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the Minimally Acceptable Level Over the Aspiration Level

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Abstract

When pursuing multiple goals over time, the amount of time (i.e., resources) available affects which goal is pursued: people prioritize (i.e., spend time on) the goal furthest from the aspiration level when there is plenty of time available to attain the aspiration level on the multiple goals but switch to prioritize the goal closest to the aspiration level when the time available starts to run out (e.g., Schmidt, Dolis, & Tolli, 2009). Although the aspiration level is the most commonly examined goal level, other goal levels possessing different psychological meanings (e.g., minimally acceptable or status quo goal levels) also exist. I examined the effect of multiple goal levels (i.e., the minimally acceptable level and the aspiration level) on goal prioritization decisions. I hypothesized that when people were provided with both the minimally acceptable level and the aspiration level, they would prioritize attaining the minimally acceptable level over the aspiration level. Participants (*N*=316) engaged in a fully within-persons decision-making task where they repeatedly decided which of two goals to allocate their time to. The amount of time available for allocation was systematically varied. Results indicated that people first strived for the minimally acceptable level on one goal. When they attained the minimally acceptable level on that goal, they switched to striving for the minimally acceptable level on the second goal. Only when people attained the minimally acceptable levels for both goals did they strive for the aspiration level (on one of the goals). The only exception is when they had insufficient time to attain both minimally acceptable goal levels; in that case, they focused only on one goal and strived for the aspiration level on that goal. Results imply that when choosing which goal to prioritize, people consider multiple goal levels. Implications of multiple goal levels for goal pursuit, goal revision, and theories of motivation are discussed.

Keywords: multiple goals, goal prioritization, goal levels, motivation, self-regulation

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Chapter 1: Introduction

People often pursue multiple goals. However, because resources (e.g., time) are limited, to effectively attain these multiple goals, people may choose to work on one goal to the exclusion or detriment of other goals at each given time point (Mitchell, Harman, Lee, & Lee, 2008; Orehek & Vazeou-Nieuwenhuis, 2013; Radner & Rothschild, 1975; Seshadri & Shapira, 2001; Sun & Frese, 2013; Unsworth, Yeo, & Beck, 2014). That is, they prioritize, at least temporarily, one goal over the others. For example, imagine that a student, Mary, has to submit a final report for each of two classes. Because she cannot simultaneously work on the report for one class (Report A) and the report for the other class (Report B), she may choose to work on (i.e., prioritize) Report A in the morning and Report B in the afternoon, before switching back to working on Report A in the evening. To explain how people prioritize between two goals (e.g., Report A and Report B) over time, researchers recently developed a computational model of multiple-goal pursuit (MGPM; Vancouver, Weinhardt, & Schmidt, 2010).

The MGPM accounts for two findings in the multiple-goal pursuit literature (Schmidt & DeShon, 2007; Schmidt & Dolis, 2009; Schmidt, Dolis, & Tolli, 2009). First, between two goals, one with incentives and the other without incentives, participants were more likely to prioritize the goal with incentives than the goal without incentives (Schmidt & DeShon, 2007). Second, participants were more likely to prioritize the goal further from completion (i.e., the goal further from the desired level or the aspiration level) when they had sufficient resources (e.g., time) to attain the aspiration level on both goals and were more likely to prioritize the goal closer to completion (i.e., the goal closer to the aspiration level) when they had insufficient resources to attain the aspiration level on both goals (Schmidt & Dolis, 2009; Schmidt et al., 2009).[1]

Thus far, the MGPM has been applied to the pursuit of goals with a single goal level (i.e., the aspiration level). However, goals may have more than one goal level (Lopes, 1987; March & Shapira, 1992; Wang & Johnson, 2012). In addition to the aspiration level, which is the level on the goal that people hope to or desire to attain (Lewin, Dembo, Festinger, Sears, & Hunt, 1944; March & Shapira, 1987; Starbuck, 1963), a goal may also have a minimally acceptable level, which is the lowest possible level on the goal that, if unattained, indicates failure on the goal (Rotter, 1954). For example, if Mary, the student in our opening example, does not attain a minimally acceptable level on her report (i.e., goal), she may receive a failing grade for the report and may consequently fail the entire course. Evidence exists to suggest that if the minimally acceptable level on a goal has not been attained or is under the threat of not being attained, people are likely to prioritize attaining the minimally acceptable level over the aspiration level. For example, compared to firms that were underperforming (i.e., had not met the aspiration level on firm performance) but were not close to bankruptcy (i.e., met the minimally acceptable level on firm performance), firms that were close to bankruptcy (i.e., under threat of not meeting

[1] The term "goal" typically refers to the desired level on an object (e.g., Austin & Vancouver, 1996). For example, the goal for a researcher may be to write a highly polished manuscript. However, in this dissertation, I am investigating the effect of multiple goal levels on goal prioritization decisions. To avoid confusion, I make a distinction between the object the person is working on (e.g., a manuscript) and the level of performance on the object (e.g., a minimally acceptable level or an aspiration level). I refer to the object as the goal and the level(s) of performance as goal level(s). In cases where only one goal level is available, I refer to the single goal level as the aspiration level (i.e., the desired goal level) because most research on goals has thus far focused on the aspiration level (however, see Campion & Lord, 1982 for an exception).

the minimally acceptable level) spent less resources on research and development efforts that would help them attain the aspiration level (Chen & Miller, 2007). Instead, presumably, these firms devoted more resources to essential operations that would help them avoid bankruptcy (i.e., meet the minimally acceptable level). Thus, it is possible that if multiple goal levels (i.e., a minimally acceptable level on top of an aspiration level) exist for each goal, people may prioritize their goals differently than what current research (e.g., Schmidt & DeShon, 2007; Schmidt & Dolis, 2009; Schmidt, Dolis, & Tolli, 2009) on multiple-goal pursuit suggests. Specifically, they may try to attain the minimally acceptable level on their multiple goals first before the aspiration level on either goal.

Assume that when Mary started working on the reports, she had a choice to complete each report to a distinction level (i.e., the aspiration level) or to a pass level (i.e., the minimally acceptable level). Initially, she chose to complete both reports to a distinction level. However, as the deadline approached, Mary realized that she was short on time and would be able to submit only one distinction-level report. If Mary considered only one goal level (i.e., the aspiration level), she would prioritize the report closest to attaining the distinction level (e.g., Report A; Schmidt et al., 2009). Only if she had time left over would she work on the second report (e.g., Report B). However, if Mary considered both goal levels (i.e., the minimally acceptable level and the aspiration level), she might shift her focus from completing Report B to a distinction level to completing it to a pass level. In this scenario, Mary might prioritize Report B instead so that it attained the pass level and then continue working on Report A until it reached the distinction level. Given that different prioritization patterns may be observed depending on whether a person considers a single goal level or multiple goal levels, it may be worthwhile to investigate whether people consider more than one goal level when pursuing multiple goals over time.

In this dissertation, I examined how people prioritize two goals over time, where each goal has a minimally acceptable level and an aspiration level. To that end, I tested the predictions of two models, the MGPM and an extension of the MGPM, the Multiple-Goal Pursuit Model, Extended (MGPME). The MGPM allows for consideration of only one goal level per goal at each time point. The MGPME explicitly allows for the consideration of two goal levels per goal at each time point: the minimally acceptable level and the aspiration level. If the MGPM better accounted for how people prioritized goals, then it would suggest that people consider only one goal level when pursuing multiple goals. However, if the MGPME provided the better account, then it would suggest that people do consider multiple goal levels when pursuing multiple goals.

In the following sections, I describe the MGPM, provide evidence that people consider multiple goal levels when pursuing goals, and present the MGPME. I then describe a simulation study, in which I simulated participants' prioritization decisions on a decision-making task for the MGPM and the MGPME. Results from the simulation study formed the specific hypotheses (i.e., predictions) for the MGPM and the MGPME. These predictions were then tested in a within-persons experiment, in which participants made decisions on the same decision-making task used in the simulation study.

Chapter 2: The Multiple-Goal Pursuit Model (MGPM)

A person can typically focus on only one goal at a time. Functional neuroimaging studies (e.g., Tombu et al., 2011) show that people's ability to process more than one task at a time is limited by an attentional bottleneck in the prefrontal regions of the brain. This implies that when pursuing multiple goals that compete for the same resources (e.g., time, attention), people are likely to switch back and forth among their various goals (e.g., Payne, Duggan, & Neth, 2007). Thus, Mary may start to write Report A in the morning, edit Report B in the afternoon, and then return to revise Report A in the evening. This type of goal pursuit has two features: it involves repeated choice among competing goals and it is dynamic. It involves repeated choice because at each given time point, Mary has to choose (i.e., prioritize) which report to work on. It is dynamic because Mary's progress on the reports changes over time as she works on them and the change in progress influences Mary's choice at the next time point. The multiple-goal pursuit model (MGPM; Vancouver et al., 2010) was developed to explain this type of goal pursuit.

The MGPM models a person's pursuit of two goals with a common deadline, where each goal has a single goal level, the aspiration level (g_{AL}). In this dissertation, the aspiration level in the MGPM is labelled g_{ALA} for Goal A and g_{ALB} for Goal B. According to the MGPM, at a given time point (e.g., t_{n}), the person compares the perceived attractiveness of working on the first goal (e.g., Goal A) to the perceived attractiveness of working on the second goal (e.g., Goal B) and chooses to work on (i.e., prioritize) the more attractive goal. Perceived attractiveness is operationalized as the subjective expected utility (*SEU*; Savage, 1954) associated with the goal, where the more attractive goal is the goal with the higher *SEU*. The *SEU* is determined by the perceived ability to attain the aspiration level (i.e., expectancy associated with the aspiration level) and the perceived value of attaining the aspiration level (i.e., valence associated with the aspiration level). Because each goal has only one goal level, the aspiration level (g_{AL}), in the MGPM, the expectancy associated with the goal is equivalent to the expectancy associated with the aspiration level. Similarly, the valence associated with the goal is equivalent to the valence associated with the aspiration level. The expectancy and valence associated with each goal (i.e., Goal A and Goal B) depends on the person's goal choice at the previous time point, t_{n-1}. Restated, the person's goal choice at t_n affects the expectancy and valence associated with each goal at the next time point, t_{n+1}, which in turn determine the *SEU*s associated with each goal at that time point, t_{n+1}. At $t_{n+1,}$ the person compares the *SEU* associated with Goal A (SEU_A) to the *SEU* associated with Goal B (SEU_B) and chooses to work on the goal with the higher *SEU* for the duration between t_{n+1} and the subsequent time point, $t_{n+2.}$ At t_{n+2}, the person again evaluates the expectancy and valence (and *SEU*) associated with each goal to choose the goal to prioritize for the duration between t_{n+2} and the next time point, t_{n+3}. This cycle continues until the aspiration level for both goals are attained or until the person has run out of time.

In the following sections, I describe the MGPM processes in greater detail. Because the MGPM is a computational model, I also provide relevant mathematical formulae for the processes. To illustrate the processes, I use the example of the student Mary who has to write two final reports. Because all the variables in a computational model have to be quantified, I made the simplifying assumption that

Mary would attain distinction level (i.e., aspiration level) if the report contains at least 2,500 words (i.e., writing more words requires greater effort and is therefore rewarded with a better grade). Furthermore, I assumed that Mary's grades from both classes are equally important to her, that she is striving to complete both reports to distinction level, and that she currently has only four hours to work on the reports until the submission deadline.

Goal Choice and Subjective Expected Utility

According to the MGPM, when choosing whether to work on Report A (i.e., Goal A) or Report B (i.e., Goal B) at the first hour (i.e., t_1), Mary compares the *SEU* associated with Report A (SEU_A) at t_1 to the *SEU* associated with Report B (SEU_B) at t_1. If the SEU_A is larger than the SEU_B, Mary would choose to work on Report A for the first hour; if the SEU_B is larger than the SEU_A, Mary would choose to work on Report B for the first hour; if the SEU_A is equal to the SEU_B, Mary would arbitrarily choose one report to work on for the first hour. The MGPM refers to this arbitrary choice as the default choice. Because evidence suggests that people tend to repeat the same tasks even when they could voluntarily switch to a different one (Arrington & Logan, 2004), in this dissertation, I assume the default choice is the person's choice at the preceding time point. Prior to choosing which of the two reports to work on, however, Mary must determine the SEU_A and the SEU_B.

The *SEU* associated with a goal at a given time point is determined by the perceived ability to attain the aspiration level (i.e., expectancy associated with the aspiration level, E_{AL}) and the perceived value of attaining the aspiration level (i.e., valence associated with the aspiration level, V_{AL}) at that time point. Thus, the SEU_A at

t_1 depends on whether Mary thinks she can complete Report A to distinction-level by the end of the four hours (i.e., expectancy) and how much Mary values completing Report A to distinction level (i.e., valence) at t_1. Because expectancy and valence interact to determine the *SEU*, the *SEU* is low when expectancy is low, when valence is low, or when both expectancy and valence are low. Mathematically, the *SEU* is expressed as:

$$SEU = E_{AL}V_{AL} \quad (1)$$

I describe how each of these two components, expectancy and valence, is determined below.

