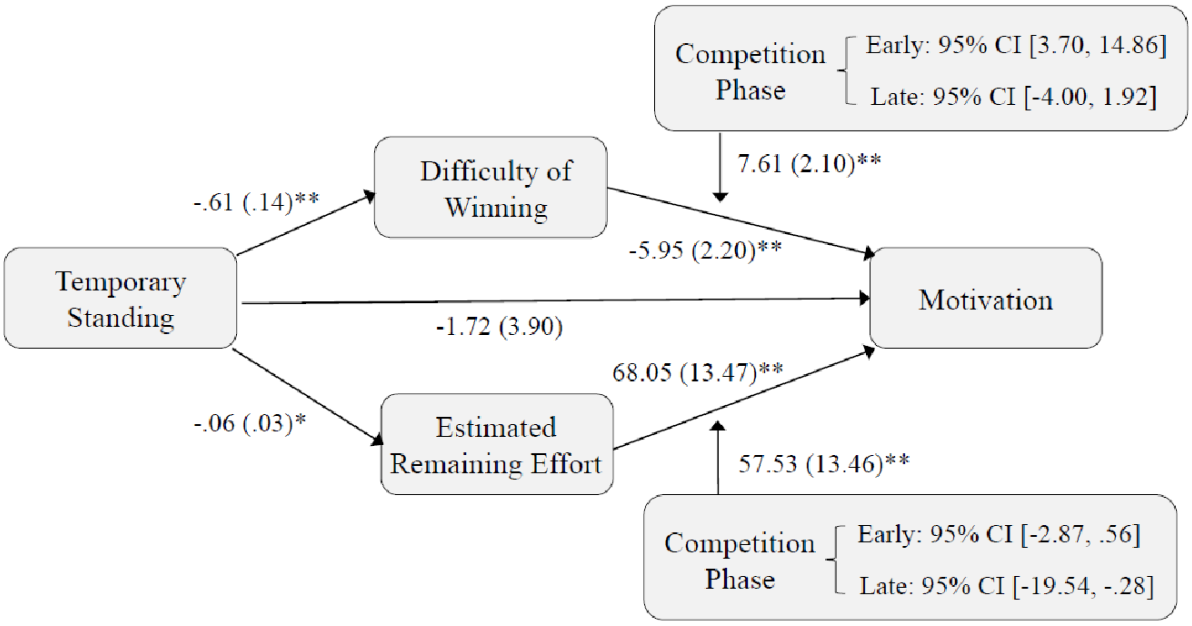


Figure 2b. Moderated mediation analysis: The effect of temporary standing on motivation in multiphase competitions is driven by the perceived attainability of winning in the early phase, and by the estimated remaining effort needed to win in the later phase (Study 2).



Note. The numbers in parentheses refer to the standard error of the regression coefficient. Standardized coefficients are reported. * $p < .05$, ** $p < .01$

Figure 2c. Attainability of winning × competition phase interaction in moderated mediation model

