Running Head: MOTIVATING PERFORMANCE WITH CHALLENGING GOALS

Motivating Individual Performance with Challenging Goals:

Is it Better to Stretch a Little or a Lot?

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Manuscript submitted for publication, June 2003

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Abstract

Goal setting studies consistently report that specific, difficult goals induce better performance than do vague or easy goals. The robustness of this effect prompts the question of how difficult a goal should be in order to best stretch performance. Traditional goal setting theory suggests that (all else equal) the more difficult the goal the better. Using an alternative account of goal setting based on the prospect theory value function, we predict and find that, holding goal commitment constant, most people perform better with a goal that is just beyond their reach than a goal that is far beyond their reach. We offer a potential explanation to reconcile our findings with the traditional literature and discuss prescriptive implications.

Keywords: goal setting, prospect theory, performance

Motivating Individual Performance with Challenging Goals:

Is it Better to Stretch a Little or a Lot?

An established finding in goal setting research is that specific, difficult goals yield better performance than do vague or easy goals in a variety of domains, ranging from clerical tasks and anagrams, to manufacturing and production, to exercise and weight loss (for reviews, see Latham & Locke, 1991; Latham, Locke, & Fassina, 2002; Locke & Latham, 1990; 1994; 2002; Locke, Shaw, Saari, & Latham, 1981; Mento, Steele, & Karren, 1987; Tubbs, 1986). The robustness of this effect, combined with anecdotal evidence of the value of "stretch goals," suggests that even extremely difficult, ambitious goals might elicit high performance (for a theoretical discussion of the organizational implications of these types of goals, see Sitkin, Miller, See, Cardinal, & Lawless, 2002). Indeed, in a review for the Handbook of Organizational Behavior, Locke advises that organizations should make goals "very hard—even outrageous" (2001, p. 50). Yet while the effectiveness of difficult goals is widely documented, researchers have pointed out that "goal theory is vague as to how hard a goal should be" (Locke & Latham, 1990, p. 39). The extent to which performance can and should be stretched using challenging goals is thus an empirical question that we highlight by contrasting two views of goal setting. These accounts make different predictions regarding the optimal level of goal difficulty.

A straightforward interpretation of the traditional goal setting findings from the numerous review papers and meta-analyses cited above is that *"the more difficult the goal, the higher the performance achievement"* (Locke, 2001, p.44—italics in the original). The conventional "difficult" goals used to induce high performance in experimental goal research are set such that individuals have roughly a 10% objective probability of attaining the goal (Locke & Latham, 1990, p. 349).[1] There is some evidence that as goals go beyond this level of difficulty into the

range of impossibility, motivation and performance level off but do not drop (Garland, 1982; 1983, Locke, 1982; Locke, Frederick, Buckner, & Bobko, 1983), and in these situations ability and goal commitment become the major predictors of performance (Locke, 1982). That is, at some level of goal difficulty people may do no better, but should also do no worse, so long as they remain committed to the goal and are "capable of attaining or making substantial progress toward the goal" (Locke, 2001, p. 46; Locke & Latham, 1990; 1994; 2002). Thus, the implication of the traditional theory is that, all else equal, the more difficult the goal the more it will stretch performance.

An alternative theoretical account of goal setting based on the prospect theory value function (Heath, Larrick, & Wu, 1999) makes a different prediction than the traditional theory for the *majority* of individuals in the performance distribution. Traditional goal setting theory argues that goals produce improved performance because they regulate the level of effort and persistence people devote to a task, direct attention, and facilitate use of more effective strategies (Latham et al., 2002; Locke & Latham, 1990). We think this explanation can be pushed another step by asking *why* goals have these effects. Applying the value function of prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), we assert that a goal increases motivation because it serves as a salient reference point that divides outcomes into regions of gains (e.g, successfully attaining a goal) and losses (e.g., falling short of a goal), which affects how people evaluate their progress toward the goal and overall performance (Heath et al., 1999). When current performance is below the reference point (goal), people experience their performance as a "loss" relative to the goal. The convex shape of the value function in the domain of losses implies that people will experience increasing marginal reinforcement and feel more motivated by the progress they make as they move closer to their goal. Whereas the

traditional prediction in goal setting research is that difficult goals yield the highest *average* performance, we predict that the *majority of individuals* will extend more effort and persist longer when the goal is just barely within their grasp. Since most people will, by design, fall short of a difficult goal (i.e., one with a 10% objective probability of attainment), it follows that the majority people should perform better with a goal that is lower than goals set at the conventional level of difficulty. In short, we argue that performance will be stretched more by a goal that is *just beyond reach* than a goal that is far beyond reach.

To understand the concept of a goal that is just beyond reach, imagine a researcher who plans to work every day on a book and who, with maximum effort, could write no more than 5 pages a day. Which would be more effective, being stretched by a difficult goal of writing 6 pages, or being stretched an even more difficult goal of writing 10 pages? Even if the researcher was highly committed to the 10-page goal, she might not feel she was making much progress if she only managed to write 3 pages in the morning; in contrast, if she had set a goal of 6 pages, she would be experiencing greater reinforcement from making progress toward her goal and might be more motivated to continue. Thus, a goal that is just beyond reach is one that an individual can nearly attain with maximum effort. Note that whereas the traditional prediction in goal setting research concerns the effect of goals on *average* performance, we focus the present investigation on performance of *individuals*.

Understanding how people function when confronted with specific, challenging goals can generate insights of both theoretical and practical importance. From a theoretical perspective, understanding the limits of challenging goals might provide important insights into the psychological basis of goal effectiveness. From a practical perspective, organizations are dabbling with extreme performance targets (e.g., “stretch goals”) because they have heard

anecdotal evidence of the effectiveness of such practices (Thompson, Hochwarter, & Mathys, 1997; Tully, 1994). Goals set at high levels of difficulty may stretch the performance of individuals with higher ability (potentially bolstering *average* performance) but also demotivate a significant majority of individuals. Therefore, it is important to understand the effects of goal difficulty throughout the entire performance distribution in order to determine the extent to which organizations can stretch individual performance with challenging goals.

In two experiments we test our core prediction that the majority of people perform better with a goal that is just beyond reach than well beyond reach. Earlier studies (Heath et al., 1999) provide some support for this hypothesis using surveys of hypothetical behavior. In this paper we provide the first direct test using real behavior in physical tasks. Support for our prediction would lend credence to a model of goal setting that is grounded in a psychological analysis of value, with obvious practical implications for goal setting in organizational contexts. Moreover, by applying the prospect theory value function to goal setting, we seek to unite the cognitive insights from the decision making literature with the motivational insights from the goal literature, thus identifying new implications for both.

Relationship Between Goal Difficulty and Performance

As mentioned above, the bulk of the established research on goal setting has shown that specific, difficult goals produce higher average performance than vague or easy goals. Even when goals are in the impossible range, performance and motivation do not necessarily decline but rather show a nonsignificant upward trend (Garland, 1982; 1983, Locke, 1982; Locke et al., 1983). Though the relationship between goal difficulty and performance can be moderated by a variety of factors (Latham et al., 2002), the most relevant variable in the context of difficult goals is arguably goal acceptance or *goal commitment*. Goal commitment is expected to interact with

goal difficulty in the following way: higher goal commitment should produce higher performance across goal difficulty levels, but the correlation between goal commitment and performance should be stronger for more difficult goals (Locke, Latham, & Erez, 1988; Hollenbeck, Williams, & Klein, 1989; Klein, Wesson, Hollenbeck, & Alge, 1999). When goals are too extreme or seemingly impossible, goal commitment and self-efficacy can suffer, people may reject the goal, or they may make failed attempts at the goal that result in lowered morale or job satisfaction (Locke & Latham, 1994). For this reason, goal setting researchers have sometimes argued that "difficult but attainable" goals may be more advisable in field settings in order to (1) balance concerns for productivity with the satisfaction that comes from reaching a goal (Locke & Latham, 1985; 1994, p. 23) and (2) preserve goal acceptance and commitment, which are in part influenced by the expectancy of reaching the goal and the value of the goal (Klein, 1991; Klein et al., 1999; Locke, 1982; Locke & Latham, 1994). Therefore, if commitment is held constant, a straightforward reading of the traditional goal setting findings is that the more difficult the goal the better.