Expectancy

Expectancy associated with the aspiration level (E_{AL}) is the perceived ability to attain the aspiration level of a given goal. In the MGPM, expectancy is determined by the difference between the amount of time a person has left to work on both goals (T_L) and the amount of time a person needs to spend on the given goal to attain the aspiration level (T_{NAL}). A greater positive difference reflects a higher expectancy. Thus, if Mary needs four hours to complete Report A to distinction level (i.e., T_{NALA} = 4 hours), she is more likely to perceive that she can complete Report A when she has 10 hours left to the deadline (i.e., T_L = 10 hours), than if she has exactly four (i.e., T_L = 4 hours). However, if the amount of time left falls short of the amount of time needed, for example if Mary only has an hour left to the deadline (i.e., T_L = 1 hour), Mary would perceive that she has no ability to attain the aspiration level. That is, when there is insufficient time to attain the aspiration level, the MGPM assumes that the value of expectancy is fixed at zero (i.e., expectancy does not take on a negative value). Mathematically, the expectancy associated with the aspiration level (E_{AL}) is expressed as:

If $T_L - T_{NAL} > 0$, then $E_{AL} = T_L - T_{NAL}$

Else $E_{AL} = 0$ (2)

The amount of time needed to attain the aspiration level (T_{NAL}) is further determined by two factors: how much time the person takes to complete one unit of the goal (i.e., expected lag, α) and how far the person is from the aspiration level (i.e., discrepancy from the aspiration level, d_{AL}). Expected lag (α) is the inverse of a person's working speed on the goal. For example, if Mary writes fast, the amount of time she takes to write one unit of the report (i.e., one word) is small. Conversely, if Mary writes slow, the amount of time she takes to write one word is large. Thus, the expected lag (α) is the amount of time Mary needs, on average, to write one word of the report. If Mary needs an average of half a minute to write one word, her expected lag is $\frac{1}{120}$ hour.

The discrepancy from the aspiration level (d_{AL}) refers to the difference between the aspiration level (g_{AL}) and the current state on the goal (s). Assuming that Mary is striving to write a total of 2,500 words for Report A (i.e., the aspiration level for Report A, g_A = 2,500 words) and has already written 2,200 words (i.e., the current state of Report A, s_A = 2,200 words), she will need to write another 300 words to attain the aspiration level. Hence, her discrepancy from the aspiration level is 300 words (i.e., d_{ALA} = 300). If Mary has written 2,500 or more words, she would have met or surpassed the aspiration level. Hence, her discrepancy would be zero because the current state is at or greater than the aspiration level. The discrepancy from the aspiration level, d_{AL}, is mathematically expressed as:

If $g_{AL} - s > 0$, then $d_{AL} = g_{AL} - s$

Else, $d_{AL} = 0$ (3)

The amount of time needed (T_{NAL}) is determined by an interaction (i.e., multiplication) of the expected lag (α) and the discrepancy from the aspiration level (d_{AL}). If the person is very far from attaining the aspiration level (e.g. Mary has not even started writing Report A) but needs very little time to complete each goal unit (e.g., Mary writes very fast), the amount of time needed may be small. Conversely, if the person is very close to attaining the aspiration level (e.g., Mary is close to completing Report A) but needs a lot of time to complete each goal unit (e.g., Mary writes very slowly), the amount of time needed may be large. The amount of time needed, T_{NAL}, is mathematically expressed as:

$T_{NAL} = \alpha d_{AL}$ (4)

Thus, Mary, who takes $\frac{1}{120}$ hour to write one word on average ($\alpha = \frac{1}{120}$) and has to write another 300 words (d_{ALA} = 300) will need 2.5 hours (i.e., $T_{NAL} = \frac{1}{120}$x 300) to complete Report A to distinction level.

Valence

To determine the *SEU* associated with a given goal, in addition to expectancy associated with the aspiration level, the person must also consider valence associated with the aspiration level (V_{AL}). Valence is the subjective immediate value of attaining the aspiration level of a given goal. In the MGPM, valence is determined by the value a person places on the consequences associated with attaining the aspiration level (i.e., gain, k) and the discrepancy from the aspiration level (i.e., d_{AL}).

Gain (k_{AL}) refers to the perceived value of the consequences of attaining the aspiration level. These consequences may be positive (e.g., reward), negative (e.g., a punishment), extrinsic (e.g., a performance bonus), or intrinsic (e.g., a sense of satisfaction). When people value the consequences of attaining the aspiration level, they tend to put in more effort into the goal. For example, compared to participants who had smaller monetary incentives for meeting the aspiration level (i.e., presumably smaller gain), those who had larger incentives were more committed and performed better on the goal (Riedel, Nebeker, & Cooper, 1988; Wright, 1992). In Mary's case, the gain associated with attaining the distinction level on Report A refers to how much Mary values the grade she gets on Report A. If Mary cares a lot about the grade she gets, gain is large. Conversely, if Mary does not care about the grade, gain is small.

As described earlier, the discrepancy from the aspiration level (d_{AL}) refers to the distance between the current state (s) and the aspiration level (g_{AL}). The discrepancy from the aspiration level "provides information about the current need to act on the goal" (Vancouver et al., 2010, p. 991). If a person is very far from attaining the aspiration level (e.g., Mary has not started writing Report A), the large discrepancy between the current state (s) and the aspiration level (g_{AL}) signals an urgent need for the person to work on the goal. If the same person has already attained the aspiration level (e.g., Mary has completed Report A), then there is no discrepancy, signaling that there is no need to work any further on the goal. Findings from multiple-goal pursuit research indicates that when there was sufficient time available to attain the aspiration level on multiple goals, participants tend to prioritize the goal with the larger discrepancy from the aspiration level (Schmidt & DeShon, 2007; Schmidt et al., 2009). This was because compared to the goal with the smaller discrepancy, the goal with the large discrepancy signals a greater need to act. Because acting on the goal with the larger discrepancy provides greater subjective immediate value than acting on the goal with the smaller discrepancy (Vancouver et al., 2010), participants chose to prioritize the goal with the larger discrepancy.

Gain and discrepancy interact to determine valence such that if the discrepancy associated with the aspiration level (d_{AL}) is large (e.g., Mary has not started writing Report A) but the gain associated with the aspiration level (k_{AL}) is small (e.g., Mary does not care about her grade on Report A), then the valence associated with the aspiration level (V_{AL}) is likely to be small. Conversely, if the discrepancy associated with the aspiration level (d_{AL}) is small (e.g., Mary only needs to write another 50 words) but the gain associated with the aspiration level (k_{AL}) is large (e.g., Mary cares deeply about her grade on Report A), then the valence associated with the aspiration level (V_{AL}) is likely to be large. Valence associated with the aspiration level (V_{AL}) is mathematically expressed as:

$$V_{\mathrm{AL}} = d_{\mathrm{AL}}k_{\mathrm{AL}} \tag{5}$$

Assume that, on an arbitrary scale of 0 to 10 of how much she values the consequences of attaining the distinction level on Report A (where 0 = does not value consequences at all, 10 = values the consequences a lot), Mary reports a 10 (i.e., $k_{\mathrm{ALA}} = 10$). Given that she has to write 300 words to complete Report A (i.e., $d_{\mathrm{ALA}} = 300$), her valence associated with attaining the distinction level for Report A will be 3000 (i.e., V_{ALA} = 300 x 10).

In summary, according to the MGPM, when people pursue multiple goals over time, they prioritize the goal that has the higher *SEU* at each time point, where the *SEU* is determined by expectancy (E_{AL}) and valence (V_{AL}) associated with the aspiration level (g_{AL}) for each goal. Expectancy (E_{AL}) is determined by whether a person has sufficient resources (i.e., time) to attain the aspiration level (i.e., T_L – T_{NAL}) and valence (V_{AL}) is determined by the perceived value of the consequences (i.e., gain, k_{AL}) and the need to act on the goal (i.e., discrepancy, d_{AL}). Therefore,

$$SEU = E_{AL}V_{AL}$$

$$= (T_L - T_{NAL})(d_{AL}k_{AL})$$

$$= (T_L - \alpha d_{AL})(d_{AL}k_{AL}) \quad (6)$$

The MGPM and the Empirical Findings

The MGPM was developed to explain two main results from the multiple-goal pursuit research—the incentive effect and the reversal effect. The incentive effect refers to the tendency for participants to prioritize the goal with monetary incentives over the goal without incentives (Schmidt & DeShon, 2007). According to the MGPM, because there are no consequences from attaining the aspiration level on the nonincentivized goal, there is no value in working on the goal (i.e., gain, $k_{AL} = 0$). All things equal, the *SEU* associated with the nonincentivized goal would be smaller (i.e., less attractive) than the *SEU* associated with the incentivized goal. Hence, participants would be more likely to choose the goal with the incentives instead of the one without incentives.

The reversal effect refers to the finding that participants prioritized the goal with the larger discrepancy from the aspiration level when more time was available but prioritized the goal with the smaller discrepancy from the aspiration level when less time was available (Schmidt & DeShon, 2007; Schmidt & Dolis, 2009). According to the MGPM, when more time was available, participants expected to be able to attain the aspiration level for both goals, that is, the expectancies associated with the two goals did not differ much. Thus, valence became the more dominant determinant of the *SEU*. Recall that compared to the goal with the smaller discrepancy, the goal with the larger discrepancy from the aspiration level has greater valence. Given that expectancies for the two goals did not differ much and the valence for the goal with the larger discrepancy was larger, the *SEU* associated with the goal with the larger discrepancy was larger than the *SEU* associated with the goal with the smaller discrepancy. Therefore, when more time was available, participants prioritized the goal with the larger discrepancy from the aspiration level. However, when less time was available, participants expected they could attain the aspiration level for one goal or the other, but not both. Because of the limited time, expectancy became the dominant determinant of the *SEU*, with valence playing a diminished role. Recall that compared to the goal with the larger discrepancy, the goal with the smaller discrepancy from the aspiration level has greater expectancy. Thus, the *SEU* associated with the goal with the smaller discrepancy was larger than the *SEU* associated with the goal with the larger discrepancy. Therefore, when less time was available, participants prioritized the goal with the smaller discrepancy from the aspiration level.

Although the MGPM is able to explain findings from current multiple-goal pursuit studies, these studies have only examined goals with a single goal level. It is unclear whether the MGPM can account for how people prioritize their goals when the goals have multiple goal levels. It is important to examine the MGPM in such situations because there is evidence suggesting that people consider multiple goal levels.

Chapter 3: Multiple Goal Levels in Goal Pursuit

When a person pursues a goal, she may pursue it to different goal levels, with lower goal levels being easier to attain than higher goal levels. The goal level that people choose to pursue is important because people use these goal levels to guide their allocation of resources such as attention and effort (Kanfer, Frese, & Johnson, 2017). For example, participants who received a specific, difficult goal level performed better than those given vague instructions to do their best, presumably because the participants adjusted their effort to the goal level they were assigned (Locke & Latham, 1990, 2002). Even when striving towards a selected goal level, however, a person may still consider alternative goal levels. For example, after continuously failing to attain a given goal level, the person may switch to striving for a lower, more attainable, goal level instead (Campion & Lord, 1982; Donovan & Williams, 2003; Lewin et al., 1944). Such a switch suggests that when pursuing a goal over time, a person may compare the selected goal level against alternative goal levels (i.e., they may consider multiple goal levels) and strive for a different goal level instead.

When multiple goal levels exist, how do people choose the goal level to strive towards? One model of control theory (Klein, 1989) proposes that when a person dynamically pursues a single goal with two possible goal levels, a higher (i.e., more challenging) and a lower (i.e., less challenging) goal level, the person would compare the SEU associated with the more challenging goal level with the SEU associated with the less challenging goal level and choose the goal level with the larger SEU. For example, if the more challenging goal level has the higher SEU, the person would choose to strive towards the more challenging goal level. The person continues to compare the SEUs associated with the two goal levels as the person pursues the goal over time. If the SEU of the more challenging goal level remains higher than the SEU of the less challenging goal level, the person would continue to strive towards the more challenging goal level. If the SEU of the less challenging goal level becomes higher than the SEU of the more challenging goal level, the person would choose to strive towards the less challenging goal level instead. The theory proposes that when pursuing a goal over time, the person would consider the multiple goal levels at each time point and strive towards the goal level that has the higher SEU at that time point. I extend this idea from a single-goal pursuit context to a multiple-goal pursuit context to examine how people dynamically pursue multiple goals that have multiple goal levels.