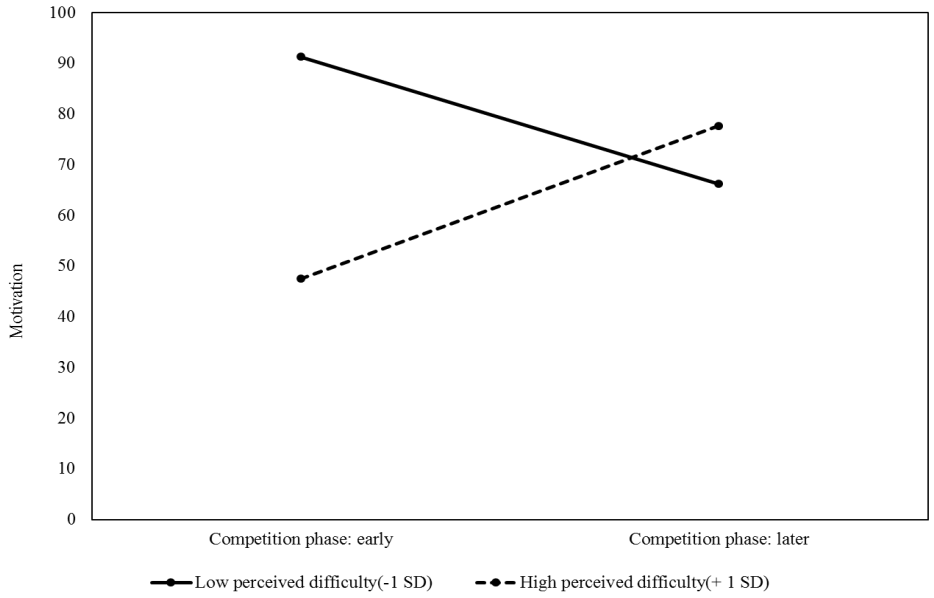


Figure 2d. Estimated remaining effort × competition phase interaction in moderated mediation model

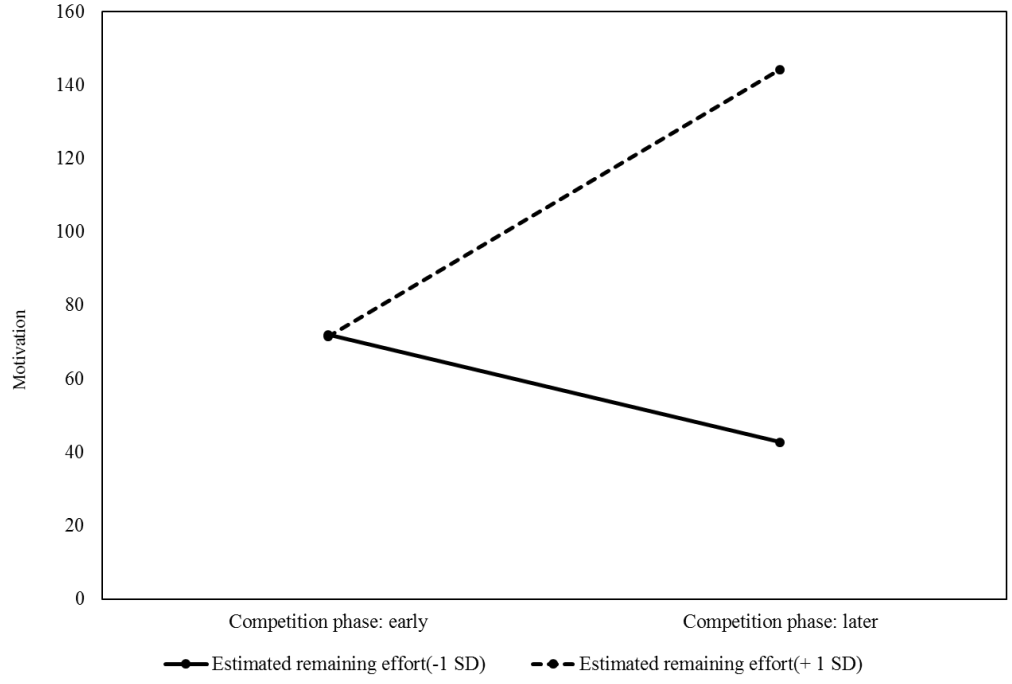


Figure 3a. Motivation (in seconds) as a function of temporary standing and attainability signal (Study 3a). Error bars represent ±1 standard error of the mean.