In addition to goal commitment, *ability* is occasionally noted as a moderator of the relationship between goal difficulty and performance and is thought to affect performance only "at very high (i.e., impossible) goal levels because such goals exceed the reach of virtually all people" (Latham & Locke, 1991, p. 230; Locke, 1982). Early research in goal setting failed to consistently demonstrate that ability moderates the effect of difficult goals on performance (Locke, 1965; for a review, see Terborg, 1977), hence for most tasks researchers have not predicted that such goals would necessarily cause performance to decline but rather to "level off after the limit of ability has been reached" (Locke & Latham, 1990, p. 257; 2002). Taken together, traditional goal setting theory would predict that, provided commitment remains in tact,

higher goals should not necessarily have any negative ramifications for people with lower ability—they may not perform better, but they should not perform significantly worse.

Finally, some theorists have argued that the perceived feasibility or attainability of goals influence motivation through an individual's need for achievement and anticipated satisfaction from reaching a goal. For example, Naylor and Ilgen (1984, p. 108-109) assert that failure to reach a goal is always evaluated as unsatisfactory, and achieving a goal yields a jump in satisfaction that subsequently asymptotes just above the goal, resulting in a kind of "step function" utility. Such a step function implies relatively low motivation before and after the goal, with a psychological boost when the goal is attained. Moreover, expectancy-based models of motivation incorporate perceptions of attainability, operationalized as the subjective probability that an action will result in a particular outcome (Tubbs, Boehne, & Dahl, 1993; Vroom, 1964). Atkinson (1964) predicts that individuals who are high in need for achievement tend to prefer tasks of intermediate difficulty, because such tasks optimize the tradeoff between probability of success (which declines as goal difficulty increases) and satisfaction at having reached a challenging goal (which rises as goal difficulty increases). Thus, expectancy approaches and the Naylor & Ilgen (1984) step function account would make a similar prediction as the value function in situations where the probability of attaining the lower goal is viewed as substantially higher than the probability of attaining the higher goal. However, when both goals are viewed as clearly unattainable, these same accounts would predict that performance should be roughly constant across experimental conditions because neither goal affords a realistic chance of receiving the psychological boost or satisfaction that comes from *achieving* a goal. These predictions runs counter to the prediction of the goal traditional literature that, holding commitment constant, higher goals would induce higher motivation and performance.[2]

Using the Value Function to Explain Goal Effectiveness

The prospect theory value function models the psychological impact of consequences. The value function has been invoked in the analysis of a variety of phenomena, ranging from economic behavior (Barberis, Huang, & Santos, 2001; Benartzi & Thaler, 1995; Camerer, 2000; Odean, 1998), to consumer behavior (Darke & Freedman, 1993; Hardie, Johnson, & Fader, 1993; Thaler, 1985), to medical decision making (McNeil, Pauker, & Tverky, 198l; Treadwell & Lenert, 1999). Figure 1 depicts the value function, where objective outcomes are plotted on the *x*-axis, and the subjective value attached to those outcomes ($v(x)$) is plotted on the *y*-axis. There are three fundamental properties of the value function. First, it features a *reference point* that segregates outcomes into regions of "gains" and "losses." Second, it is steeper for losses than for gains, a phenomenon known as *loss aversion*—i.e., the pain derived from a loss is greater than the satisfaction derived from an equivalent gain. Third, the value function exhibits *diminishing sensitivity*—the marginal psychological impact of a particular gain or loss diminishes as one moves away from the reference point.

INSERT FIGURE 1 ABOUT HERE

We posit that people evaluate their performance relative to a goal in a way that can be characterized by the properties of the prospect theory value function, where the goal serves as a reference point (Heath et al., 1999). Thus, individuals experience their performance relative to the goal as either a loss (when they fail to reach the goal) or a gain (when they surpass the goal). Consider, for example, a goal of performing 50 sit-ups (see Figure 1). Loss aversion predicts that an individual will experience greater satisfaction as they progress from 45 to 50 sit-ups (segment B) than they will progressing from 50 to 55 sit-ups (segment A), i.e., the slope of the value function is greater below than above the reference point. Moreover, the convex shape of

the value function for losses implies that people experience greater marginal satisfaction per unit of performance as they approach their goal, i.e., the slope of the value function increases as it approaches the reference point. If someone has a goal of performing 50 sit-ups, they will experience less satisfaction as they progress from 30 to 35 sit-ups (segment E) than they will progressing from 35 to 40 sit-ups (segment D), which is in turn less satisfaction than they will experience progressing from 40 to 45 sit-ups (segment C). Thus, motivation increases as one approaches the goal and decreases as one exceeds the goal.

Returning to the impact of challenging goals on performance, the convex shape of the value function below the reference point predicts that people will work harder to reach a goal that is just beyond reach than a goal that is far beyond reach, even if individuals remain highly committed to the more difficult goal.[3] Because the definition of a goal that is just beyond reach will differ for different individuals, the value function approach makes more specific predictions than the standard goal setting literature, which has emphasized that (holding commitment constant) *average* performance will be higher for conventionally set difficult goals.[4] Moreover, we predict that individuals will work harder as they approach their goal even if they do not expect to attain it—a prediction that is inconsistent with motivational accounts that place an emphasis on the likelihood and value of actually achieving a goal (Atkinson, 1964; Tubbs, et al., 1993). Although people may well experience satisfaction when they reach a goal, the value function analysis suggests that people are motivated by the increasing marginal *benefits* (value) from incremental *progress* toward their goal, even if they acknowledge they will miss it.[5]

In the following two studies we test our predictions using an effort task and a persistence task. Because work is a function of effort and persistence, these two experiments jointly explore the major vehicles of performance. Study 1 investigates the influence of goals on effort expended

by expert runners and tests the prediction that effort will be higher when goals are just beyond reach than when they are far beyond reach, even when neither goal is attainable. Study 2 investigates the influence of goals on persistence of undergraduates holding an uncomfortable position and tests the prediction that the bulk of participants will persist longer with a goal that is just beyond their reach than a goal that is far beyond their reach. In this case both goals are set lower than the difficult (i.e., 90^{th} percentile) goals conventionally set in the literature. Importantly, in both studies we measure goal commitment and expect to find roughly equivalent levels across experimental conditions.

Study 1: Track Runners (Effort)

In the first study, we use a classic effort task with a population of experts—college varsity track athletes—to test our simplest prediction: individuals exert higher marginal effort (and perform better) when approaching a lower (more proximate) goal rather than a higher (more distal) goal. The type of running task we used relies on quick muscle and stored energy and thus provides a reasonably pure measure of effort. By using varsity athletes, we ensure that all runners are well-calibrated and understand that the goals are unattainable. Moreover, we hold ability constant by using a within-subject design.

The goal in this study was simple and concrete: participants were asked to run until they heard an air horn, at which point they would have 10 seconds to get as close as possible to the finish line marker. Although participants did not know this, we timed the sounding of the air horn so that they would have to run either 100 or 200 meters in the time remaining to achieve their goal. Figure 2 illustrates hypothetical value functions for two individual runners, one with a lower goal of 100 meters, and the other with a higher goal of 200 meters. The satisfaction or benefit, $b_g(.)$, of a given level of performance, x, is evaluated relative to the goal, g, using the

value function, $v(.)$, so that $b_g(x)=v(x-g)$. The distances are long enough that runners in both conditions surely know that they will fall short of their goal, but the runner with the lower goal of 100 meters experiences greater reinforcement (i.e., the slope is greater) as she moves closer to her goal and should therefore exert greater effort to reach it. That is, Figure 2 illustrates that for any level of performance below the goal, the slope of the benefit function with the 100-meter goal, $b'_{100m}(x)$, is greater than slope of the benefit function with the 200-meter goal, $b'_{200m}(x)$, thus we predict that the marginal effort expended to work toward the goal will be greater in the lower goal condition.[6]

INSERT FIGURE 2 ABOUT HERE

For this first experiment we wanted to rule out issues of expectancy or attainability, thus we set goals that would be clearly unattainable. Note that all participants were experts performing a task that they understood very well. All runners in our sample engaged in regular workouts that include the distances that we asked them to run. However, because traditional theories of goal setting might be concerned that runners would reject the higher of the two goals, we also obtained measures of goal commitment. The value function model of goal setting predicts that, even when runners are highly committed to both goals that are obviously unattainable, runners in the lower goal condition will run further in the last ten seconds than those in the higher goal condition.