Although many goal levels may exist for a given goal, two goal levels have received considerable attention in the literature: the minimally acceptable level and the aspiration level (Austin & Vancouver, 1996; Campion & Lord, 1982; Converse, Steinhauser, & Pathak, 2010; Locke & Bryan, 1968; March & Shapira, 1992; Wang & Johnson, 2012). The minimally acceptable level is the lowest possible level on the goal that, if unattained, indicates failure on the goal. The minimally acceptable level on a goal has also been referred to as the minimal goal (Brendl & Higgins, 1996; Locke & Bryan, 1968; Rotter, 1954), the minimum satisfactory goal (Campion & Lord, 1982), the survival point (March & Shapira, 1992), the minimum requirement (Wang & Johnson, 2012), and the reservation point (Thompson, Wang, & Gunia, 2010). Although these terms may have some variation in meanings (e.g., the survival point specifically refers to the point below which death is certain to happen), common among these terms is the notion that if a person fails to attain the minimally acceptable level on the goal, she has failed on the goal. For example, the minimally acceptable level on a manuscript may be a complete draft. If the researcher cannot write a complete draft (i.e., she cannot attain the minimally acceptable level), then the researcher has failed on her goal of writing the manuscript. The aspiration level is the level on the goal that people hope to or desire to attain (Lewin et al., 1944; March & Shapira, 1987; Starbuck, 1963). For example, the aspiration level on a manuscript may be a highly polished draft. The aspiration level is referred to as the goal when there is only one goal level (e.g., Vancouver et al., 2010).

Some evidence suggests that when a goal has both a minimally acceptable level and an aspiration level, people prioritize attaining the minimally acceptable level over the aspiration level. For example, compared to firms that were underperforming (i.e., had not met the aspiration level on firm performance) but were not close to bankruptcy (i.e., met the minimally acceptable level on firm performance), firms that were close to bankruptcy (i.e., under threat of not meeting the minimally acceptable level) spent less resources on research and development efforts that would help them attain the aspiration level (Chen & Miller, 2007). Instead, presumably, these firms devoted more resources to essential operations that would help them avoid bankruptcy. This study provides some initial evidence that if the minimally acceptable level on the goal (i.e., firm performance) has not been attained or is under severe threat of not being attained, managers are likely to prioritize attaining the minimally acceptable level over the aspiration level.

Wang and Johnson (2012) explicitly tested whether people prioritized attaining the minimally acceptable level over the aspiration level. In their study, the authors first elicited participants' minimally required salary (minimally acceptable level) and the desired salary (aspiration level) for a first job. Participants were then asked to decide between a risky option that had an equal chance of a salary outcome below the minimally acceptable level or above the aspiration level, and a riskless option that had a salary outcome above the minimally acceptable level but below the aspiration level. The expected value for the risky option was equal to the value for the salary outcome in the riskless option. In this scenario, participants tended to choose the riskless option. However, in a different scenario, when the risky option did not have the possibility of a salary outcome below the minimally acceptable level, participants chose the risky option instead. These findings imply that people prioritize attaining the minimally acceptable level over the aspiration level. That is, they would rather secure the minimally acceptable level than risk failing to attain the minimally acceptable level to attain the aspiration level.

To understand the psychological processes that underlie these findings, consider the consequences of attaining the minimally acceptable level versus the consequences of attaining the aspiration level. The minimally acceptable level is the lowest possible outcome that, if met, still leads to a positive consequence (Rotter, Chance, & Phares, 1972). In other words, not attaining the minimally acceptable level leads to negative consequences (e.g., a firm that does not attain minimally acceptable level of performance ceases to exist). Because people do not want to experience the negative consequences, when there is a risk that the minimally acceptable level might not be attained, people are less likely to take risks. In comparison, the aspiration level is the outcome that leads to a large positive consequence. Assuming the minimally acceptable level has already been attained, not attaining the aspiration level still results in a positive consequence, only that it is *less positive* than attaining the aspiration level. Because people still experience positive consequences regardless of attaining the aspiration level, when attaining the minimally acceptable level is certain, they are more likely to take the risk. I provide a more concrete example to illustrate this point. Consider Peter, a manager for whom the minimally acceptable level on the job goal is keeping his job and the aspiration level on the job goal is getting a promotion. Peter has to decide whether or not to invest the company's assets in a risky venture. If the investment is successful, he could get a promotion (i.e., attain his aspiration level). But if the investment is unsuccessful, he could lose his job (i.e., not attain his minimally acceptable level). In this scenario, Peter is unlikely to take the risk because keeping his job (i.e., attaining the minimally acceptable level) is not assured. By contrast, if the investment is unsuccessful, instead of losing his job, Peter simply does not get the promotion (i.e., not attain his aspiration level), then Peter is more likely to take the risk because keeping his job (i.e., attaining the minimally acceptable level) is assured.

These findings imply two things. First, when considering multiple goal levels (i.e., minimally acceptable level and aspiration level), people subjectively value attaining the minimally acceptable level more than the aspiration level. Second, people tend to prioritize attaining the minimally acceptable level over attaining the aspiration level when attaining the minimally acceptable level is not assured.

Attaining the minimally acceptable level may not be assured if a decision is risky (such as in Peter's case when an investment is risky) or if resources are limited (such as in Mary's case when she does not have enough time). If resources are so limited that attaining the minimally acceptable level is not guaranteed, then people should prioritize attaining the minimally acceptable level over attaining the aspiration level. However, if resources are sufficient such that attaining the minimally acceptable level is guaranteed, then people should be less likely to prioritize attaining the minimally acceptable level over attaining the aspiration level.

Drawing on the theoretical foundation provided by the MGPM (Vancouver et al., 2010) and an integrated model of control theory (Klein, 1989), as well as empirical research on multiple goal levels (Wang & Johnson, 2012), I extended the MGPM to try to explain how people would prioritize their multiple goals when each goal has multiple goal levels. I also examine how people would prioritize their goals differently when different amounts of resources are available.

Chapter 4: Extending the MGPM: The MGPME

The MGPME, like the MGPM, models the pursuit of two goals with a common deadline. In the MGPM, only one goal level, the aspiration level (g_{AL}) is considered for each goal (e.g., Goal A or Goal B). The MGPM aspiration level is labelled g_{ALA} for Goal A and g_{ALB} for Goal B. In the MGPME, two goal levels—the minimally acceptable level (g_{MR}) and the aspiration level (g_{AL})—are considered. The minimally acceptable level is labelled g_{MRA} for Goal A and g_{MRB} for Goal B. The aspiration level is labelled g_{ALA} for Goal A and g_{ALB} for Goal B. The MGPME proposes that when choosing between two goals (i.e., Goal A or Goal B) to prioritize at a given time point, a person engages in a two-step process. In the first step, the person determines the attractiveness of working on the minimally acceptable level (i.e., SEU_{MR}) and the attractiveness of working on the aspiration level (i.e., SEU_{AL}) for each goal. The person chooses the more attractive goal level (i.e., the goal level that has a higher *SEU*) to strive towards on that goal (Klein, 1989). In the second step, the person determines which goal is more attractive (i.e., has the higher *SEU*) and prioritizes the more attractive goal.

At a given time point (e.g., t_1), to determine which goal level (i.e., g_{MR} or g_{AL}), to strive towards for a given goal, for example Goal A, the person compares the *SEU* associated with the minimally acceptable level for Goal A (SEU_{MRA}) to the *SEU* associated with the aspiration level for Goal A (SEU_{ALA}). According to the MGPME, if the SEU_{MRA} is larger than the SEU_{ALA}, the person will strive towards the minimally acceptable level for Goal A. Conversely, if the SEU_{ALA} is larger than the SEU_{MRA}, the person will strive towards the aspiration level for Goal A. If the SEU_{MRA} is equal to

SEU_{ALA}, the person would make an arbitrary choice between the two goal levels, referred to here as the default option. For example, assume that for Mary, the student from our opening example, a report has attained the minimally acceptable level if it contains at least 1,500 words (g_{MR} = 1,500) and has attained the aspiration level if it contains at least 2,500 words (g_{AL} = 2,500). To choose the goal level for Report A (i.e., Goal A), Mary compares the *SEU* associated with writing 1,500 words for Report A (SEU_{MRA}) and the *SEU* associated with writing 2,500 words for Report A (SEU_{ALA}). If the *SEU* associated with writing 1,500 words for Report A (SEU_{MRA}) is larger than the *SEU* associated with writing 2,500 words for Report A (SEU_{ALA}), Mary will strive towards writing 1,500 words. In contrast, if the *SEU* associated with writing 2,500 words (SEU_{ALA}) is larger than the *SEU* associated with writing 1,500 words (SEU_{MRA}), Mary will strive towards writing 2,500 words for Report A. If the *SEU* associated with writing 2,500 words (SEU_{ALA}) is equal to the *SEU* associated with writing 1,500 words (SEU_{MRA}), Mary will arbitrarily choose the goal level to strive towards for Report A.

After selecting the goal level to strive towards for each goal, the person chooses the goal to work on for the duration between t_1 and the next time point, t_2. To do so, the person compares the *SEU* of the *selected goal level* for the first goal (e.g., Goal A) and the *SEU* of the *selected goal level* for the second goal (e.g., Goal B). Assume that the *SEU* associated with the aspiration level for Report A (SEU_{ALA}) is larger than the *SEU* associated with the minimally acceptable level for Report A (SEU_{MRA}). The *SEU* associated with Report A (SEU_A) would therefore be equivalent to the *SEU* associated with the aspiration level for Report A (SEU_{ALA}). Assume that the *SEU* associated with the aspiration level for Report B (SEU_{ALB}) is smaller than the *SEU* associated with the minimally acceptable level for Report B (SEU_{MRB}). The *SEU* associated with Report B (SEU_{B}) would therefore be equivalent to the *SEU* associated with the minimally acceptable level for Report B (SEU_{MRB}). Mary then chooses the goal to prioritize by comparing the *SEU* associated with Report A (i.e., $SEU_{A} = SEU_{ALA}$) to the *SEU* associated with Report B (i.e., $SEU_{B} = SEU_{MRB}$). If the SEU_{A} is larger than the SEU_{B}, Mary will prioritize Report A. If the SEU_{B} is larger than the SEU_{A}, Mary will prioritize Report B. If the SEU_{A} is equal to the SEU_{B}, then Mary would choose the default option, which, as mentioned earlier, is assumed to be the person's choice at the preceding time point. The two-step process of comparing subjective expected utilities between goal levels first and then comparing the *SEU* of the selected goal level for Goal A with the *SEU* of the selected goal level for Goal B continues until the aspiration level for both goals is reached or until no more resources (e.g., time) remain. However, prior to selecting the goal level, Mary must first determine the SEU_{MR} and the SEU_{AL} for each goal at a given time point.

The SEU_{AL} in the MGPME is determined using the same processes as those used to determine the SEU_{AL} in the MGPM. The SEU_{AL} is determined by the expectancy (E_{AL}) and the valence (V_{AL}) associated with attaining the aspiration level. The E_{AL} is determined by the difference between the amount of time available (T_{L}) and the amount of time needed to attain the aspiration level (T_{NAL}). The amount of time needed to attain the aspiration level (T_{NAL}) is further determined by the discrepancy from the aspiration level (d_{AL}) and the expected lag (α). The discrepancy from the aspiration level (d_{AL}) is the distance between the current state (s) and the aspiration level (g_{AL}). The V_{AL} is determined by the discrepancy from the aspiration level (d_{AL}) and the perceived value of the consequences of attaining the aspiration level (k_{AL}). Formally stated, the SEU_{AL} is:

$$\begin{aligned} SEU_{AL} &= E_{AL}V_{AL} \\ &= (T_L - T_{NAL})(d_{AL}k_{AL}) \\ &= (T_L - \alpha d_{AL})(d_{AL}k_{AL}) \qquad (7) \end{aligned}$$

The SEU_{MR} is determined by two factors: the perceived ability to attain the minimally acceptable level (i.e., expectancy associated with attaining the minimally acceptable level, E_{MR}) and the perceived value of attaining the minimally acceptable level (i.e., valence associated with attaining the minimally acceptable level, V_{MR}). The E_{MR} is determined by the difference between how much time is left (T_L) and how much time is needed to attain the minimally acceptable level (T_{NMR}). The amount of time needed to attain the minimally acceptable level (T_{NMR}) is in turn determined by the discrepancy from the minimally acceptable level (d_{MR}) and the amount of time a person needs to complete one goal unit (i.e., expected lag, α). The discrepancy from the minimally acceptable level is the distance between the current state (s) and the minimally acceptable level (g_{MR}). The V_{MR} is determined by the discrepancy from the minimally acceptable level (d_{MR}) and the perceived value of the consequences attaining the minimally acceptable level (i.e., gain, k_{MR}). Formally stated, the SEU_{MR} is:

$$\begin{aligned} SEU_{MR} &= E_{MR}V_{MR} \\ &= (T_L - T_{NMR})(d_{MR}k_{MR}) \\ &= (T_L - \alpha d_{MR})(d_{MR}k_{MR}) \qquad (8) \end{aligned}$$

Equations (7) and (8) show that in determining the SEU_{AL} and the SEU_{MR}, the amount of time available (T_L) and the expected lag (α) are the same. However, the discrepancy from the discrepancy from the aspiration level (d_{AL}) and the discrepancy from the minimally acceptable level (d_{MR}) are different, as are the gain associated with the aspiration level (k_{MR}) and the gain associated with the minimally acceptable level (k_{MR}). Below, I describe how these parameters are derived and how they differ.