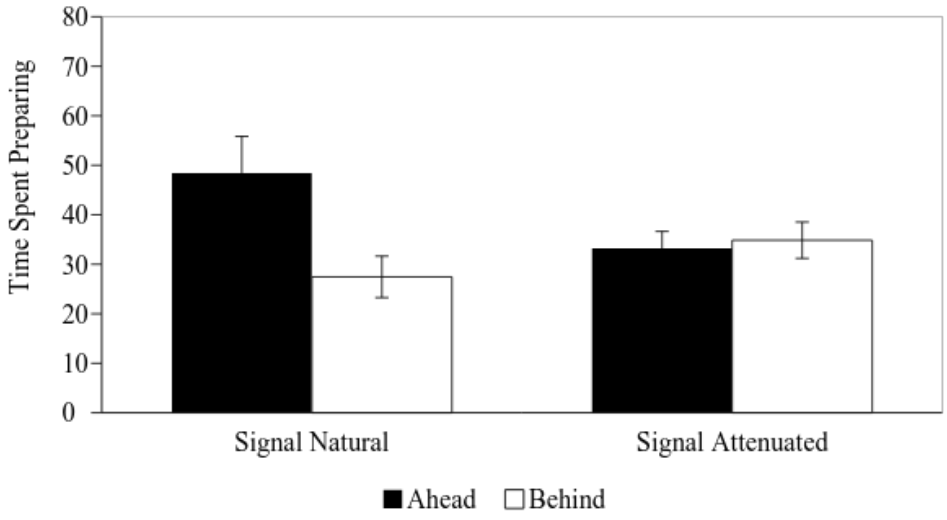


Figure 3b. Performance (number of correctly identified provinces) as a function of temporary standing and attainability signal (Study 3a). Error bars represent ±1 standard error of the mean.

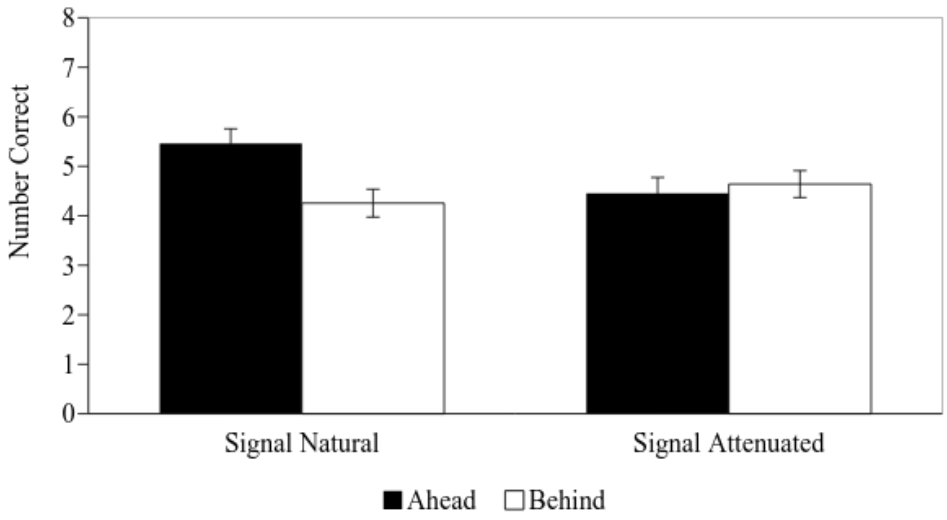


Figure 4. Performance (number of correctly identified countries) as a function of temporary standing and effort requirement signal (Study 3b). Error bars represent ±1 standard error of the mean.

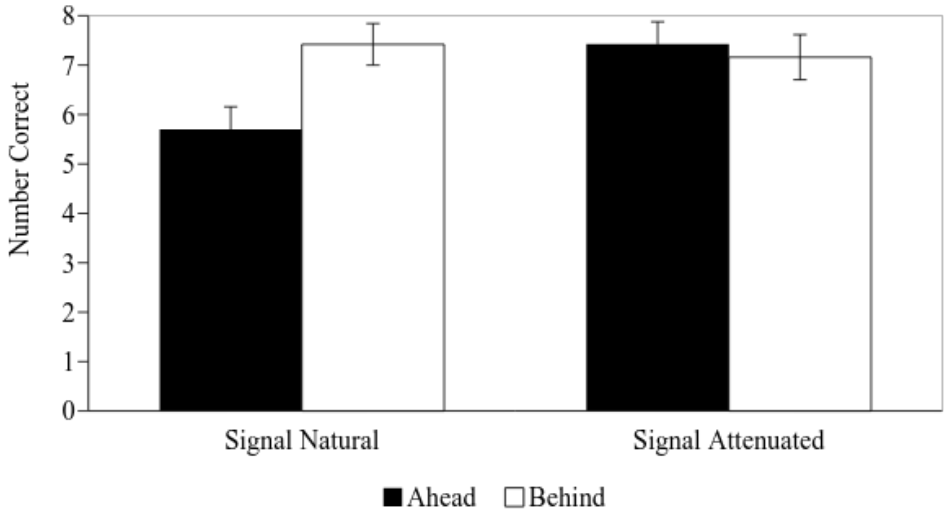


Figure 5. Motivation (in seconds) as a function of temporary standing and early-phase attainability concern (Study 4). Error bars represent ±1 standard error of the mean.