Method

Participants. Eighteen members of the Duke University intercollegiate varsity track team (eleven women and seven men) were recruited to participate in a study of "running performance" and were paid $10.[7]

Design and procedure. In order to control as much as possible for variance in ability so that we could use conventional tests on average performance, we employed a within-subject design in which each participant ran alone on two different occasions, separated by a few days. Each participant ran once in a lower goal condition and once in a higher goal condition (a visual depiction of the design of this study is included in Appendix A), the order of which was counterbalanced. In both conditions, participants were assigned the goal of getting as close as possible to the finish line on a 400-meter track. However, participants in the lower goal condition started at the 100-meter mark, whereas participants in the higher goal condition started at the starting line. Participants knew that at some point during their run they would hear an air horn, which would indicate that they have 10 seconds to run as far as possible. Unbeknownst to our participants, we always sounded the air horn after they had run 200 meters, so that when the horn sounded, low goal participants were exactly 100 meters away from the finish line, whereas high goal participants were exactly 200 meters away.

Because these participants were all experienced runners, we surmise that they all fully realized they could not reach their goal—10 seconds to run 100 meters is world-record pace for a 100-meter dash, and participants had already run 200 meters.[8] However, the experiment was designed so that participants in the lower goal condition could come closer to their goal in the remaining 10 seconds than participants in the higher goal condition.

Results and discussion. Four participants (one woman and three men) were dropped from all analyses because they did not participate in both conditions. In order to make sure that participants did not reject our goals, we measured perceived goal importance and seriousness for all participants using two items that were scored on a 1-7 Likert scale (see Appendix B). We anticipated that these two measures would form a reliable scale, but the runners evidently treated

goal "importance" and "seriousness" somewhat differently (Cronbach's α = .64). However, using a within-subject *t*-test we found no significant mean differences between conditions on either measure: "goal importance" (5.00 in the lower goal condition; 4.71 in the higher goal condition) or "goal seriousness" (5.57 in the lower goal condition; 5.71 in the higher goal condition).

During the first 200 meters of the task before the horn was sounded, the average running time for participants was 34.0 seconds in the lower goal condition and 35.2 seconds in the higher goal condition, which is not quite a statistically significant difference ($t(13)=-2.04$, $p=.062$).[9] Once the horn was sounded to indicate the last 10 seconds of the task, participants ran an average of 63.1 meters in the lower goal condition and 59.6 meters in the higher goal condition, a statistically significant difference of 3.5 meters ($t(13)=2.56$, $p<.05$). If this difference in rates were extrapolated to a full 100 meters, it would correspond to an improvement in time of about .94 seconds. This is a large difference by track and field standards. The difference for college runners between "automatic" and "provisional" qualifying standards for the 100-meter dash in Division I NCAA competition is .18 seconds for men and .25 seconds for women (source: NCAA website). Consistent with our prediction derived from the prospect theory value function, participants expended more effort working toward a goal when the goal was closer than when it was further away.

On a theoretical level, these results distinguish the value function model from expectancy-based theories which might make a similar prediction that a lower goal is more motivating, but for very different theoretical reasons (Atkinson, 1964; Vroom, 1964). In particular, theories of achievement motivation (Atkinson, 1964), which have held that people respond better to goals of medium difficulty, can only explain the present result if one assumes

that our runners thought that there was a substantially higher probability that they would reach the goal when it was closer than when it was further away. This assumption seems dubious in our case because experienced runners would recognize that they could not attain their goal in either experimental condition. Nevertheless, the runners who were closer to their goal apparently exerted more effort, a unique prediction of the value function account.

Furthermore, because participants were assigned to goals they knew they could not reach, the results of the present study provide evidence for the value function over other proposed forms of utility functions. Although traditional goal setting theorists do not explicitly invoke utility functions in their analysis, more general discussions of motivation typically imply concave or step functions (Campion & Lord, 1982; Carver & Scheier, 1982; March & Simon, 1958; Naylor & Ilgen, 1984). Because the goal in this case is patently unattainable in both conditions, such accounts would predict either that the more difficult 200-meter goal would induce higher performance (if the utility function is concave), or they would predict that performance should be roughly constant across experimental conditions (if the utility function is step) because runners will not experience a psychological boost unless they *achieve* a goal. Thus, the increased effort of the runners during the last 10 seconds when facing a lower (yet still unattainable) goal cannot be explained by a concave or step utility function, and instead supports an account of utility for goals that is convex in the region approaching a goal.

Study 2: The Wall-Sit (Persistence)

The first study shows that when commitment is held constant the same person is more motivated by a goal that is just beyond reach than a goal that is far beyond reach. The relatively homogeneous distribution of ability in our sample of elite athletes allowed us to identify one goal that all participants would find just beyond reach and a second goal that all participants would

find far beyond reach. However, in most organizational environments there is great variation in ability relative to the range of goals that might be chosen. In the goal setting literature, "difficult" goals are typically defined by the criterion that 90% of individuals will fail to reach the goal. The value function analysis predicts that such challenging goals will have different effects on people of different ability. In particular, difficult goals might stretch the performance of high ability individuals for whom such goals are just beyond reach (e.g., participants in the 70^{th} to 90^{th} percentile) but also fail to motivate individuals who find the same goal level too far beyond reach (e.g., individuals in the 1^{st} to 50^{th} percentile). Although previous studies have shown that (with sufficient goal commitment) performance tapers off but does not necessarily decline when people are working toward a goal that well exceeds their reach (Locke, 1982; Locke et al., 1984), we assert that people will actually perform significantly worse when faced with a goal that is far beyond reach.

In Study 2 we asked participants to persist in a difficult physical task called the "wall-sit." We expected that there would be substantial differences in people's ability (or willingness) to endure the pain associated with this task. Participants in this study were assigned to a lower or higher goal condition that differed by the start position of a visual timer that tracked how long they persisted in the wall-sit position. We expected that, holding goal commitment constant, the majority of individuals in the lower goal condition would be able to hold the wall-sit position for a longer amount of time than individuals in the higher goal condition (i.e., the median sitting time will be greater for those in the low goal condition than the high goal condition).

Method

Participants. One hundred fifty Duke University undergraduate and graduate students participated in this experiment. All individuals were recruited to participate in a bundle of

unrelated experiments at the student union with a total time of 15-20 minutes and total payment of $5.

Design and procedure. We used a between-subjects design in which participants performed a "wall-sit" task that required them to "sit" on air with their backs straight against a wall and their knees bent at a 90-degree angle (see Appendix A).[10] This position quickly becomes extremely uncomfortable, thus providing a good test of persistence. Based on pilot tests, we knew that performance on this task varied across individuals but could not be predicted by gender, age, or the self-reported fitness level of the students in our sample.

Persistence was tracked and timed on a laptop computer using a red horizontal "timer bar" (see Appendix A). The timer bar gradually expanded, similar to a thermometer, from its starting position on the left side of the screen toward a goal "finish line" on the right side of the screen. In the instructions, participants were shown a photograph of a person performing the wall-sit task and were told that their goal would be to hold the position until the red bar reached the finish line, and even longer if they were able.

Participants were randomly assigned to a low or high goal condition that varied only in terms of the starting position of the timer bar (n=75 per condition). In the high goal condition, the timer bar took 6 minutes to reach the finish line (and 7.5 minutes to reach the end of the screen if participants held the position longer than the assigned goal). In the low goal condition, the timer bar started 25% of the way to the finish line and took 4.5 minutes to reach the finish line (6 minutes to reach the end of the screen if they persisted beyond the goal). Note that although the bars were moving different distances between conditions, the rate at which the bar moved was identical for all participants. After the participants were in position and had begun timing, they could stop the experiment at any time by pressing any key on the laptop.

Although most participants seemed familiar with the wall-sit exercise (66% of participants reported having done this exercise before), we wanted to ensure they clearly understood what it entailed before administering the goal commitment measures. All participants briefly tried the position so that they understood how to perform it correctly and could gauge its difficulty. They were also given a 20-second preview of the rate at which the timer bar moved across the screen so they could better understand how long they would need to hold the position in order to reach their goal. After trying the wall-sit and previewing the timer bar, but before completing the actual task, participants indicated their degree of goal commitment by answering a four-item survey. Because the goal commitment items in our previous study had not formed a reliable scale, for the current study we used items developed by Hollenbeck, Williams, & Klein (1989), which are included in Appendix B.