Figure 1A shows a goal with a minimally acceptable level (g_{MR}) and an aspiration level (g_{AL}), where the current state (s) has not reached the minimally acceptable level (g_{MR}). The discrepancy from the minimally acceptable level (d_{MR}, depicted by the dotted line bracket) is the difference between the current state (s) and the minimally acceptable level (g_{MR}). The discrepancy from the aspiration level (d_{AL}, depicted by the solid line bracket) is the difference between the current state (s) and the aspiration level (g_{AL}). The minimally acceptable level (g_{MR}) is attained *en route* to the aspiration level (g_{AL}). Hence, the discrepancy from the aspiration level (d_{AL}) comprises the discrepancy from the minimally acceptable level (d_{MR}) and the discrepancy *between* the minimally acceptable level and the aspiration level. When the current state (s) has reached the minimally acceptable level (g_{MR}; depicted in Figure 1B), the discrepancy from the minimally acceptable level is zero (i.e., d_{MR} = 0). The discrepancy from the aspiration level (d_{AL}) is now the difference between the current state (s) and the aspiration level (g_{AL}). Finally, when the current state (s) has reached the aspiration level (g_{AL}; depicted in Figure 1C), the discrepancy from the minimally acceptable level and the discrepancy from the aspiration level are both zero ($d_{MR} = d_{AL} = 0$).

As discussed earlier, because failing to attain the minimally acceptable level tends to be more consequential than failing to attain the aspiration level (Wang & Johnson, 2012), people have been shown to value attaining the minimally acceptable level more than the aspiration level. Therefore, in this dissertation, I assume that attaining the minimally acceptable level has a greater marginal (i.e., incremental) value than attaining the aspiration level. That is, although the total value of attaining the aspiration level (which includes attaining the minimally acceptable level) is larger than the value of attaining only the minimally acceptable level, the *additional value* of attaining the aspiration level after meeting the minimally acceptable level is smaller than the value of attaining the minimally acceptable level.[2]

Thus, the gain associated with attaining the aspiration level (k_{AL}) depends on whether minimally acceptable level has been attained. If the minimally acceptable level has already been attained at that given timepoint, k_{AL} will be the value of the *additional gain* associated with attaining the aspiration level beyond the minimally acceptable level. In contrast, if the minimally acceptable level has not been attained, k_{AL} will comprise two components: The additional gain associated with attaining the aspiration level beyond the minimally acceptable level (as above) and the gain associated with attaining the minimally acceptable level (i.e., k_{MR}). Thus, if a person has not attained the minimally acceptable level, k_{AL} is the sum of k_{MR} and the value of

[2] Although it could be argued that some people might view attaining the aspiration level as having an equal or a greater marginal value than attaining the minimally acceptable level, research directly comparing the minimally acceptable level and the aspiration level (e.g., Wang & Johnson, 2012) suggests that people appear to value attaining the minimally acceptable level more than the aspiration level. Thus, in this dissertation, I focus on goals on which attaining the minimally acceptable level has a greater marginal value than attaining the aspiration level.

the additional gain associated with attaining the aspiration level after attaining the minimally acceptable level.

To examine if people consider multiple goal levels when pursuing two goals, I tested the predictions made by the MGPM against the predictions made by the MGPME in an experiment. In the following section, I describe the experiment and specify how the parameters in the MGPM and the MGPME correspond to the parameters manipulated in the experiment.

Chapter 5: The Current Study

To study how people prioritize their goals when each goal has multiple goal levels, I conducted an experiment in which participants engaged in a decision-making task. At the beginning of the task, participants received a pre-determined number of hypothetical hours that they can spend on two goals. They chose which goal to spend each hour on over a series of trials. Participants' choice on a given trial (e.g., the first trial) determined their current states on the goals on the next trial (e.g., the second trial), which in turn influenced their choice on that next trial. I generated predictions about how participants prioritize their goals over time with the MGPM and the MGPME.

Both the MGPM and the MGPME model processes that affect choice dynamically. However, dynamic processes tend to interact in a complex way. Hence, researchers are recommended to conduct simulations to generate model predictions (Hulin & Ilgen, 2000). Thus, I conducted a simulation study based on the decision-making task in the experiment and used the results from the simulation study to derive specific hypotheses (i.e., predictions) for the MGPM and the MGPME. Because the values used in the simulation study are based on the specific parameters manipulated in the decision-making task (e.g., gains), I first describe the task in detail before I describe how the simulation study was conducted. Then, I present the results of the simulation study. Based on the simulation results, I derived the hypotheses for the MGPM and the MGPME. The hypotheses were then tested to determine which model better accounts for how participants prioritize their goals in the experimental study.

Decision-making Task

Figure 2 shows a screenshot of the decision-making task (adapted from Ballard, Yeo, Neal, & Farrell, 2016). The number of trials was represented by the "number of work hours left". At the beginning of the task, participants were given a number of work hours (e.g. 35 work hours; 35 trials). On each trial, participants chose whether they would spend the next hour on Project A by clicking on the "Click to work on Project A" button or on Project B by clicking on the "Click to work on Project B" button. Each project had a number of work items (i.e., discrete tasks). For example, in Figure 2, there were 11 work items for Project A and 17 work items for Project B. For each trial (i.e., work hour), participants had an 80% chance of completing a work item on the selected project (i.e., 20% of the time the work item was not completed during the hour/trial). For example, if a participant chose to spend the next work hour on Project A, she had an 80% chance of reducing the number of work items for Project A from 11 to 10, and a 20% chance of still having 11 work items at the end of the work hour/trial. After each trial, the number of work hours left decreased by one and the number of work items left for each project was updated. Participants continued spending each work hour until no work hours remained (i.e., the number of work hours left = 0) or when there were no work items left for both Project A and Project B.

To experimentally manipulate participants' expectancy for attaining the goal levels on the two projects, the amount of resources that were available (operationalized as the number of work hours) on the first trial was systematically varied across four conditions. At the same time, the current state of the projects (operationalized as the number of work items) on the first trial were kept constant across the four conditions (i.e., 11 work items for Project A and 17 work items for Project B). Thus, as the amount of resources increased across conditions, participants' perceived ability to attain the minimally acceptable level (i.e., E_{MR}) and their perceived ability to attain the aspiration level (i.e., E_{AL}) on both projects increased.

In this task, there were five possible outcomes that could be attained by the end of each round (i.e., condition): one minimally acceptable level, one minimally acceptable level and one aspiration level, two minimally acceptable levels, two minimally acceptable levels and one aspiration level, and two minimally acceptable levels and two aspiration levels. Because spending an hour on a project leads to a binomial outcome (i.e., there is an 80% chance the work item is successfully completed and a 20% chance the work item is not successfully completed), for each condition, I computed the probability of each of the five outcomes by calculating the cumulative binomial probability associated with each outcome. For example, to attain one minimally acceptable level and one aspiration level, participants must have successfully completed at least 11 work items. Thus, I computed the probability of successfully completing at least 11 work items if they had 14 hours (*Least* condition), 18 hours (*Less* condition), 27 hours (*More* condition), and 35 hours (*Most* condition). As shown in Table 1, the probability of successfully completing at least 11 work items was 70% in the *Least* condition, 98% in the *Less* condition, 100% in the *More* and the *Most* conditions. The parameters manipulated in the task (i.e., the number of work hours on the first trial, the goal levels, the number of work items on the first trial, the incentives, and the probability of completion) and how they correspond to the parameters in the simulation study are described below.

Number of work hours on the first trial. The number of work hours on the first trial was experimentally manipulated, with the number of work hours increasing across conditions: 14 work hours (*Least* condition), 18 work hours (*Less* condition), 27 work hours (*More* condition), and 35 work hours (*Most* condition). The number of work hours corresponds to the amount of time left in the MGPM and the MGPME (i.e., T_L).

Goal levels. Two goal levels were explicitly provided for each project: a "Bonus" and a "Minimum" goal level. Participants reached the "Bonus" when no work items were left. For example, if Project A had 11 work items left, participants had to complete all 11 work items to reach the "Bonus". They reached the "Minimum" when *no more than* seven work items were left. If Project A had 11 work items remaining, participants had to complete four work items to reach the "Minimum". Because the MGPM allows for only one goal level, when simulating the MGPM, I assumed that participants would work towards the maximum possible outcome, the "Bonus", and disregard the "Minimum". In previous studies on multiple-goal pursuit (e.g., Schmidt & DeShon, 2007), the goal level is attained when participants completed all the tasks for the goal. To be consistent with these studies, I chose to equate the aspiration level in the MGPM to be the "Bonus" (i.e., all work items completed). The "Bonus" corresponds to the aspiration level in the MGPM and the aspiration level in the MGPME (i.e., g_{AL}). The "Minimum" is disregarded in the MGPM (i.e., there is no corresponding goal level in the MGPM for the minimally acceptable level) and corresponds to the minimally acceptable level in the MGPME (i.e., g_{MR}). Note that a participant who reached the "Bonus" reached both the "Minimum" and the "Bonus".

Number of work items on the first trial. The number of work items on the first trial was fixed at 11 work items for one project and 17 work items for the other project. For the sake of simplicity, the project with fewer work items (11 work items) is labeled Project A and the project with more work items (17 work items) is labeled Project B. The number of work items corresponds to the current state (s) in the MGPM and the MGPME. The current state determines the discrepancy from the aspiration level (d_{AL}) in the MGPM and the MGPME and the discrepancy from the minimally acceptable level (d_{MR}) in the MGPME. The discrepancy from the aspiration level (d_{AL}) in the MGPM and the MGPME is the difference between the current state (s) and the aspiration level (g_{AL}). In the decision-making task, the aspiration level for Project A was attained when no work items were left (i.e., $g_{ALA} = 0$). If the number of work items for Project A was 11 (i.e., $s_A = 11$), the discrepancy from the aspiration level was 11 (i.e., $d_{ALA} = s_A - g_{ALA} = 11 - 0$). The discrepancy from the minimally acceptable level in the MGPME is the difference between the current state (s) and the minimally acceptable level (g_{MR}). The minimally acceptable level for Project A (g_{MRA}) was attained when at most seven work items were left. Thus, if the number of work items for Project A was 11 (i.e., $s_A = 11$), the discrepancy from the minimally acceptable level in the MGPME was 11 (i.e., $d_{MRA} = 11 - 7 = 4$).

Incentives. The incentives participants receive for reaching the goal levels were also manipulated. To mimic a situation where people subjectively valued the minimally acceptable level more than the aspiration level (e.g., Wang & Johnson, 2012), participants received a larger incentive for reaching the minimally acceptable level (i.e., \$0.75) than for reaching the aspiration level after reaching the minimally acceptable level (i.e., an *additional* \$0.25). Therefore, for each project (i.e., goal), participants received \$0.75 if they had at most seven work items left (i.e., reached the minimally acceptable level) and \$1.00 (i.e., \$0.75 + \$0.25) if they had no work items left (i.e., reached the aspiration level). The incentive for having no work items left corresponds to the gain associated with the aspiration level (i.e., k_{AL}) in the MGPM and in the MGPME. However, the values for the gain associated with the aspiration level in the MGPM and in the MGPME differ. Because the minimally acceptable level is assumed to be ignored in the MGPM, the gain associated with attaining the MGPM goal level was fixed at 1.00 (i.e., $k_{AL} = 1.00$). That is, even when participants get \$0.75 for having at most seven work items left, because the MGPM assumes the minimally acceptable level is disregarded, the total incentive associated with attaining the goal level is \$1.00. In contrast, because both the minimally acceptable level and the aspiration level are considered in the MGPME, the total incentive associated with attaining the aspiration level changed from \$1.00 before attaining the minimally acceptable level to \$0.25 after attaining the minimally acceptable level. Thus, the gain associated with the MGPME aspiration level could take one of two values: 1.00 before the minimally acceptable level had been attained (i.e., $k_{AL} = 1.00$) and 0.25 after the minimally acceptable level had been attained (i.e., $k_{AL} = 0.25$). The incentive for reaching the minimally acceptable level corresponds to the gain associated with the minimally acceptable level in the MGPME (i.e., k_{MR} = 0.75). There is no corresponding parameter for the MGPM.