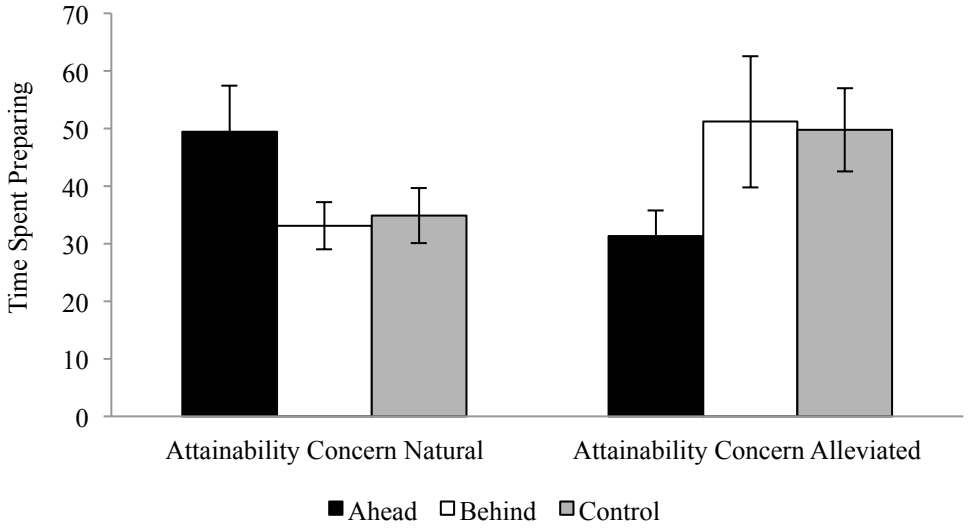


Figure 6a. Participation rate as a function of temporary standing and discrepancy intervention (Study 5).