Results and discussion. Our goal commitment measure originally included set of eight items from the Hollenbeck et al. (1989) scale, but our early pilot studies indicated that the four items listed in Appendix B were most reliable (Cronbach's α=0.80). These items were averaged to create a single indexed goal commitment variable. The mean commitment level was 3.41 (s.d.=.94) for the low goal condition and 3.46 (s.d.=1.03) for the high goal condition, which did not differ significantly. Mean persistence was 135 seconds for participants in the low goal condition and 123 seconds for participants in the high goal condition,[11] a small and nonsignificant difference (t(148)=.793, p=.429). However, when we consider the typical individual in the distribution, there was substantial evidence of the predicted pattern. First, the median participant held the position for 113 seconds in the low goal condition but only 81 seconds in the high goal condition, a difference of 40% (χ^2=5.23, p<.05 by Kruskal-Wallis). Second, people in the low goal condition persisted longer than people in the higher goal

condition up to the 85th percentile of the distribution, as shown in Figure 3. Consistent with our prediction, the majority of people performed better in the lower goal condition, eclipsed only by the very top performers.

INSERT FIGURE 3 ABOUT HERE

It is useful to note that, although we find most individuals persisting longer with a lower 4.5-minute goal, the low performance in the higher 6-minute goal condition was somewhat offset in the overall average by the very high performance of the top 15% of the distribution. Figure 4 plots the overlapping performance distributions of participants persisting in the wall-sit position for the lower goal condition (lighter shaded distribution) and higher goal condition (darker shaded distribution). The histograms reveal that the data are heavily skewed, which is why we favor nonparametric tests in our analysis. Moreover, there is a bimodal distribution for each goal condition: a small cluster of high performers on the far right (above the goal), and a large cluster of normal performers on the left (below the goal). Though high performers are randomly assigned to conditions, they can have a substantial influence on the mean results. That is, as goal difficulty increases, there will be substantial variance in performance. Indeed, the variance was 6754 seconds^2 for the lower goal condition and 10,889 seconds^2 for the higher goal condition.

According to our value function account, high performers in the lower goal condition would have performed even better had they been assigned to the higher goal condition, whereas low to average performers would have performed better had they been assigned to the lower goal condition. This tendency can in fact be seen in Figure 4, with the high performers from both conditions on the far right and the rest of the distribution from both conditions on the left. As shown, the higher performers do better in the higher goal condition (of the two far right clusters, the darker cluster performs better), but the lower performers do worse in the higher goal

condition (of the two far left clusters, the darker cluster performs worse). Clearly, the imposition of a difficult goal had very different effects on the distribution of performers, consistent with our value function predictions.

INSERT FIGURE 4 ABOUT HERE

We note that in a pilot study of Duke University students we set goals that were easier for our participants to achieve than we had anticipated, but it is instructive to look at the results of the pilot study alongside the results of Study 2 (see Figure 5). In the pilot study, the lower goal was 1.2 minutes (n=30) and the higher goal was 2 minutes (n=38). Looking at these results in conjunction with the results of Study 2 reveals that the median participant performed better with the 2-minute goal (persisting 2.03 minutes) than with the 4.5-minute goal (persisting 1.88 minutes). However, the average scores indicate the reverse: participants on average performed better with the 4.5 minute goal (2.25 seconds) than the 2-minute (1.55 seconds) goal. This suggests that average performance in a higher goal condition can sometimes be inflated by a small group of high performers, even though the bulk of the distribution and median individual is performing worse with that goal. Note also that each goal level seems to stretch the performance of a different set of participants in the distribution. The 2-minute goal appears to stretch the 37th to 49th percentile individuals, whereas the 4.5-minute goal seems to stretch individuals in the 80th to 85th percentiles. Consistent with our argument that goals that are just beyond reach are more motivating than goals that are far beyond reach, the goals that work best to stretch the high performers do not sufficiently stretch the low performers. We will have more to say about these issues in the general discussion that follows.

INSERT FIGURE 5 ABOUT HERE

Discussion

The current paper contributes to the goal setting literature by offering a parsimonious model of individual behavior that can make specific predictions about how goals affect motivation. Our analysis builds on that of Heath et al. (1999) by examining individual performance in two types of task: effort and persistence. Moreover, the value function model of goal setting provides an explanation of why goals are effective that is grounded in the behavioral decision making literature. We assert that a goal increases effort and persistence because it serves as a salient reference point that segregates gains (the psychic payoff for exceeding a goal) from losses (the psychic penalty for falling short of a goal), with diminishing marginal (dis)satisfaction the further one's performance is from the goal. We argue that marginal effort and persistence are influenced by the benefits one derives from making *progress* toward the goal, which is represented by the slope of the value function. This analysis gives rise to the unique prediction that the majority of people exert more effort (Study 1), persist longer (Study 2), and perform better (both studies) when they are working toward a goal that is just beyond reach than one that is far beyond reach. Moreover, our result does not seem to be attributable to differences in goal commitment.

On a theoretical level, our findings provide strong support for an individual model of performance based on prospect theory. We deliberately chose to exclude easy goals that put individuals in the domain of gains and instead focused on difficult goals that place individuals below the reference point in the domain of losses (see Footnote 4), posing the question of how difficult a goal should be to best stretch performance. The use of unattainable goals in our first study allowed us to rule out competing motivational theories that would make the same prediction as the value function but for very different theoretical reasons. Expectancy theory formulations explain that people will usually prefer goals of more medium difficulty because

such goals have an attractive combination of importance and likelihood of attainment. In contrast, the shape of the value function explains that people are motivated to work toward lower goals because they experience increasing marginal satisfaction with their incremental *progress* toward the goal, even if they do not expect to attain it. Moreover, Study 1 provides evidence of a convex utility function for goals rather than a step utility function, since both goals were patently unattainable with no real possibility of a discrete boost from *achieving* the goal.

Our second study employed goal levels and a goal commitment measure more consistent with what is usually found in goal setting studies. In this study we found a reversal of the traditional goal setting result in which the majority of the distribution performed better with a lower goal than is typically advised by goal setting researchers, and we also traced the differential effects of goals across an entire performance distribution. Heath et al. (1999, pp. 98-101) initially articulated the theoretical model that we invoke here and used it to re-interpret a number of behavioral results in the existing goal setting literature. However, these authors did not provide any empirical evidence for the prediction that individual effort and persistence below a goal (where most individuals fall) is enhanced by lower goals. Our studies provide the critical tests of this prediction.

Integrating Traditional Goal Setting Findings with the Value Function Model

Decades of research in traditional goal setting theory have established the positive effect of goal difficulty on performance, yielding satisfactory predictions of how a difficult goal will affect performance on average. The value function model makes predictions that are consistent with traditional goal setting research only for individuals who are near the top of the performance distribution and would therefore be effectively stretched by the conventional level (i.e., 90^{th} percentile) of goal difficulty. However, our data suggest that goals set at this level of

difficulty an be less motivating for individuals who are lower in the performance distribution (perhaps even the majority of individuals) and find these goals to be far beyond their reach. In this way, our value function approach can enrich the study of goal setting by offering more refined predictions about how individuals will perform at various levels of the distribution, as well as how the typical person will perform.

At issue is the heterogeneity of ability of different people in the group to which a goal is applied. Low and high performers arguably face different costs associated with their efforts. As the difficulty of a goal increases to the point where it exceeds the reach of many people in the group, the lower-ability individuals in the distribution may do much worse than they would have with a more moderate goal, but this effect could be offset by the substantial increase in performance of higher-ability individuals. Such a situation may yield high returns for performers at the top and a favorable *average* level of performance, but it is likely reduce performance of the *majority* of individuals. The data from Study 2 are a case in point that illustrates how our results can be reconciled with the more typical goal setting finding that higher goals lead to higher average performance. Recall that tests of median performance support our hypothesis that the majority of individuals perform better in the lower goal condition. Recall further that lower performance of the majority of individuals in the higher goal condition was somewhat offset in the average by the exceptional performance of the top 15% of the distribution (Figure 3). Given that the higher goal condition for Study 2 allowed participants to persist 1.5 minutes (i.e., 25%) longer than in the lower goal condition, the large increase in performance of a few high performing individuals apparently offset the smaller decrease in performance by the majority.