Probability of completion. People may pursue goals in a certain environment, a risky environment, or an uncertain environment (Knight, 1921). In a certain environment, an action completely determines the outcome. For example, I have a coin that is 100% biased towards heads. If I toss the coin 1,000 times, I can predict that the coin will land on heads all 1,000 times. In a risky environment, an action has a known probability of resulting in the outcome. For example, I have a coin that is unbiased. If I toss the coin 1,000 times, I can predict that the coin will reveal heads approximately 500 times. In an uncertain environment, an action has an unknown probability of resulting in the outcome. For example, I have a coin that could be biased or unbiased (but I do not know). If I toss the coin 1,000 times, I cannot predict the number of times the coin will reveal heads. When pursuing goals in a certain environment, people can plan which goals they want to prioritize and execute their plans without needing to reevaluate the plans at every time point (Kernan & Lord, 1990; Mitchell et al., 2008; Schmidt & Dolis, 2009). However, when pursuing goals in a risky or an uncertain environment, depending on changes in the environment, people may have to reevaluate their plans or re-prioritize their goals (Schmidt & Dolis, 2009). Thus, it is important to examine goal prioritization under risky or uncertain environments. Because all variables in a computational model need to be quantified, and risk can be quantified whereas uncertainty cannot, I examined goal prioritization in risky environments instead of in uncertain environments.[3] I introduced a probabilistic component to the completion of work item. For each work hour spent, the probability a work item on the selected project would be completed was fixed at 80%. Thus, the expected number of work hours needed to complete a work item (i.e., one unit on the goal) was 1.25 (i.e., $\frac{1}{0.80}$). This corresponds to expected lag (i.e., α) in the MGPM and the MGPME. Hence, if Project A had 11 work items left, a participant would expect to need 13.75 hours (i.e., 1.25 x 11) to complete all work items.

Simulation Study

In the simulation study, I examined eight simulation conditions [2 models (i.e., MGPM and MGPME) x 4 resource conditions (i.e., *Least*, *Less*, *More*, and *Most*)]. For each of the eight conditions, I conducted 1,000 replications (i.e., I simulated 1,000 participants working on the task). For a given replication (i.e., a simulated participant), I first specified the inputs (e.g., the discrepancy from the goal level for Project A) at the starting time point, t_1. From these inputs, I then generated the output (i.e., choice of whether to work on Project A or Project B). The output in turn influenced the inputs at the next time point, t_2. Thus, the inputs at each time point changed as a function of the output from the previous time point. This cycle iterated over *n* trials, where the value of *n* depends on the resource condition. The outputs for

[3] Although I examined only risky environments in this dissertation, I expect people to also prioritize attaining the minimally acceptable level on their multiple goals in uncertain environments. This is because people want to avoid the drastic consequences associated with failing to attain the minimally acceptable level. However, it is possible that in uncertain environments, people may choose to prioritize the goal with the smallest discrepancy from the aspiration level instead. Goals with smaller discrepancies from the aspiration level require fewer resources to attain the aspiration level. Thus, prioritizing such goals is likely to reduce uncertainty of attaining at least one goal level. Future studies will have to be conducted to examine if people behave similarly in the risky environment and in the uncertain environment.

each of the *n* trials were then averaged across the 1,000 replications in each condition. These average outputs formed the predictions of how participants would prioritize their goals in that condition. For example, in the MGPM *Least* condition, the average outputs represented the MGPM's predictions of how participants would prioritize their goals in the *Least* condition. Below, I describe how the simulation was conducted with an example from the MGPM *More* condition and another one from the MGPME *More* condition.

I performed the simulation in Microsoft Excel. Figure 3 shows the Excel spreadsheet set up for one replication (i.e., one participant) in the MGPM *More* condition. The first row represented the first trial (i.e., t_1). Each additional row represented the trial at the next time point. Each of the following MGPM parameters were represented in a column: the number of hours left on a given trial (i.e., T_L), the expected lag (i.e., α), the discrepancies from Project A's aspiration level (i.e., d_{ALA}) and Project B's aspiration level (i.e., d_{ALB}) on a given trial, and the gains associated with attaining Project A's aspiration level (i.e., k_{ALA}) and Project B's aspiration level (i.e., k_{ALB}) on a given trial. The following parameters, represented in additional columns, were calculated using Excel's in-built functions: The *SEU*s associated with attaining Project A's aspiration level (i.e., SEU_{ALA}) and Project B's aspiration level (i.e., SEU_{ALB}) on a given trial, the choice of project (i.e., Choice) on a given trial, and whether a work item was completed on a given trial (i.e., Item Completed). The values in Item Completed were determined by the Excel's *rand()* function, which samples values from a uniform distribution with a minimum of 0 and a maximum of 1. Given the probability a work item on the selected project would be completed was

80%, if the sampled value was less than 0.80, Item Completed was coded as 1, otherwise, Item Completed was coded as 0.

The Choice and Item Complete parameters on each row (e.g., the first row/trial) were used as inputs to compute the discrepancies on the next row (i.e., the second row/trial). For example, in Figure 3, on the first trial, Project A was chosen (i.e., Choice = A) and the work item was completed (i.e., Item Completed = 1). On the second trial (i.e., on the second row), the discrepancy from the aspiration level for Project A decreased from 11 on the first row to 10 (i.e., $d_{ALA} = 10$). Because Project B was not chosen, the discrepancy from the aspiration level remained at 17 (i.e., $d_{ALB} = 17$). On the 15th trial (i.e., on the 15th row) in Figure 3, Project B was chosen (i.e., Choice = B) but the work item was not completed (i.e., Item Completed = 0). Thus, on the 16th trial (i.e., on the 16th row), the discrepancy from the aspiration level remained at 14 (i.e., ${}_{AL}d_{B} = 14$). The new values for the discrepancies on that trial (e.g., the second row/trial) in turn affects the *SEU*s and the project chosen on that trial (i.e., the second row/trial). New rows were added until the number of work hours left was zero (i.e., $T_L = 0$) or when the discrepancies from the aspiration level for both projects was zero (i.e., $d_A = d_B = 0$).

Figure 4 shows the Excel spreadsheet set up for one replication (i.e., one participant) in the MGPME *More* condition. Similar to the set up for the MGPM *More* condition, the first row represented the first trial (i.e., t_1) and additional rows represented the subsequent trials. Each MGPME parameter was represented in a column. The following MGPME parameters were the same as the MGPM parameters: the number of hours left on a given trial (i.e., T_L), the expected lag (i.e., α), the choice of project (i.e., Choice) on a given trial, and whether a work item was completed on a given trial (i.e., Item Completed). However, because the MGPME distinguishes between the minimally acceptable level and the aspiration level, whereas the MGPM only has a single goal level (i.e., the aspiration level), the MGPME has the following additional parameters: the discrepancies from Project A's minimally acceptable level (i.e., d_{MRA}) and Project B's minimally acceptable level (i.e., d_{MRB}) on a given trial, the gains associated with attaining Project A's minimally acceptable level (i.e., k_{MRA}) and Project B's minimally acceptable level (i.e., k_{MRB}) on a given trial, the *SEU*s associated with attaining Project A's minimally acceptable level (i.e., SEU_{MRA}) and Project B's minimally acceptable level (i.e., SEU_{MRB}) on a given trial, and the *SEU*s associated with attaining the goal level for Project A (i.e., SEU_{A}) and for Project B (i.e., SEU_{B}) on a given trial. Note that in the MGPME, the SEU_{A} represented the *SEU* associated with attaining the *selected* goal level for Project A and the SEU_{B} represented the *SEU* associated with attaining the *selected* goal level for Project B. That is, the SEU_{A} was the higher of the SEU_{ALA} and the SEU_{MRA}; similarly, the SEU_{B} was the higher of the SEU_{ALB} and the SEU_{MRB}.

Similar to the MGPM *More* condition, the Choice and Item Complete parameters were used as inputs to compute the discrepancies on the next row (i.e., the second row/trial) in the MGPME *More* condition. For example, in Figure 4, on the first trial, Project A was chosen (i.e., Choice = A) and the work item was completed (i.e., Item Completed = 1). On the second trial (i.e., the second row), the discrepancy from the aspiration level decreased from 11 to 10 (i.e., $d_{\mathrm{ALA}} = 10$). On the same trial (i.e., the second row), the discrepancy from the minimally acceptable level decreased from 4 to 3 (i.e., d_{MRA} = 3). Because Project B was not chosen, the discrepancy from the aspiration level remained at 17 (i.e., d_{ALB} = 17) and the discrepancy from the minimally acceptable level remained at 10 (i.e., d_{MRB} = 10). On the 15th trial (i.e., on the 15th row) in Figure 4, Project B was chosen (i.e., Choice = B) but the work item was not completed (i.e., Item Completed = 0). Thus, on the 16th trial (i.e., on the 16th row), the discrepancy from the aspiration level remained at 7 (i.e., d_{ALB} = 7). The discrepancy from the minimally acceptable level was 0 because the minimally acceptable level had been attained (i.e., d_{MRB} = 0). Similar to the MGPM *More* condition, the new values for the discrepancies on that trial (e.g., the second row/trial) affected the *SEU*s and the project chosen on that trial (i.e., the second row/trial). New rows were added until the number of work hours left was zero (i.e., T_L = 0) or when the discrepancies from the aspiration level for both projects was zero (i.e., d_{ALA} = d_{ALB} = 0).

In this dissertation, the outcome of interest on each trial was whether participants (simulated and actual) spent the work hour on the project with the smaller discrepancy from its aspiration level (i.e., the smaller d_{AL} project). That is, if Project A had a discrepancy from the aspiration level of four work hours (d_{ALA}= 4) and Project B had a discrepancy from the aspiration level of six work hours (d_{ALB} = 6), I was interested in whether the participant chose to spend the work hour on Project A (coded 1) or on Project B (coded 0). Conversely, if Project A had a discrepancy from the aspiration level of eight work hours (d_{ALA}= 8) and Project B had a discrepancy from the aspiration level of six work hours (d_{ALB} = 6), I was interested in whether the participant chose to spend the work hour on Project B (coded 1) or on Project A (coded 0). This is because past research has shown that people prioritize their goals based on their discrepancy from the goal level (e.g., Schmidt & DeShon, 2007; Schmidt et al., 2009). Thus, in this dissertation, the outcome was whether the smaller d_{AL} project was chosen (i.e., whether the smaller d_{AL} project was prioritized).

Because the outcome was whether the project with the smaller d_{AL} was chosen, I excluded trials on which the discrepancy from the aspiration level for both projects were the same. I also excluded trials on which one aspiration level had been attained because on those trials, there was no choice but to spend time on the project that had yet to attain the aspiration level.

Simulation Results

I compared the MGPM and the MGPME simulation results separately for each resource condition. By comparing the two models for each resource condition, I could observe in which resource conditions the MGPM and the MGPME made the same predictions and in which resource conditions the MGPM and the MGPME made different predictions.

For each resource condition, I plotted the proportion of times the simulated participants chose the smaller d_{AL} project (i.e., proportion of times smaller d_{AL} project chosen) against the number of hours left for the MGPM simulation condition and for the MGPME simulation condition. For example, if all 1,000 simulated participants chose the smaller d_{AL} project when there were 14 hours left in the MGPM *Least* condition, the proportion would be 1.00. If 500 simulated participants chose the smaller d_{AL} project instead, the proportion would be .50. The proportion of times the smaller d_{AL} project was chosen over the number of hours left represents the MGPM and the MGPME predictions in that resource condition.

The graphs are presented in Figure 5 for the *Least* condition, Figure 6 for the *Less* condition, Figure 7 for the *More* condition, and Figure 8 for the *Most* condition. In each figure, the solid line represents the MGPM simulation condition and the dotted line represents the MGPME simulation condition. The number of hours left in these graphs is plotted in reverse order, from the greatest to the smallest number of hours left. In the decision-making task, participants received a fixed number of hours at the beginning of the task (e.g., 35 hours). As they spent each hour, the current states on the projects change, which affect their subsequent choice. Thus, plotting the number of hours left in reverse order reflects how participants' prior choices affect their subsequent choices.

In Figure 5, which represents the *Least* condition, the MGPM (i.e., solid line) predicts that participants would choose the smaller d_{AL} project all the time (i.e., proportion of times smaller d_{AL} project chosen = 1.00) across all trials (i.e., hours left). The prediction is represented by a flat line, indicating that the number of hours left is unrelated to the proportion of smaller d_{AL} project chosen. To find out why the MGPM made this prediction, I examined the expectancy and valence associated with each project across all trials. The amount of time available was severely limited in the *Least* condition. Hence, the goal level (i.e., the aspiration level) for the project with the larger d_{AL} was unattainable (i.e., expectancy was zero). Thus, despite the larger valence associated with the larger d_{AL} project, the simulated participants consistently chose the smaller d_{AL} project because the goal level for the smaller d_{AL} project was attainable.