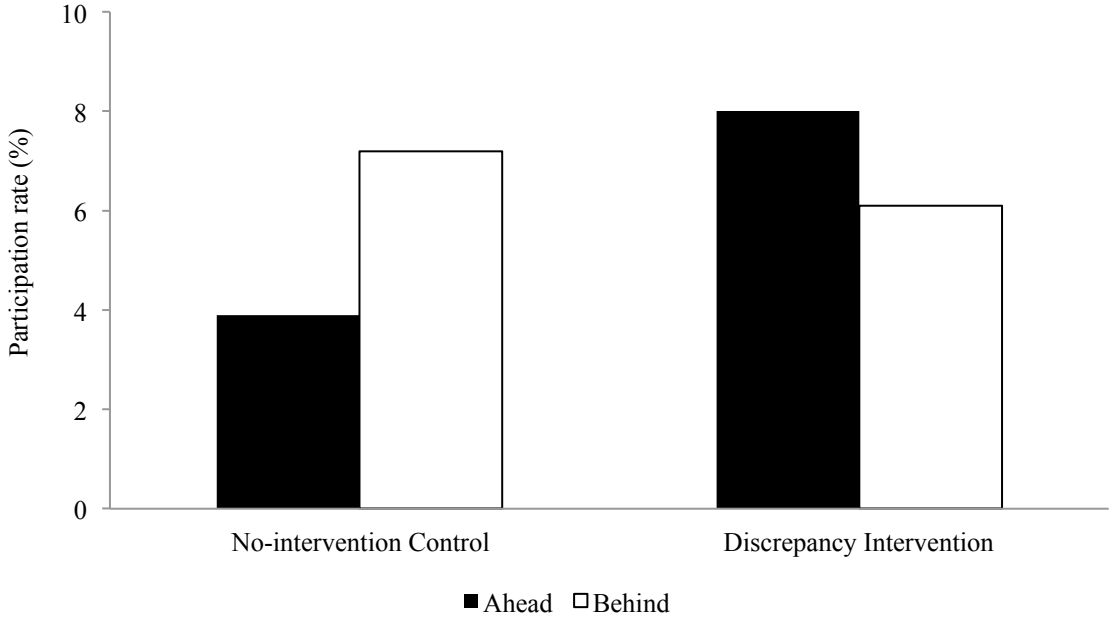
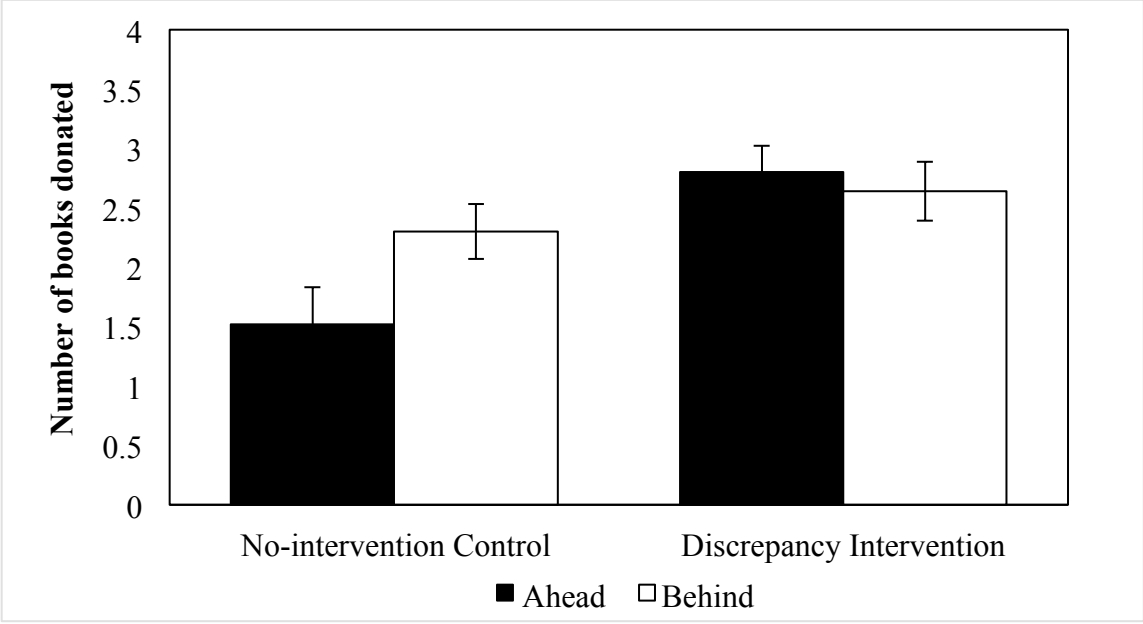


Figure 6b. Number of books donated as a function of temporary standing and discrepancy intervention (Study 5). Error bars represent ±1 standard error of the mean.



Appendix A: Measures Used in Studies 1–5

Study 1

- Dependent measure: Time spent on the bonus dice rolls
- Other measures:
  - Demographic: Gender, age, highest level of education, ethnicity, total household income
  - Exploratory: Social Comparison Scale (Gibbons & Buunk, 1999)[15], goal importance ("How important was it for you to win the dice game?" 1 = *Not at all important* to 7 = *Very important*), task engagement ("How engaged were you in the dice game?" 1 = *Not at all* to 7 = *Very much*)

Study 2

- Dependent measure: Time spent memorizing the colors
- Process measures:
  - How difficult will it be for you to win? on a 10-point scale (1 = *Not at all difficult* to 10 = *Very difficult*)
  - How many more points do you think you need to earn in order to win? (open-ended)
- Other measures:
  - Demographic: Gender, age, English as first language
  - Exploratory: Accuracy rate (in percentages), goal importance ("How important is it for you to win?" 1 = *Not at all important* to 10 = *Very important*), color recognition ability ("In daily life, how is your ability to memorize colors? 1 = *Very bad* to 7 = *Very good*), color recognition confidence ("In daily life, how confident are you about your ability to memorize colors?" 1 = *Not confident at all* to 7 = *Very confident*)