Figure 4 provides a vivid illustration of how the imposition of a goal has differential effects on performers of varying ability. The overlapping distributions reveal that the low to

average performers (the larger clusters on the left) are stretched by the lower goal but do worse with the harder goal, while the higher performers (two smaller clusters on the right) are stretched more by the higher goal than the lower goal.[12] Additional evidence of this pattern is displayed in Figure 5. As noted earlier, the typical (i.e., median) individual performs best with a 2-minute goal, whereas the average performance scores place this condition second from bottom. Note that approximately 63% of individuals were able to attain the goal of holding the wall-sit position for 2 minutes, thus it would be considered a relatively "low" or "easy" goal by conventional standards. In fact, Figure 5 illustrates that there tends to be a gap in the performance of individuals that occurs around the 40 to 49th percentiles for the 2-minute goal. Thus, the 2-minute goal is apparently stretching the lower performers who are just below the 50th percentile of the distribution. In contrast, the two higher goal manipulations (4.5 and 6 minutes) seem to stretch out the tails of the distributions by motivating the very high performers. These results indicate that average performance scores can sometimes be higher for higher goals, even though a substantial percentage of the distribution is performing worse with higher goals—in Figure 5 the highest average performance occurs for the 4.5-minute goal, whereas the highest performance for the majority of individuals (and the median) in the distribution occurs for the 2-minute goal.

These data underscore the important point that focusing only on average performance scores may mask important underlying individual-level effects. Thus, to fully understand how the entire distribution of individuals is affected by the presence of a goal, it will generally be necessary to include additional measures of central tendency, such as median tests, and plots of percentiles and cumulative distributions.

Organizational Implications

The present findings provide a caveat against the use of high, uniform "stretch goals" in organizations. Certainly there may be organizational scenarios in which the main concern is to maximize average performance by stretching enough of the high ability individuals, and in these cases a high uniform goal might accomplish this objective. But as goal difficulty increases, the variance in performance may also increase for any task in which there is large variation in ability. Thus, while such goals may stretch moderate to high performers they can also demotivate lower ability individuals who may feel discouraged as they struggle to make progress far away from that goal. Consistent with our intuitions, Locke notes that the use of a uniform "stretch goal" can be effective for high ability managers but otherwise result in a drop in company morale as other employees become demotivated (Locke, 2001, p. 53). We would take this one step further to assert that a goal that is well beyond reach of most people may result not only in a drop in morale but also a drop in performance of those people. In determining optimal goals, organizations should consider this tradeoff between stretching the top performers and possibly raise averaging performance, versus inhibiting performance of the majority.

The present account suggests that if organizations wish to optimize collective performance they should use goals that are just beyond reach and indexed to individual ability. As noted at the beginning of the paper, a goal that is just beyond reach is one that an individual can very nearly attain with maximum effort. Thus, we predict that if an individual could achieve 46 sales with maximum effort in a given quarter, then performance should be better for a goal of 47 that it would be with a higher goal of, say, 57.

Because organizations do not always have well-calibrated information on an individual's level of ability, an alternative approach is a multi-tiered goal system. The simplest option would be a two-tiered system based on either stratification or subgoals. With a two-tiered stratification

system, individuals would be assigned to one of two goal levels based on their ability, with a lower goal (for the majority of individuals) set just above the expected median level of performance, and a higher goal that is set "just beyond the reach of the most capable performer" (Garland, 1983, p. 22). This option would be useful in preventing lower performers from striving for a goal that is so far beyond their reach as to be unmotivating (or demotivating). An alternative option would be a two-tiered subgoal system in which both goals are visible and individuals can work toward either of them. We surmise that most individuals will adopt the higher goal only if the lower goal can be easily exceeded. One goal would be in place to stretch the large group of people whose abilities fall in the middle of the distribution (i.e., setting the goal just above the expected achievement of the median performer) and a higher stretch goal would encourage the high achievers to work as hard as possible.

It is worth noting that previous researchers have proposed similar multi-tiered goal setting schemes (along with increasing incentives) but for different reasons. Previous researchers were concerned that the bulk of the distribution might reject a goal that is too high and might be demotivated by repeated failures (Locke and Latham, 1994; Locke, 2001). Furthermore, in a research context, Locke et al., (1981, p. 146) acknowledged the value in setting goals based "on each individual's ability on the task in question as measured by a preexperimental work sample" in order to insure goal acceptance and reduce error variance introduced by heterogeneity of ability. In contrast, we suggest that individualized or two-tiered goal systems are useful approaches even when people would enthusiastically commit to a higher goal. Paradoxically, low performers who are extremely committed to a high goal may actually perform *worse* than they would have performed if they had tried for a lower goal. Although organizations may incur significant costs for implementing goal systems that are indexed to individual performance

(Garland, 1982), the value function account of goal setting highlights the potential opportunity cost of setting a single stretch goal for the entire organization. In many situations a two-tiered goal system may strike an appropriate balance between these costs.

We emphasize that our value function approach implies that difficult goals are highly motivational because they prompt people to frame their progress toward the goal within the domain of losses such that they might feel they are working their way "out of a hole." For this reason, such goals should be managed carefully. Approaching a goal that is just beyond reach may be highly motivational even as it is frustrating and dissatisfying. But we note that satisfaction with progress toward a goal is not the same as satisfaction with one's accomplishment. In the Greek myth, Tantalus spent a tragically unsatisfying eternity because he was never able to consume the food and water that was just beyond his reach, yet according to the story, the proximity of his goals kept him motivated to keep reaching throughout eternity. In less mythical realms, tradeoffs come into play if someone is continually faced with goals that they will never reach. It would indeed be frustrating to never attain our goals and continually labor in the domain of losses. Though motivation to keep working might be highest just below one's goal, in applied settings it might be more humane to set goals that require great effort but are attainable at least some of the time.

Conclusion

We advance an individual model of goal setting that explains the motivational effects of goals in terms of values. Because goals serve as reference points, goal setting fundamentally changes the psychological value that people attach to various levels of performance, and this in turn affects motivation. While traditional goal setting research has advanced our understanding of the relationship between goal difficulty and average performance, this paper provides tangible

evidence that goal difficulty can have very different motivational and performance effects when predictions are made at the disaggregated, individual level. Thus, in applied settings there can be a very real tradeoff between maximizing individual, collective, or average performance. Ultimately, a more complete understanding of goal setting phenomena will be informed by investigating performance effects at multiple levels of analysis.

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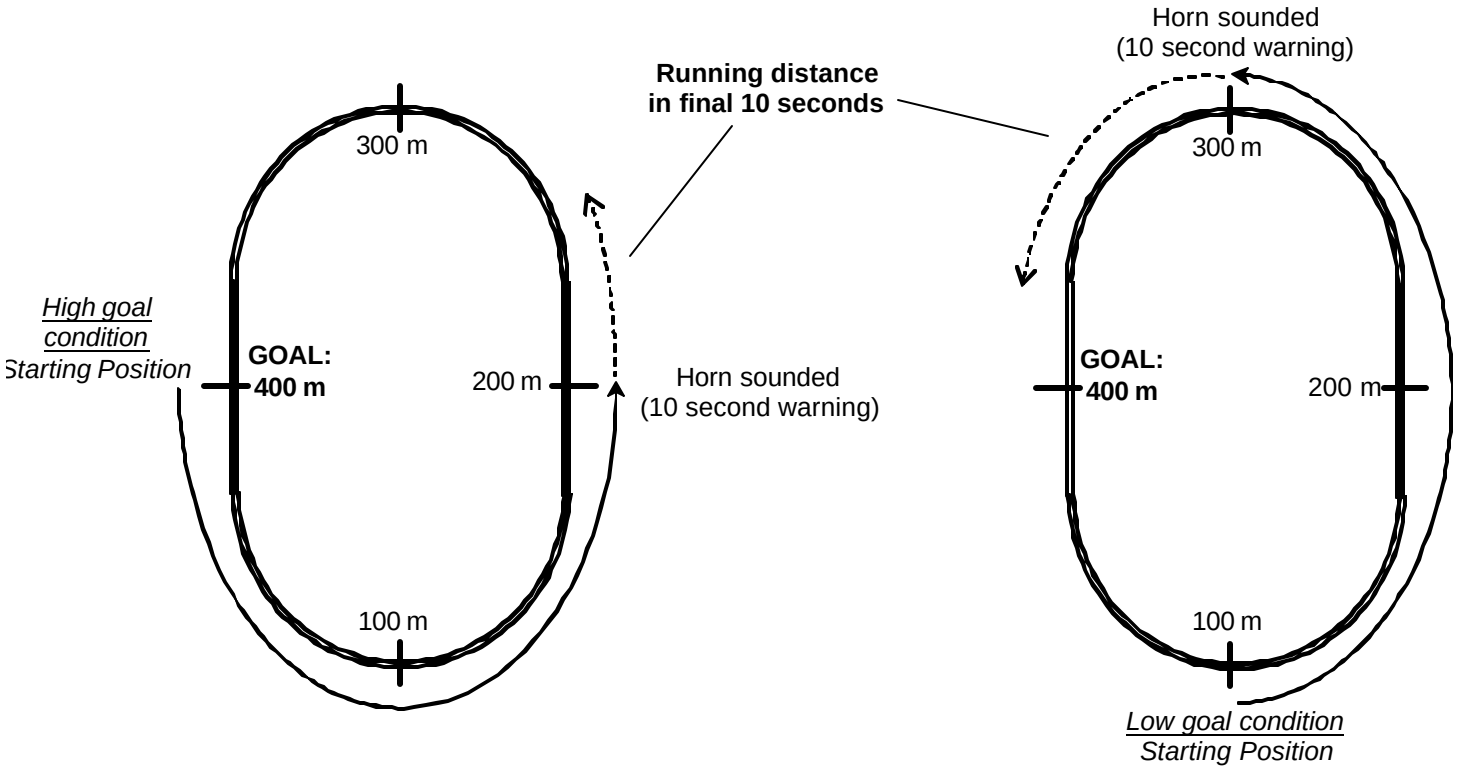
Appendix A: Visual illustrations of the experimental design features of Studies 1 and 2