In Figure 5, the MGPME (i.e., dotted line) also predicts that participants would choose the smaller d_{AL} project all the time (i.e., proportion of times smaller d_{AL} project chosen = 1.00) across all trials (i.e., hours left). The prediction is represented by a flat line, again indicating that the number of hours left is unrelated to the proportion of smaller d_{AL} project chosen. An examination of the expectancy and valence associated with each project across all trials suggests that the amount of time available was so severely limited that even the minimally acceptable level for the larger d_{AL} project was difficult to attain (i.e., expectancy for attaining the minimally acceptable level was very low). Thus, although valence was higher for the larger d_{AL} project than for the smaller d_{AL} project, the simulated participants consistently chose the smaller d_{AL} project as its aspiration level was more attainable.

In the *Least* condition, both the MGPM and the MGPME predict that the number of hours left would be unrelated to the proportion of smaller d_{AL} project chosen. However, if participants chose to prioritize attaining the minimally acceptable level for both projects despite having insufficient time available, I expect that upon attaining the minimally acceptable level for the smaller d_{AL} project, they would switch to attain the minimally acceptable level for the larger d_{AL} project. If this were true, then I expect a curvilinear relationship between the number of hours left and choice of the project with the smaller d_{AL}. Thus, I hypothesize that:

Hypothesis 1: In the Least condition, there is a positive quadratic (i.e., U-shaped) relationship between the number of hours left and choice of the project with *the smaller d_{AL}. Specifically, as the number of hours left decreases, participants are less likely to choose the project with the smaller d_{AL}. .*

Support for Hypothesis 1 would mean that the models *do not* account for how participants prioritize the projects on the task in the *Least* condition. That is, participants still choose to prioritize attaining the minimally acceptable level on both projects despite having insufficient resources to do so. A lack of support for Hypothesis 1 would mean that the MGPM and the MGPME account for how participants prioritize the projects on the task in the *Least* condition.

In Figure 6, which represents the *Less* condition, the MGPM (i.e., solid line) predicts that participants would choose the smaller d_{AL} project all the time (i.e., proportion of times smaller d_{AL} project chosen = 1.00) across all trials (i.e., hours left). The prediction is represented by the flat line, indicating that the number of hours left is unrelated to the proportion of smaller d_{AL} project chosen. Similar to the *Least* condition, in the *Less* condition, the amount of time available was severely limited. Hence, as an investigation into the expectancy and valence associated with each project indicates, the goal level (i.e., the aspiration level) for the larger d_{AL} project was unattainable (i.e., expectancy was zero). As a result, the simulated participants consistently chose the smaller d_{AL} project as the goal level for the smaller d_{AL} project was attainable.

However, a different pattern was observed for the MGPME *Less* condition in Figure 6 (i.e., dotted line). Initially, the simulated participants chose the smaller d_{AL} project. As the number of hours left decreased (i.e., from 15 to 14 hours), some simulated participants started choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from 1.00 to .64). As the number of hours left further decreased (i.e., from 4 to 3 hours), the simulated participants again starting choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .64 to .66). This pattern suggests that there is a curvilinear relationship between the number of hours left and proportion of smaller d_{AL} project chosen. This curvilinear pattern was observed because upon attaining the minimally acceptable level for the smaller d_{AL} project (i.e., at 14 hours left), some simulated participants switched from prioritizing the smaller d_{AL} project to prioritizing the larger d_{AL} project. This switch occurred because the minimally acceptable level of the larger d_{AL} project was still unmet. Hence, the valence associated with the larger d_{AL} project was greater than the valence associated with the smaller d_{AL} project. As these participants started attaining the minimally acceptable level on the larger d_{AL} project (i.e., at 3 hours left), they switched back to prioritizing the smaller d_{AL} project. However, not all simulated participants followed this pattern of prioritization. Because the number of hours was limited, other simulated participants continued choosing the smaller d_{AL} project after attaining the minimally acceptable level of the smaller d_{AL} project as it was more attainable (i.e., expectancy for the smaller d_{AL} project was higher than expectancy for the larger d_{AL} project). From the discussion above, the number of hours left appears to have a general curvilinear (i.e., U- shaped) relationship with the proportion of smaller d_{AL} project chosen. Therefore, in the *Less* condition, the MGPME predicts that the number of hours left has a positive quadratic (i.e., U- shaped) relationship with the proportion of smaller d_{AL} project chosen. Given that the MGPM predicts no relationship and the MGPME predicts a curvilinear relationship, I hypothesize that:

Hypothesis 2: In the Less condition, there is a positive quadratic (i.e., U-shaped) relationship between the number of hours left and choice of the project with the smaller d_{AL}. Specifically, as the number of hours left decreases, participants are less likely to choose the project with the smaller d_{AL}. As the number of hours left further decreases, participants are more likely to choose the project with the smaller d_{AL}.

Support for Hypothesis 2 would suggest that the MGPME provides a better account of how participants prioritize the projects in the task in the *Less* condition. A lack of support for Hypothesis 2 would suggest that the MGPM provides a better account of how participants prioritize the projects in the task in the *Less* condition.

In Figure 7, which represents the *More* condition, the MGPM (i.e., solid line) predicts that participants would choose the smaller d_{AL} project all the time (i.e., proportion of times smaller d_{AL} project chosen = 1.00) across all trials (i.e., hours left). The prediction is represented by the flat line, indicating that the number of hours left is unrelated to the proportion of smaller d_{AL} project chosen. In the *More* condition, there were much fewer hours available to attain the goal level (i.e., the aspiration level) for the project with the larger d_{AL} than the project with the smaller d_{AL}. That is, the expectancy for the project with the smaller d_{AL} was much higher than the expectancy for the project with the larger d_{AL}. Thus, the simulated participants consistently chose the smaller d_{AL} project as the goal level for the smaller d_{AL} project was attainable. Therefore, in the *More* condition, the MGPM shows that the number of hours left would be unrelated to the proportion of smaller d_{AL} project chosen.

However, a different pattern was observed for the MGPME *More* condition (i.e., dotted line). Initially, the simulated participants chose the smaller d_{AL} project. As the number of hours left decreased (i.e., from 24 to 23 hours), some simulated participants started choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from 1.00 to .60). As the number of hours left further decreased (i.e., from 13 to 12 hours), the simulated participants again starting choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .00 to .05). This pattern suggests that there is a curvilinear (i.e., U-shaped) relationship between the number of hours left and proportion of smaller d_{AL} project chosen. This curvilinear pattern was observed because upon attaining the minimally acceptable level for the project with the smaller d_{AL} (i.e., at 23 hours left), some simulated participants started switching from prioritizing the smaller d_{AL} project to prioritizing the larger d_{AL}. This switch occurred because the minimally acceptable level of the larger d_{AL} project was still unmet. Hence, the valence associated with the larger d_{AL} project was greater than the valence associated with the smaller d_{AL} project. As these participants started attaining the minimally acceptable level on the larger d_{AL} project (i.e., at 12 hours left), they switched back to prioritizing the smaller d_{AL} project. Unlike in the *Less* condition, the MGPME predicts that all participants would choose to switch from prioritizing the smaller d_{AL} project to prioritizing the larger d_{AL} project when the minimally acceptable level of the smaller d_{AL} project was met. From the discussion above, the number of hours left appears to have a curvilinear (i.e., U- shaped) relationship with the proportion of smaller d_{AL} project chosen. Therefore, in the *More* condition, the MGPME predicts that the number of hours left had a positive quadratic (i.e., U-shaped) relationship with the proportion of smaller d_{AL} project chosen. Given that the MGPM predicts no relationship and the MGPME predicts a curvilinear relationship, I hypothesize that:

Hypothesis 3: In the More condition, there is a positive quadratic relationship between the number of hours left and choice. Specifically, as the number of hours left decreases, participants are less likely to choose the project with the smaller d_{AL}*. As the number of hours left further decreases, participants are more likely to choose the project with the smaller* d_{AL}*.*

Support for Hypothesis 3 would suggest that the MGPME provides a better account of how participants prioritize the projects in the task in the *More* condition. A lack of support for Hypothesis 3 would suggest that the MGPM provides a better account of how participants prioritize the projects in the task in the *More* condition.

In Figure 8, which represents the *Most* condition, the MGPM (i.e., solid line) predicts that participants would switch between choosing the smaller d_{AL} project and the larger d_{AL} project (i.e., proportion of times smaller d_{AL} project chosen fluctuates between 1.00 and 0.20) across all trials (i.e., hours left). The prediction is represented by the fluctuating line. The fluctuating line appears to indicate that the number of hours left is unrelated to the proportion of smaller d_{AL} project chosen. In the *Most* condition, the goal level of the project with the larger d_{AL} and the smaller d_{AL} were similarly attainable (i.e., their expectancies were similar). Hence, the simulated participants were more likely to switch back and forth between projects to ensure equal progress towards the goal level on both projects.

However, in Figure 8, a different pattern was observed for the MGPME *Most* condition (i.e., dotted line). Initially, the simulated participants chose the smaller d_{AL} project. As the number of hours left decreased (i.e., from 31 to 30 hours), some simulated participants started choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from .61 to .44). As the number of hours left further decreased (i.e., from 17 to 16 hours), the simulated participants again starting choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .00 to .42). This pattern suggests that there is a curvilinear relationship between the number of hours left and proportion of smaller d_{AL} project chosen. This curvilinear pattern was observed because upon attaining the minimally acceptable level for the smaller d_{AL} project (i.e., at 30 hours left), some simulated participants started switching from prioritizing the smaller d_{AL} project to prioritizing the larger d_{AL} project. This switch occurred because the minimally acceptable level of the project with the larger d_{AL} was still unmet. Hence, the valence associated with the larger d_{AL} project was greater than the valence associated with the smaller d_{AL} project. As these participants started attaining the minimally acceptable level on the larger d_{AL} project (i.e., at 20 hours left), they switched back to prioritizing the project with the smaller d_{AL}. The MGPME predicts that most participants would choose to switch from prioritizing the smaller d_{AL} project to prioritizing the larger d_{AL} project when the minimally acceptable level of the smaller d_{AL} project was met. From the discussion above, the number of hours left appears to have a curvilinear (i.e., U- shaped) relationship with the proportion of smaller d_{AL} project chosen. Therefore, in the *Most* condition, the MGPME predicts that the number of hours left had a positive quadratic (i.e., U- shaped) relationship with the proportion of smaller d_{AL} project chosen. Given that the MGPM predicts no relationship and the MGPME predicts a curvilinear relationship, I hypothesize that:

Hypothesis 4: In the Most condition, there is a positive quadratic relationship between the number of hours left and choice. Specifically, as the number of hours left decreases, participants are less likely to choose the project with the smaller d_{AL}. As the number of hours left further decreases, participants are more likely to choose the project with the smaller d_{AL}.

Support for Hypothesis 4 would suggest that the MGPME provides a better account of how participants prioritize the projects in the task in the *Most* condition. A lack of support for Hypothesis 4 would suggest that the MGPM provides a better account of how participants prioritize the projects in the task in the *Most* condition.

Next, I examined how the amount of resources affected the predictions made by the MGPM and the MGPME. Because the number of hours available at the beginning of each condition was different, a decrease in one hour in the conditions with lesser amount of time was a proportionally larger decrease in the amount of time than a decrease in one hour in the conditions with greater amount of time. For example, there were 14 hours for the *Least* condition and 18 hours for the *Less* condition. A decrease in one hour was a 7.14% decrease in the total number of hours available in the *Least* condition and a 5.56% decrease in the total number of hours available in the *Less* condition. Thus, to make the rate of decrease equivalent, I transformed the number of hours left to a proportion of the number of hours available at the beginning of each condition. If the number of hours left was 10, then the proportion was 0.71 (i.e., 10 hours left / 14 hours available at the beginning of the task) in the *Least* condition and 0.56 (i.e., 10 hours left / 18 hours available at the beginning of the task) in the *Less* condition. A 0.10 proportion decrease in the *Least* condition would then be equivalent to a 0.10 proportion decrease in the *Less* condition. I plotted the proportion of smaller d_{AL} project chosen as a function of the proportion of the hours available at the beginning of each condition by resource conditions separately for the MGPM and the MGPME. The graphs are presented in Figure 9 for the MGPM simulation conditions and Figure 10 for the MGPME simulation conditions. Figures 9 and 10 show four lines: A solid line representing the *Least* condition, a dotted line representing the *Less* condition, a dashed line representing the *More* condition, and the dash-dot line representing the *Most* condition.

A visual examination of Figure 9 suggests that the MGPM predicts that there is no relationship between the number of hours left and the proportion of smaller d_{AL} project chosen in all four resource conditions. Hence, resource conditions do not moderate the relationship between the number of hours left and the choice of the smaller d_{AL} project. However, a visual examination of Figure 10 suggests that resource conditions do moderate the quadratic relationship between the number of hours left and the choice of the smaller d_{AL} project. Specifically, the strength of the quadratic relationship (i.e., the steepness of the curve) between the number of hours left and choice of the smaller d_{AL} project differs by resource conditions in the

MGPME simulations. The quadratic relationship appears to be the strongest (i.e., the curve is the steepest) in the *More* (i.e., dashed line) condition, followed by the *Most* (i.e., dash-dot line) and the *Less* (i.e., dot line) conditions. There is no relationship between the number of hours and choice of the smaller d_{AL} project in the *Least* (i.e., solid line) condition.