Study 3a

- Dependent measures:
  - Time spent studying the map
  - Number of correctly identified provinces
- Process measure: How difficult will it be for you to win? on a 7-point scale (1 = *Not at all difficult* to 7 = *Very difficult*)
- Other measures:
  - Demographic: Lived in China (yes-no), gender
  - Exploratory: Remaining effort (open-ended)[16], effort certainty ("How certain are

[15] An exploratory regression of motivation on temporary standing, competitive phase, mean-centered social comparison orientation, and their interactions found no main effect of social comparison orientation ($t < 1$) nor interactions with the manipulated variables (t's < 1); the focal temporary standing × competition phase interaction also held when controlling for social comparison orientation, $F(1, 289) = 8.84$, $p = .003$, $\eta^2 = .030$.

[16] We added effort estimate as a simultaneous mediator in the main moderated mediation model to ensure it did not play a role in the early phase. Results confirmed it did not: signal-natural: $ab = -.02$, 95% CI [-1.61 to 1.10]; signal-attenuated: $ab = -.01$, 95% CI [-1.25 to .94].

you about the remaining points you need to win the dice game?" 1 = *Not very certain* to 7 = *Very certain*)

Study 3b

- Dependent measure: Number of correctly identified provinces
- Process measure: How many more points do you think you need to earn in order to win? (open-ended)
- Other measures:
    - Demographic: Lived in Africa (yes-no), gender
    - Exploratory: Attainability (1 = *Not at all difficult* to 7 = *Very difficult*)[17], effort certainty ("How certain are you about the remaining points you need to win the dice game?" 1 = *Not very certain* to 7 = *Very certain*), goal importance ("How important is it for you to win?" 1 = *Not at all important* to 7 = *Very important*)

Study 4

- Dependent measure: Time spent studying the map
- Process measures:
    - How difficult will it be for you to win? on a 7-point scale (1 = *Not at all difficult* to 7 = *Very difficult*)
    - How much more effort do you think you need to invest in order to win the competition? on a 100-point scale (0 = *No additional effort* to 100 = *Much additional effort*)
- Other measures:
    - Demographic: Lived in Canada (yes-no), gender, age
    - Exploratory: None

Study 5

- Dependent measures:
    - Participation rate
    - Number of books donated
- Other measures:
    - Demographic: Gender, age
    - Exploratory: None

[17] We added attainability as a simultaneous mediator in the main moderated mediation model to ensure it did not play a role in the later phase. Results confirmed it did not: signal-natural: *ab* = -.02, 95% CI [-.19 to .11]; signal-attenuated: *ab* = -.03, 95% CI [-.21 to .07].

Appendix B: Results and Discussion for First Follow-Up to Study 1

We assigned three orthogonal planned contrast codes to the four discrepancy conditions: the "small discrepancy" code (2, -1, -1, 0) to the 5-point, 30-point, 60-point, and 95-point conditions respectively, to compare the discrepancies used in Study 1 (30 and 60 points) with the 5-point discrepancy condition; the "large discrepancy" code (0, -1, -1, 2) to the 5-point, 30-point, 60-point, and 95-point conditions respectively, to compare the 30- and 60-point discrepancies with the 95-point discrepancy; the "moderate discrepancy" code (0, -1, 1, 0) to the 5-point, 30-point, 60-point, and 95-point conditions respectively, to control for the remaining difference between the 30-point and 60-point discrepancy conditions. We then constructed regression models using the small, large, and moderate discrepancy codes, temporary standing, competition phase, and all two-way and three-way interactions as predictors. Results are summarized below.

Size of discrepancy. As expected, we found significant main effects for each of the discrepancy codes, such that the Study 1 discrepancies (30- and 60-point) were perceived to be larger than the 5-point discrepancy ($M = 2.05$), $\beta = -.70$, $t(530) = -24.02$, $p < .001$, yet smaller than the 95-point discrepancy ($M = 5.53$), $\beta = .49$, $t(530) = 16.75$, $p < .001$; in addition, the 60-point discrepancy ($M = 5.03$) was perceived to be larger than the 30-point discrepancy ($M = 4.02$), $\beta = .20$, $t(530) = 7.19$, $p < .001$. The only other significant effect in this analysis was a main effect of competition phase, such that discrepancy seemed smaller in the early ($M = 3.94$) versus later phase of the competition ($M = 4.49$), $\beta = .16$, $t(530) = 5.73$, $p < .001$.