Study 1. Effort in the Runners Study



The figure depicts the design of the college runners experiment (Study 1). The goal for both conditions was to reach the 400-meter mark. Participants in the higher goal condition (left side of illustration) were assigned to a starting position at the starting line. Participants in the lower goal condition (right side of illustration) were assigned to a starting position at the 100-meter mark. The horn was always sounded after the participant had run 200 meters, which indicated that 10 seconds remained. Running distances in the final 10 seconds were recorded for participants in the two conditions.

Study 2: Persistence in the Wall-Sit Study

Source of image: The Nicholas Institute of Sports Medicine and Athletic Trauma (NISMAT). http://www.nismat.org/traintip/ski/ski.html

The image above is the "wall-sit" exercise participants performed in Study 2. The two bars below are the computerized "timer bars" used to track the time each participant held the wall-sit position. The top bar was shown to participants in the high goal condition and took 6 minutes to reach the finish line. The bottom bar was shown to participants in the low goal condition and took 4.5 minutes to reach the finish line. Both bars moved at the exact same rate of speed, but the low goal condition progress meter started 25% of the way toward the finish line.

Appendix B: Goal Acceptance/Commitment Items

Items for Study 1	Response Scale
"How important is this goal to you?"	1 – 7
"How seriously do you take this goal?"	1 – 7

Items for Study 2	Response Scale
"I am strongly committed to the goal of holding the wall-sit position until the bar reaches the finish line."	1 – Disagree strongly 2 – Disagree somewhat
"Quite frankly, I don't care if I reach the goal of holding the wall-sit position until the finish line or not." (R)	3 – Neither agree nor disagree 4 – Agree somewhat
"It wouldn't take me much to abandon the goal of holding the wall-sit position until the finish line." (R)	5 – Agree strongly
"It is unrealistic for me to expect to reach the goal of holding the wall-sit position until the finish line." (R)	

Note: Items for Study 2 were adapted from Table 1 of Hollenbeck, Williams, & Klein (1989). We originally used a broader set of eight commitment items, but our early pilot studies indicated that the four items above were most reliable (α=0.80). These items were used to create a single indexed goal commitment variable for study 2. Items with (R) were reverse coded before analysis.

Author Note

The authors thank Kristin Diehl, Neil Fassina, Rick Larrick, Cade Massey, Sim Sitkin, Glen Whyte, and George Wu for helpful comments that greatly improved this manuscript. Most of this research was completed while Chip Heath and Craig Fox were at the Fuqua School of Business, Duke University, whose support is gratefully acknowledged. Portions of this research were presented at the 2002 Academy of Management meetings.

Footnotes

1 Locke and Latham (1990, p. 349) recommend that experimenters set "difficult" goals so that the objective probability of attainment is roughly 10%. In a meta-analysis, Klein, Wesson, Hollenbeck, and Alge (1999) report that many goal setting studies adopt this 10% guideline.

2 Although expectancy is typically operationalized as subjective probability of success, various researchers (e.g., Eden, 1988; Garland, 1984; Ilgen, Nebeker, & Pritchard, 1981) have noted that such a measure does not fully capture the expectancy that one will exert effort to perform well in the course of working toward a goal, nor does it include other aspects of expectancy theory (i.e., value of the consequence). The apparent contradiction between expectancy-based approaches and goal setting theory is generally resolved when broader measures, such as self-efficacy, are used (Locke, Motowidlo, & Bobko, 1986). Furthermore, measures of goal commitment (Hollenbeck et al., 1989; Klein et al., 1999) subsume both expectancy and valence beliefs.

3 For evidence that people share our intuition, see Problem 7 of Heath et al. (1999, p. 90).

4 Note that for individuals who easily exceed their goals, the value function account predicts that they would perform better if they had a more difficult goal, consistent with the traditional goal setting account (Wu, Heath, & Larrick, 2000). That is, like traditional goal theory, the prospect theory value function predicts that a goal that is too "easy" relative to an individual's ability will yield inferior performance. When an easy goal is reached an individual quickly moves into the domain of gains where the concavity of the value function suggests that the marginal satisfaction of working beyond the goal will decay rapidly and lead to a "piling up" of quitters who have just achieved or barely exceeded their goals (Wu et al, 2000).

5 Garland (1983) provides empirical evidence that motivation is not driven purely by the attainability of the goal, who found that people did not necessarily show decreases in motivation after repeatedly working toward an impossible goal, even when they had information that the goal was unattainable. Moreover, Locke and Shaw (1984) found that subjective probability of success was not related to performance.

6 For a formal account of the model that forms the basis of the assumptions and graphical predictions in this section, see Wu et al. (2000).

7 We thank Kim Voyticky for access to this subject population and collecting these data.

8 At this writing, the world record in the 100-meter dash is 9.78 seconds for men and 10.49 seconds for women.

9 Although the slightly faster pre-horn running time in the low goal condition might confer the advantage of higher momentum on these runners, we surmise that this would be more than counteracted by greater fatigue.

10 We thank Dan Ariely for suggesting this task to us.

11 Because participants in the 4.5-minute goal condition were timed for up to 6 minutes, whereas participants in the 6-minute goal condition were timed for up to 7.5 minutes, we also calculated means and significance levels truncating all quitting times at 6 minutes. This truncation applies to ten participants in the high goal condition and one participant in the low goal condition. When we apply the truncation, the mean is 116 seconds for the high goal condition and 135 seconds for the low goal condition ($t(148)=1.41$, $p=.16$).

12 Other evidence that the imposition of a goal can have a more detrimental effect on performance for individuals with low cognitive ability relative to those with high ability is provided by Kanfer and Ackerman (1989) in a study of skill acquisition for complex tasks.

Figure Captions

Figure 1. The Prospect Theory value function is distinguished by a reference point, a steeper curve for losses than gains, and convex shape for losses and concave shape for gains. Here the reference point is a goal of doing 50 sit-ups.

Figure 2. Effort predictions for two individuals with differing goals of running 100 meters or 200 meters in 10 seconds. The dotted lines indicate performance at 80 meters, 150 meters, and 220 meters, and the slopes, $b'_g(x)$, indicate the level of effort each individual will exert at those points. Adapted from Heath et al. (1999, Figure 2).

Figure 3. Cumulative percent quitting times for lower goal and higher goal individuals in Study 2.

Figure 4. Overlapping performance distribution of participants persisting in the wall-sit position for Study 2. Note that there is a bimodal distribution for both conditions: the far left (right) histograms show performance of the low-moderate (high) performers for the lower 4.5-minute goal (lighter clusters) and higher 6-minute goal (darker clusters).

Figure 5. Cumulative percent quitting times plotted for the wall-sit task (Study 2) combined with cumulative percent quitting times for an early pilot study using 1- and 1.2-minute goals.