The amount of resources (i.e., number of hours) was varied to manipulate participants' expectancy of attaining the goal levels for the two projects. Thus, I examined the expectancy for the smaller d_{AL} project and the larger d_{AL} project in each condition to find out why the strength of the curvilinear relationship differs. In the *Least* condition, there were only sufficient hours to attain the aspiration level for the smaller d_{AL} project 70% of the time (see Table 1). Because of the number of hours was severely limited, the expectancy of attaining the minimally acceptable level on the larger d_{AL} project was zero. Thus, upon attaining the minimally acceptable level for smaller d_{AL} project, the simulated participants did not switch to prioritizing the larger d_{AL} project. Hence, no quadratic relationship was observed in the *Least* condition. In the *Less* resources condition, there were sufficient hours to attain both minimally acceptable levels 72% of the time (see Table 1). However, because the number of hours was still limited, the expectancy of attaining the minimally acceptable level on the larger d_{AL} project was small. Thus, upon attaining the minimally acceptable level for the smaller d_{AL} project, some but not all simulated participants switched to the larger d_{AL} project. Therefore, a weak quadratic relationship in the *Less* condition was observed. In the *More* condition, there were sufficient hours to attain both minimally acceptable levels and an aspiration level

71% of the time (see Table 1). Because the expectancy of attaining the minimally acceptable level on the larger d_{AL} project was large, once the minimally acceptable level for the smaller d_{AL} project has been attained, participants would overwhelmingly switch to the larger d_{AL} project. Therefore, a strong quadratic relationship in the *More* condition was observed. This quadratic relationship was stronger than that observed in the *Less* condition. In the *Most* condition, there were sufficient hours to attain both minimally acceptable levels *and* both aspiration levels 60% of the time. The *Most* condition is akin to a situation where attaining the minimally acceptable levels is certain. Most of the simulated participants switched to the larger d_{AL} project after attaining the minimally acceptable level for the smaller d_{AL} project. However, because the number of hours was not as limited as in the *More* condition, some participants did not. Thus, compared to the *More* condition, the quadratic relationship in the *Most* condition appeared weaker. However, compared to the *Less* condition, the quadratic relationship appeared to be stronger. I predict that:

Hypothesis 5: The quadratic relationship between the number of hours and choice of the smaller d_{AL} project is moderated by resource conditions. Specifically, the quadratic relationship is the strongest in the More condition, followed by the Most and then the Less condition. Finally there is no relationship between the number of hours and choice of the smaller d_{AL} project in the Least condition.

Support for Hypothesis 5 would suggest that the MGPME provides a better account of how participants prioritize the projects in the task. A lack of support for Hypothesis 5 would suggest that the MGPM provides a better account of how participants prioritize the projects in the task.

The next two hypotheses, Hypothesis 6 and Hypothesis 7, explicitly test whether people consider more than one goal level when pursuing multiple goals. If participants use both the minimally acceptable level and the aspiration level to guide their prioritization decisions, then upon attaining the minimally acceptable level for one project, I expect them to switch projects to try to attain the minimally acceptable level on the second project. However, if participants only consider one goal level (i.e., the aspiration level), then upon attaining the minimally acceptable level for one project, I expect them to ignore the minimally acceptable level and continue prioritizing that project instead of switching to attain the minimally acceptable level on the second project. Therefore, I hypothesized that:

Hypothesis 6: Participants are more likely to switch projects upon attaining the minimally acceptable level on one project (i.e., on the trial that they attained the minimally acceptable level) than at all other time points (i.e., on all other trials).

The amount of resources (i.e., time) available has been shown to affect goal prioritization decisions (Schmidt & DeShon, 2007; Schmidt & Dolis, 2009; Schmidt et al., 2009). Specifically, when the amount of resource available is insufficient to attain the aspiration level on two goals, people prioritized the goal with the smaller discrepancy to the aspiration level. Similarly, I propose that the amount of resources available affects the tendency to prioritize attaining the minimally acceptable level on the two projects. Upon attaining the minimally acceptable level on one project, if people have sufficient resources to attain the minimally acceptable level on the second project, their expectancy to attain the minimally acceptable level on that project should be high. Thus, they would switch to attain the minimally acceptable level on the second project (i.e., the goal with the larger discrepancy to the aspiration level at this time point). However, upon attaining the minimally acceptable level on one project, if people have insufficient resources to attain the minimally acceptable level on the second project, their expectancy to attain the minimally acceptable level on the second project should be low or non-existent. Thus, they would be less likely to switch to attain the minimally acceptable level on the second project. Instead, they would continue prioritizing the project on which they attained the minimally acceptable level and strive to attain the aspiration level on that project (i.e., the goal with the smaller discrepancy to the aspiration level at this time point).

I examined whether the amount of time left would affect participants' tendency to switch projects upon attaining the minimally acceptable level on one project. If participants had less than or equivalent to the minimum number of hours needed to attain the minimally acceptable level on the second project, they should not expect to attain the minimally acceptable level on that project. This is because participants had only an 80% chance of successfully completing the work item when they spend one hour on the work item. Only if participants had more than the minimum number of hours needed should they exhibit a tendency to switch projects. Therefore, I hypothesized that:

Hypothesis 7: Upon attaining the minimally acceptable level on one project, participants are more likely to switch projects only when they have more than the minimum number of hours needed to attain the minimally acceptable level on the second project.

Chapter 6: Method

Participants

Participants (*N* = 317) were approached on three university campuses in Singapore to complete a 30-minute study and told that they would engage in a computer-based decision making task and complete a short demographic survey. They completed the decision-making task and a demographic survey on desktop computers in the laboratory (*n* = 196) or on the laptops in other campus premises such as the cafeteria (*n* = 120). I had made an a priori decision to exclude participants older than 45 because of potential computer literacy concerns, and I excluded one 52-year-old participant for this reason.[4] All reported analyses were based on 316 participants (266 students, 42 working adults, and 8 unemployed individuals), with an average age of 22.59 years (*SD* = 3.27 years). About half the participants were male (*n* = 163, 51.60%), and most were Chinese (*n* = 276, 87.30% with 12.70% other). All participants rated their English proficiency as fair or better.

Procedure

After providing informed consent, participants read the instructions for the decision-making task. They were asked to imagine that they would work on two projects (Project A and Project B) over the next four months (i.e., rounds). The number of hours available to work on the projects varied across months. Each month, participants had to decide which project to spend the given hours on. For each hour they spent, they had 80% chance of completing a work item for the selected project and a 20% chance of not completing the work item. Participants were further told that for each month, if they completed all the work items on a project, they would receive

[4] All the results reported did not change with the inclusion of this participant.

$1.00. If they had at most seven work items left, they would receive $0.75. If they had more than seven work items left, they would receive nothing. The incentive structure was the same for Project A and Project B. After reading these instructions, participants answered three multiple-choice questions to test their understanding of the incentive structure. If participants answered any question incorrectly, they were provided with a detailed explanation of the incentive structure and asked the question again. If participants answered the questions correctly, they were automatically re-directed to the decision-making task. Participants completed two trial rounds, where they were given 30 work hours for the first trial round and 40 work hours for the second trial round. The number of work items was fixed at 11 for Project A and 17 for Project B. They then completed, in randomized order, four rounds of the task, with a different number of hours (i.e., 14, 18, 27, or 35) for each round.

After the decision-making task, participants answered a Need for Closure (NFC) scale, which was collected as part of another study and is not discussed in this dissertation. They also answered questions about their age, gender, employment status, ethnicity, and language proficiency. Participants were debriefed about the purpose of the study. They then received SGD$5.00 for completing the study and up to an additional SGD$8.00 depending on their task performance. Finally, participants were thanked and dismissed.

The task was created as an Internet application and accessed separately. All other study components (e.g., instructions for the task, the comprehension questions, NFC questionnaire, and the demographic questions) were presented via Qualtrics, an online survey platform.

Analytic Strategy and Interpretation

The outcome of interest in this study is binary. Participants either chose the smaller d_{AL} project (coded 1) or the larger d_{AL} project (coded 0). Logit models (i.e., logistic regression) are used to test binary outcomes. However, each participant provided multiple observations, that is, they repeatedly chose between the two projects over a number of trials and conditions. Observations taken from the same participant tend to be more similar than observations taken from different participants. This is due to unobserved participant characteristics. For example, some participants are more risk averse than others so they tend to choose the smaller d_{AL} project on every trial. To account for these unobserved participant characteristics, I tested the hypotheses with logistic mixed effects models. In the logistic mixed effect models, the outcome (i.e., choice of the smaller d_{AL} project) was predicted by the predictor variables (e.g., number of hours) and a random intercept. The random intercept comprised a fixed component representing the average tendency of all participants to choose the smaller d_{AL} project and a random component representing the difference between the average tendency and each participant's tendency to choose the smaller d_{AL} project. In predicting the outcome, participants' tendency to choose the smaller d_{AL} project was explicitly included in the model. Thus, the fixed effect estimates for the predictor could be interpreted as the effect of the predictor free of any participant characteristics.

The analyses were conducted in SAS PROC GLIMMIX, using a Laplace estimation and an unstructured covariance matrix. Following recommendations for how to fit mixed models, the continuous predictor (i.e., the number of hours left) was centered on person mean (Enders & Tofighi, 2007; Hofmann & Gavin, 1998), where the mean of the predictor (i.e., the number of hours left) averaged across all observations for each person is subtracted from each of the person's observations.

The outputs from the logistic mixed effects analyses comprise the fixed effect estimate (i.e., gamma, γ), the odds ratio [OR = exponential(γ)], and the confidence interval for the OR. The fixed effect estimate, γ, represents the average effect estimate and is roughly analogous to conducting a separate logistic regression for each person and averaging the resulting regression weights across individuals. A positive γ value indicates that the log odds ratio of the outcome increased as the predictor increased whereas a negative γ value indicates that the log odds ratio of the outcome decreased as the predictor increased. The exponential of γ is the OR, which represents the change in odds resulting from one unit change in the predictor. An OR greater than one indicates that as the predictor (e.g., the number of hours left) increases, the odds of the outcome (e.g., choice of project with the smaller d_{AL}) increases. Thus, an OR of 1.30 means that increasing the number of hours left by one increases the odds of choosing the project with the smaller d_{AL} by 30%. Conversely, an OR less than one means that as the predictor increases, the odds of the outcome decreases. An OR of .67 means that increasing the number of hours left by one decreases the odds of choosing the project with the smaller d_{AL} by 33% (i.e., 1 - .67 = .33). Finally, an OR of one indicates that an increase in the predictor has no effect on the odds of the outcome. Therefore, a 95% confidence interval for an OR that contains 1.00 indicates a nonsignificant effect of the predictor.

To test the quadratic relationships, I fitted quadratic models to the data. In the quadratic models, both the linear term for the predictor (i.e., the number of hours left) and its quadratic term (i.e. the square of the number of hours left) are used to predict the outcome. If the likelihood ratio test indicates that the model fit improves significantly when the quadratic term is added to the linear term, and if the quadratic effect estimate is significant, then the quadratic relationship can be said to be present. A positive value for the quadratic effect estimate indicates the relationship is convex (i.e., U-shaped) while a negative value indicates the relationship is concave (i.e., inverse U- shaped).

Chapter 7: Results

Data Screening

Initially, there were 29,324 observations across four conditions. After excluding trials on which the discrepancy from the aspiration level for the two goals were the same and trials on which the aspiration level for one project had been attained, 24,160 observations remained.

Descriptive Results

I plotted the proportion of smaller d_{AL} project chosen against the number of hours left by resource conditions (see Figure 11). In all conditions, a quadratic relationship between the number of hours left and proportion of smaller d_{AL} project chosen was observed. However, the quadratic relationship appeared to be strongest in the *More* (dashed line) condition, followed by the *Most* condition (dash-dot line), the *Less* condition (dotted line), and weakest in the *Least* condition (solid line).

In the *Least* condition (solid line), participants initially prioritized the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen = .87). At 10 hours, some participants started attaining the minimally acceptable level for the smaller d_{AL} project and choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from .89 to .74 from 15 to 14 hours). However, because it was not possible to attain the minimally acceptable level for the project with the larger d_{AL}, the proportion of times the smaller d_{AL} project was chosen did not increase subsequently.

In the *Less* condition (dotted line), participants initially prioritized the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen = .83). At 14 hours, some participants started attaining the minimally acceptable level for the smaller d_{AL} project and choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from .82 to .63 from 15 to 14 hours). Participants continued choosing the larger d_{AL} project until the minimally acceptable level for the larger d_{AL} project was attained at 3 hours. Then, participants started choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .16 to .23 from 3 to 2 hours).