Likelihood to change. As expected, we found significant main effects for each of the discrepancy codes, such that the Study 1 discrepancies (30- and 60-point) were perceived to be less likely to change than the 5-point discrepancy ($M = 5.29$), $\beta = .36$, $t(530) = 9.04$, $p < .001$, and more likely to change than the 95-point discrepancy ($M = 3.97$), $\beta = -.217$, $t(530) = -5.40$, p

< .001; in addition, the 60-point discrepancy (M = 4.04) was perceived to be less likely to change than the 30-point discrepancy (M = 4.45), β = - .10, t(530) = - 2.74, p < .01. The only other significant effects in this analysis were a main effect of competition phase, such that the outcome seemed less likely to change in the later (M = 4.03) versus early phase of the competition (M = 4.80), β = - .27, t(530) = - 7.15, p < .001, and a main effect of temporary standing, such that the outcome seemed less likely to change for those who were behind (M = 4.29) versus ahead of the opponent (M = 4.53), β = .08, t(530) = 2.12, p < .05.

Attainability. Supporting our theory, we found a significant main effect of temporary standing, such that those who were ahead (M = 3.19) perceived winning to be more attainable (i.e., less difficult) than those who were behind (M = 4.71), β = - .46 t(530) = - 13.58, p < .001. We also found a temporary standing × competition phase interaction, β = - .15, t(530) = - 4.46, p < .001, such that temporary standing had a bigger impact on how difficult winning seemed in the later phase of the competition (M_{ahead} = 2.93 vs. M_{behind} = 4.93) compared to the early phase (M_{ahead} = 3.44 vs. M_{behind} = 4.48). Importantly, we obtained significant interactions between each of the three discrepancy codes and temporary standing, β = .37, t(530) = 10.44, p < .001 for the small-discrepancy code, β = - .25, t(530) = - 7.19, p < .001 for the large-discrepancy code, and β = - .08, t(530) = - 2.38, p < .05 for the moderate-discrepancy code, confirming that the attainability signal derived from being ahead depended on the size of the discrepancy. Specifically, being ahead (vs. behind) made winning seem more attainable (i.e., less difficult) in the 30-point (M_{ahead} = 3.22 vs. M_{behind} = 4.68, t(129) = 6.93, p < .001), 60-point (M_{ahead} = 2.85 vs. M_{behind} = 5.03, t(130) = 9.39, p < .001), and 95-point conditions (M_{ahead} = 2.75 vs. M_{behind} = 5.43, t(159) = 12.50, p < .001), but not in the 5-point condition (the pattern unexpectedly reversed in this case: M_{ahead} = 4.03 vs. M_{behind} = 3.53, t(131) = - 2.50, p < .05).

Estimated remaining effort. Supporting our theory, we found a significant main effect of temporary standing, such that those who were ahead (M = - .21) thought less additional effort was needed to win than those who were behind (M = .21), β = - .20, t(530) = - 4.75, p < .001. Importantly, we obtained significant interactions between the small-discrepancy code and temporary standing, β = .13, t(530) = 3.06, p < .01, as well as the large-discrepancy code and temporary standing, β = - .10, t(530) = - 2.24, p < .05; confirming that the signal of effort requirement derived from being ahead depended on the size of the discrepancy. Specifically, being ahead (vs. behind) decreased the estimated effort needed to win in the 30-point (M_{ahead} = - .19 vs. M_{behind} = .18, t(126) = 3.24, p < .01), 60-point (M_{ahead} = - .18 vs. M_{behind} = .37, t(129) = 4.26, p < .001), and 95-point conditions (M_{ahead} = - .34 vs. M_{behind} = .54, t(156) = 6.87, p < .001), but not in the 5-point condition (M_{ahead} = - .08 vs. M_{behind} = - .32, t(128) = - 1.96, *ns*).

Appendix C: Pictures from the Cross-Campus Book Donation Competition (Study 5)