Figure 1

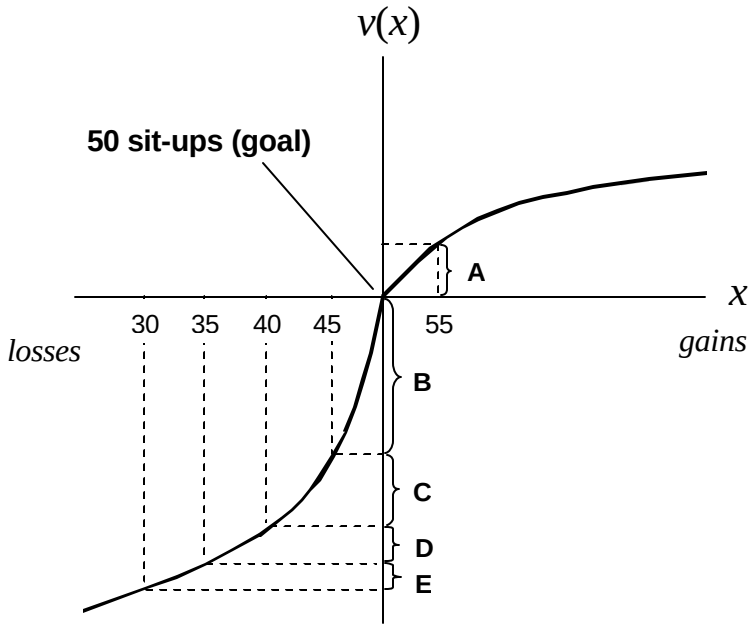
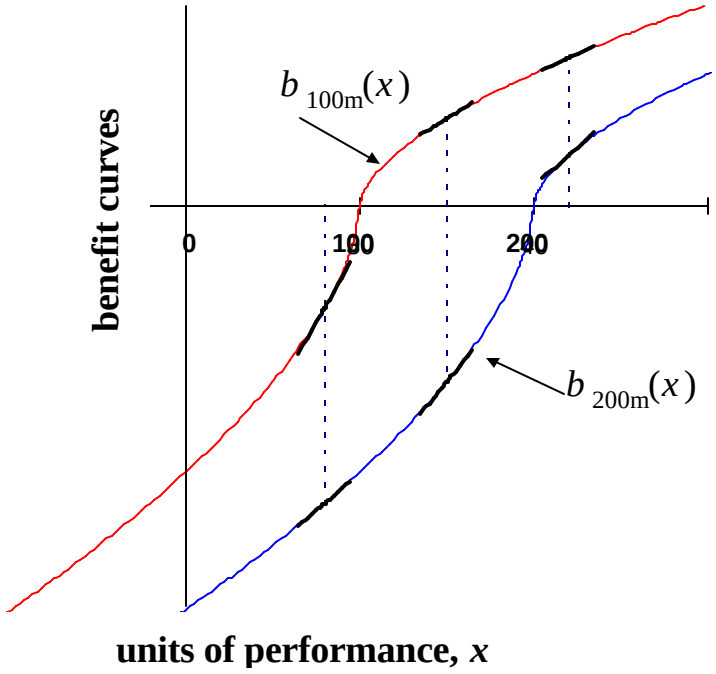


Figure 2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100
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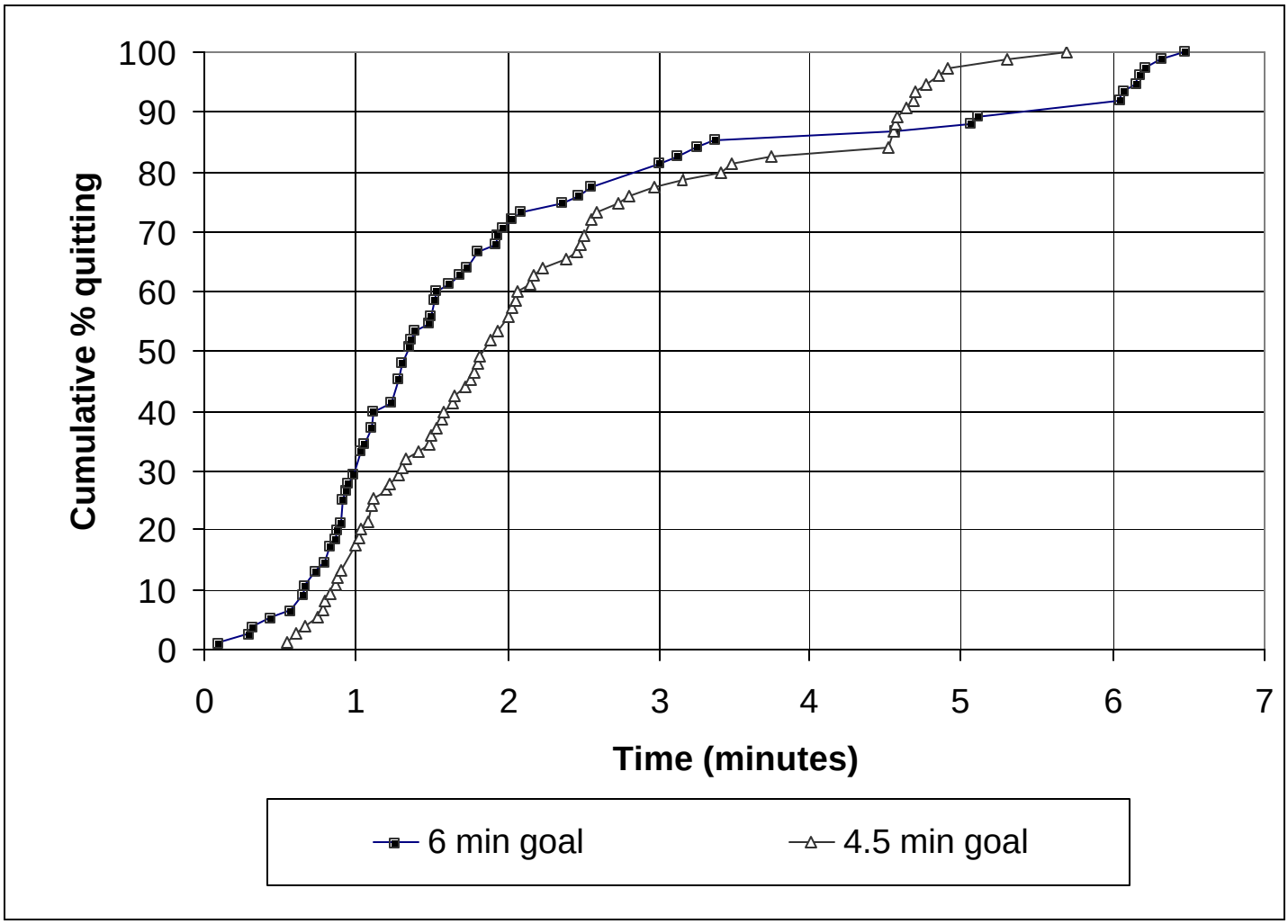
units of performance, x

Figure 3


Cumulative % quitting
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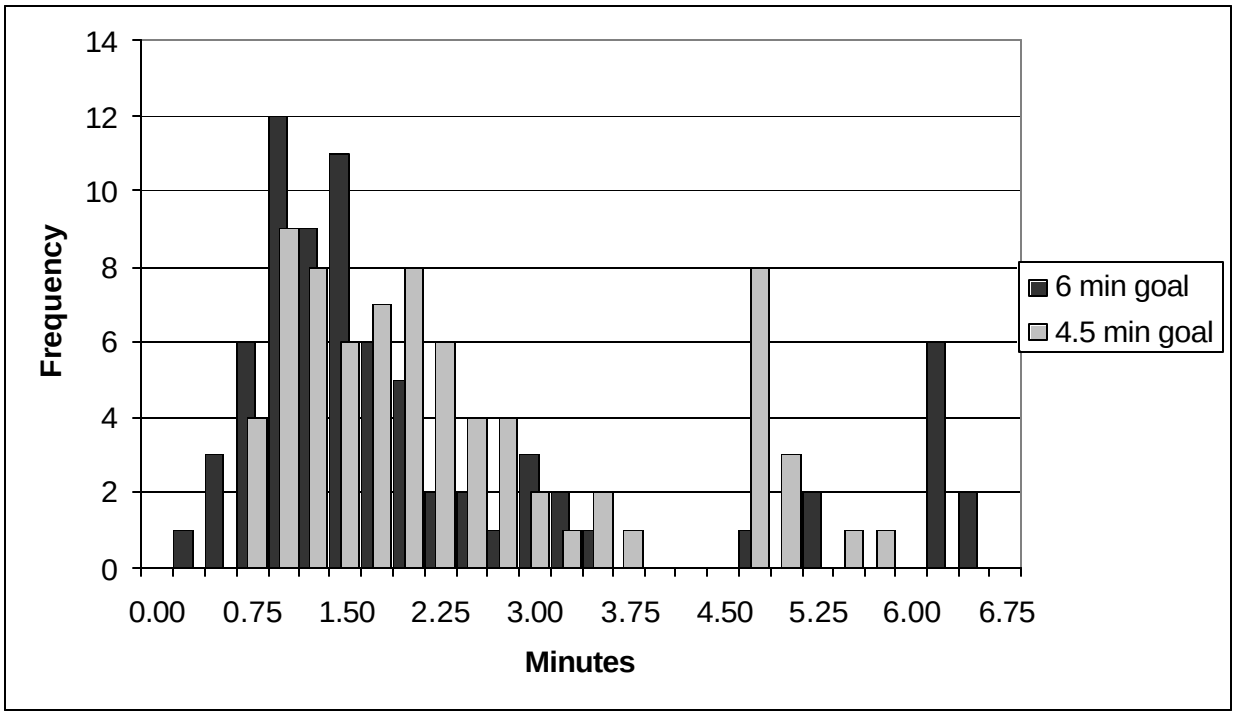
Time (minutes)
6 min goal
4.5 min goal

Figure 4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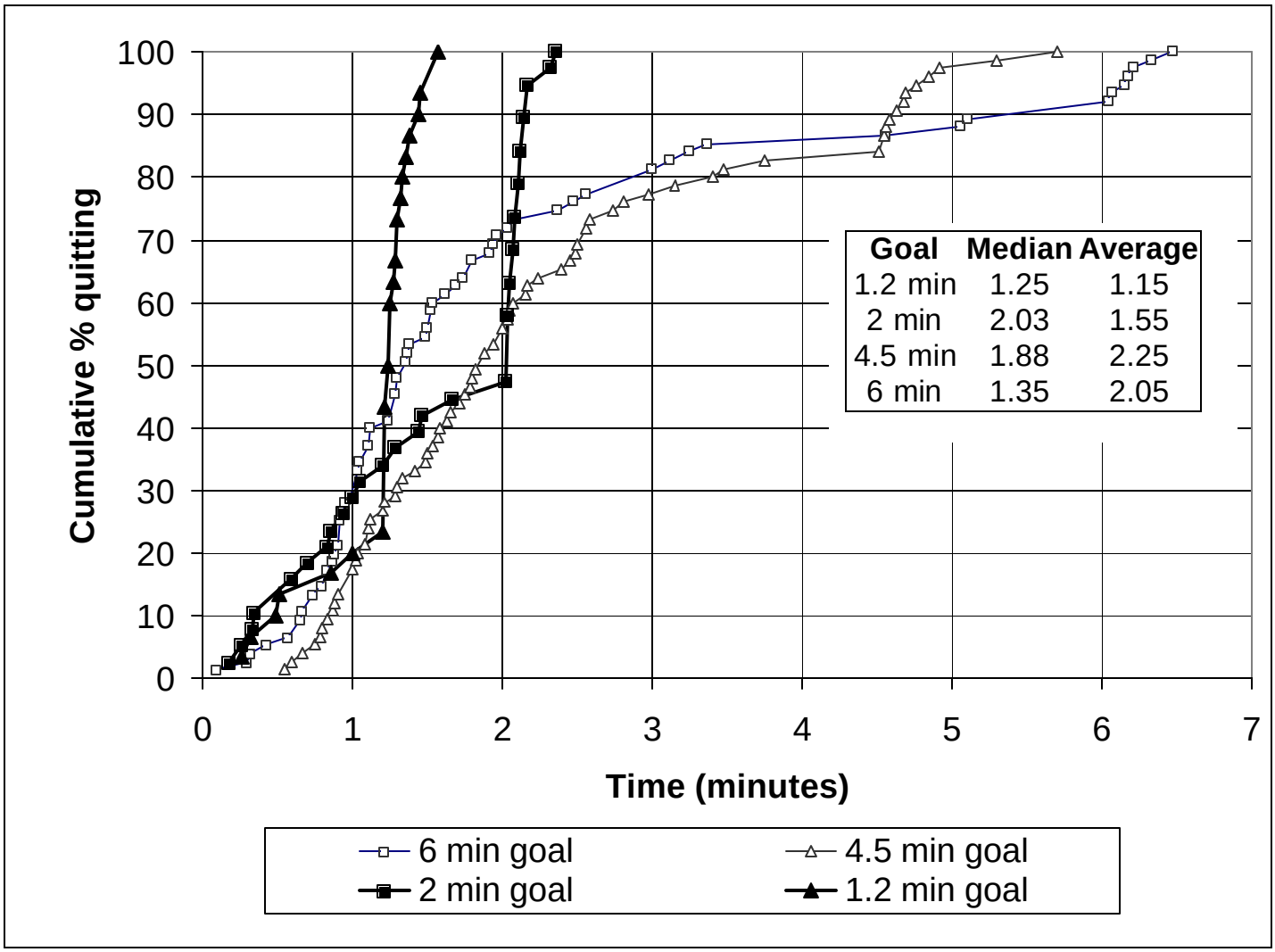
6 min goal
4.5 min goal

Figure 5


Cumulative % quitting
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Time (minutes)
Goal Median Average
1.2 min 1.25 1.15
2 min 2.03 1.55
4.5 min 1.88 2.25
6 min 1.35 2.05
6 min goal
4.5 min goal
2 min goal
1.2 min goal

[1] Locke and Latham (1990, p. 349) recommend that experimenters set "difficult" goals so that the objective probability of attainment is roughly 10%. In a meta-analysis, Klein, Wesson, Hollenbeck, and Alge (1999) report that many goal setting studies adopt this 10% guideline.

[2] Although expectancy is typically operationalized as subjective probability of success, various researchers (e.g., Eden, 1988; Garland, 1984; Ilgen, Nebeker, & Pritchard, 1981) have noted that such a measure does not fully capture the expectancy that one will exert effort to perform well in the course of working toward a goal, nor does it include other aspects of expectancy theory (i.e., value of the consequence). The apparent contradiction between expectancy-based approaches and goal setting theory is generally resolved when broader measures, such as self-efficacy, are used (Locke, Motowidlo, & Bobko, 1986). Furthermore, measures of goal commitment (Hollenbeck et al., 1989; Klein et al., 1999) subsume both expectancy and valence beliefs.

[3] For evidence that people share our intuition, see Problem 7 of Heath et al. (1999, p. 90).

[4] Note that for individuals who easily *exceed* their goals, the value function account predicts that they would perform better if they had a more difficult goal, consistent with the traditional goal setting account (Wu, Heath, & Larrick, 2000). That is, like traditional goal theory, the prospect theory value function predicts that a goal that is too "easy" relative to an individual's ability will yield inferior performance. When an easy goal is reached an individual quickly moves into the domain of gains where the concavity of the value function suggests that the marginal satisfaction of working beyond the goal will decay rapidly and lead to a "piling up" of quitters who have just achieved or barely exceeded their goals (Wu et al, 2000).

[5] Garland (1983) provides empirical evidence that motivation is not driven purely by the attainability of the goal, who found that people did not necessarily show decreases in motivation after repeatedly working toward an impossible goal, even when they had information that the goal was unattainable. Moreover, Locke and Shaw (1984) found that subjective probability of success was not related to performance.

[6] For a formal account of the model that forms the basis of the assumptions and graphical predictions in this section, see Wu et al. (2000).

[7] We thank Kim Voyticky for access to this subject population and collecting these data.

[8] At this writing, the world record in the 100-meter dash is 9.78 seconds for men and 10.49 seconds for women.

[9] Although the slightly faster pre-horn running time in the low goal condition might confer the advantage of higher momentum on these runners, we surmise that this would be more than counteracted by greater fatigue.

[10] We thank Dan Ariely for suggesting this task to us.

[11] Because participants in the 4.5-minute goal condition were timed for up to 6 minutes, whereas participants in the 6-minute goal condition were timed for up to 7.5 minutes, we also calculated means and significance levels truncating all quitting times at 6 minutes. This truncation applies to ten participants in the high goal condition and one participant in the low goal condition. When we apply the truncation, the mean is 116 seconds for the high goal condition and 135 seconds for the low goal condition ($t(148)=1.41$, $p=.16$).

[12] Other evidence that the imposition of a goal can have a more detrimental effect on performance for individuals with low cognitive ability relative to those with high ability is provided by Kanfer and Ackerman (1989) in a study of skill acquisition for complex tasks.