In the *More* condition (dashed line), participants initially prioritized the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen = .84). At 23 hours, some participants started attaining the minimally acceptable level for the smaller d_{AL} project and choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from .82 to .59 from 24 to 23 hours). Participants continued choosing the larger d_{AL} project until the minimally acceptable level for the larger d_{AL} project was attained at 11 hours. Then, participants started choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .13 to .24 from 12 to 11 hours).

In the *Most* condition (dash-dot line), participants initially prioritized the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen = .78). At 31 hours, some participants started attaining the minimally acceptable level for the smaller d_{AL} project and choosing the larger d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen decreased from .78 to .53 from 32 to 31 hours). Participants continued choosing the larger d_{AL} project until the minimally acceptable level for the larger d_{AL} project was attained at 20 hours. Then, participants started choosing the smaller d_{AL} project (i.e., the proportion of times smaller d_{AL} project chosen increased from .18 to .21 from 21 to 20 hours).

Descriptive results (presented in Table 2) show that across the four conditions, before participants attained either minimally acceptable level (i.e., Attained No MAL column), a greater proportion of participants chose the project with the smaller d_{AL} ($M_{proportion\_choice}$ = .77; range: .71 to .84). However, after attaining the minimally acceptable level for the project with the smaller d_{AL} (i.e., Attained 1 MAL column), a smaller proportion of participants chose the project with the smaller d_{AL} ($M_{proportion\_choice}$ = .28; range: .18 to .58). Finally, after attaining the minimally acceptable level for both projects (i.e., Attained 2 MALs column), a greater proportion of participants chose the project with the smaller d_{AL} ($M_{proportion\_choice}$ = .91; range: .71 to .94). These descriptives provide additional support that a quadratic trend is present in all four conditions.

The descriptive results presented in Table 3 show that across the four conditions, compared to all other trials ($M_{proportion\_switch}$ = .07; range: .05 to .08), a greater proportion of participants switched to prioritizing the larger d_{AL} project after attaining the minimally acceptable level for the smaller d_{AL} project ($M_{proportion\_switch}$ = .64; range: 57 to .72). These descriptives suggest that once the minimally acceptable level had been met for the smaller d_{AL} project, participants tended to prioritize the larger d_{AL} project (to reach the minimally acceptable level on that second project). Confirmatory tests of the hypotheses are presented next.

Hypothesis 1

Hypothesis 1 states that there is a curvilinear relationship between the number of hours left and choice of the smaller d_{AL} project in the *Least* condition. To test Hypothesis 1, I ran a logistic mixed effects model predicting choice of the smaller d_{AL} project on only the observations in the *Least* condition. I entered the linear term and the quadratic term sequentially into the model. The likelihood ratio test indicated that adding the quadratic term significantly improved model fit ($\chi^2(1) = 44.9$, $p < .001$). Both the linear term ($\gamma = 0.573$, $SE = 0.053$, $p < .001$) and the quadratic term ($\gamma = 0.0218$, $SE = 0.003$, $p < .001$) significantly predicted choice of the smaller d_{AL} project. Consistent with the descriptive results presented in Figure 11, a statistical test of the relationship between the number of hours left and choice of the smaller d_{AL} project indicates that (a) the odds of choosing the smaller d_{AL} project decreased sharply when participants started to attain the minimally acceptable level on the project with the smaller discrepancy (d_{AL}), i.e., at about the 14th trial/hour, and also that (b) the rate of change in the odds of choosing the smaller d_{AL} project decreases after this inflection point. Because there was a quadratic relationship between the number of hours left and choice, Hypothesis 1 was supported.

Hypothesis 2

Hypothesis 2 states that there is a positive quadratic relationship between the number of hours left and choice of the smaller d_{AL} project. I conducted a logistic mixed effects model predicting choice of the smaller d_{AL} project on only the observations in the *Less* condition. I entered the linear term and the quadratic term sequentially into the model. The likelihood ratio test indicated that adding the quadratic term significantly improved model fit ($\chi^2(1) = 266.7$, $p < .001$). Both the linear term (γ = 0.523, SE = 0.021, p < .001) and the quadratic term (γ = 0.028, SE = 0.002, p < .001) significantly predicted choice of the smaller d_{AL} project. The quadratic relationship between the number of hours left and choice confirms visual observations of Figure 11 that initial decreases in the number of hours left were associated with decreases in the odds of choosing the smaller d_{AL} project but further decreases in the number of hours left was associated with increases in the odds of choosing the smaller d_{AL} project. Because there was a quadratic relationship between the number of hours left and choice, Hypothesis 2 was supported.

Hypothesis 3

Hypothesis 3 states that there is a positive quadratic relationship between the number of hours left and choice of the smaller d_{AL} project. I conducted a logistic mixed effects model predicting choice of the smaller d_{AL} project on only the observations in the *More* condition. I entered the linear term and the quadratic term sequentially into the model. The likelihood ratio test indicated that adding the quadratic term significantly improved model fit ($\chi^2(1)$ = 2913.15, p < .001). Both the linear term (γ = -0.069, SE = 0.005, p < .001) and the quadratic term (γ = 0.038, SE = 0.001, p < .001) significantly predicted choice. The quadratic relationship between the number of hours left and choice confirms visual observations of Figure 11 that initial decreases in the number of hours left were associated with decreases in the odds of choosing the smaller d_{AL} project but further decreases in the number of hours left was associated with increases in the odds of choosing the smaller d_{AL} project. Because there was a quadratic relationship between the number of hours left and choice, Hypothesis 3 was supported.

Hypothesis 4

Hypothesis 4 states that there is a positive quadratic relationship between the number of hours left and choice of the smaller d_{AL} project. I conducted a logistic mixed effects model predicting choice of the smaller d_{AL} project on only the observations in the *Most* condition. I entered the linear term and the quadratic term sequentially into the model. The likelihood ratio test indicated that adding the quadratic term significantly improved model fit ($\chi^2(1) = 1803.51$, $p < .001$). Both the linear term ($\gamma = -0.404$, $SE = 0.012$, $p < .001$) and the quadratic term ($\gamma = 0.023$, $SE = 0.001$, $p < .001$) significantly predicted choice. The quadratic relationship between the number of hours left and choice confirms visual observations of Figure 11 that initial decreases in the number of hours left were associated with decreases in the odds of choosing the smaller d_{AL} project but further decreases in hours left was associated with increases in the odds of choosing the smaller d_{AL} project. Because there was a quadratic relationship between the number of hours left and choice, Hypothesis 4 was supported.

Hypothesis 5

Hypothesis 5 states that the quadratic relationship is the strongest in the *More* condition, followed by the *Most* and the *Less* conditions, and finally the *Least* condition. To identify the conditions, three dummy variables were created. The *Most* dummy coded the *Most* condition as 1 and all other conditions as 0. The *Less* dummy coded the *Less* condition as 1 and all other conditions as 0. The *Least* dummy coded the *Least* condition as 1 and all other conditions as 0. Thus, the *More* condition served as the reference group. Because the number of hours available at the beginning of each condition was different (e.g., 14 hours for *Least* condition, 18 hours for *Less* condition), I transformed the number of hours left to a proportion of the number of hours available at the beginning of each condition. Thus, in the *Least* condition, if the number of hours left was 10, then the proportion was 0.71 (i.e., 10 hours left / 14 hours available at the beginning of the task). In the *Less* condition, the proportion was 0.56 (i.e., 10 hours left / 18 hours available at the beginning of the task). To make the results interpretable, I multiplied the proportion by 100 so that a one-unit decrease (e.g., from 71 to 70 or 56 to 55) corresponded to a 1% decrease in the proportion of the hours available at the beginning of each condition.

To test Hypothesis 5, I ran a logistic mixed effects model predicting choice of the smaller d_{AL} project. I entered predictors in two steps. In the first step, I entered the person-mean centered proportion of the number of hours available (linear term), the *Most*, *Less*, and *Least* dummy variables, and all 2-way interactions between the linear term and the dummy variables. In the second step, I entered the square of the person-mean centered proportion of the number of hours available (quadratic term) and all 2-way interactions between the quadratic term and the dummy variables. Because the *More* condition was the reference group in this analysis, the quadratic term represented the quadratic effect of the number of hours left on choice in the *More* condition. The interaction between the quadratic term and the *Most* (*Less* or *Least*) dummy variable would indicate the quadratic relationship in the *Most* (*Less* or *Least*) condition differed from that observed in the *More* condition. To compare the other conditions (i.e., the *Most* with *Least* condition, the *Most* with *Less* condition, and the *Less* with *Least* condition), I conducted two more logistic mixed effects model, with different conditions serving as reference groups (i.e.., the reference group was the *Most* condition in the second model and the *Less* condition in the third model).

Results of the second step are presented in Table 4. A likelihood ratio test indicated that after adding the quadratic term and the 2-way interactions between the quadratic term and the dummy variables, model fit improved significantly ($\chi^2(4)$ = 4567.33, $p < .001$). The quadratic term significantly predicted choice ($\gamma = 0.002$, SE = 0.000, $p < .001$, 95% CI [0.002; 0.002]). Thus, there was a quadratic relationship between the proportion of the number of hours available and choice in the *More* condition. Consistent with Hypothesis 5, the quadratic effect of the proportion of the number of hours available on choice was stronger in the *More* condition than in the *Least* condition ($\gamma = -0.002$, $SE = 0.000$, $p < .001$, 95% CI [-0.002; -0.002]) and the *Less* condition ($\gamma = -0.002$, $SE = 0.000$, $p < .001$, 95% CI [-0.002; -0.001]). However, inconsistent with Hypothesis 5, the quadratic effect was not significantly stronger in the *More* condition than in the *Most* condition ($\gamma = 0.000$, $SE = 0.000$, $p = .786$, 95% CI [0.000; 0.000]). The additional model with the *Most* condition as the reference group indicated that consistent with Hypothesis 5, the quadratic effect of the number of hours left on choice was stronger in the *Most* condition than in the *Least* condition ($\gamma = -0.002$, $SE = 0.000$, $p < .001$, 95% CI [-0.002; -0.002]). However, inconsistent with Hypothesis 5, the quadratic effect of the number of hours left on choice was stronger in the *Most* condition than in the *Less* condition ($\gamma = -0.002$, $SE = 0.000$, $p < .001$, 95% CI [-0.002; -0.001]). The final model indicated that consistent with Hypothesis 5, the quadratic effect of the number of hours left on choice was stronger in the *Less* condition than in the *Least* condition ($\gamma = -0.0003$, $SE = 0.000$, $p < .001$, 95% CI [-0.0005; -0.0002]). Thus, these results partially support Hypothesis 5. Specifically, Hypothesis 5 stated that the quadratic relationship would be the strongest in the *More* condition, followed by the *Most* and the *Less* conditions, and finally the *Least* condition. However, the results indicated that the quadratic relationship was the strongest in the *More* and *Most* conditions, followed by the *Less* condition, and finally the *Least* condition.

Hypothesis 6

Hypothesis 6 states that participants are more likely to switch projects upon attaining the minimally acceptable level for one project (i.e., on the trial that they attained the minimally acceptable level) than at all other time points (i.e., on all other trials). To test Hypothesis 6, I ran a logistic mixed effects model predicting switch (i.e., whether the participant switched from prioritizing one project in the previous trial to the other project in the current trial). The predictor was a dummy variable, MAL attained, that coded for whether participants had first attained one minimally acceptable level on a given trial. That is, if a participant attained the minimally acceptable level for one project on Trial 4, MAL attained on Trial 4 is coded as 1 and MAL attained on Trial 5 is coded as 0.

Results showed that on all other trials, participants were unlikely to switch projects (γ = -3.630, *SE* = 0.094, $p < .001$, 95% CI [-3.815; -3.445]). That is, the odds of switching was 0.027 (95% CI [0.022; 0.032]). However, the odds of switching increased by 8634.9% (OR = 86.349; 95% CI [72.603; 102.688]) on the trial that participants attained the minimally acceptable level (γ = 4.458, *SE* = 0.088, $p < .001$, 95% CI [4.285; 4.632]). Specifically, the odds of switching on the trial that participants attained the minimally acceptable level was 2.290 (95% CI [1.601; 3.275]). Thus, results support Hypothesis 6 that participants were more likely to switch upon attaining the minimally acceptable level for one project compared to all other time points.

Hypothesis 7

Hypothesis 7 states that upon attaining the minimally acceptable level for one project, participants are more likely to switch projects only when they have more than the minimum number of hours needed to attain the minimally acceptable level on the second project (i.e., the project with the unattained minimally acceptable level). The minimum number of hours needed is the number of hours required assuming that participants were 100% successful at completing a work item for every hour spent. That is, if a participant had 4 work items left to attain the minimally acceptable level on the second project, the minimum number of hours required would be 4. Because participants were successful at completing a work item only 80% of the time for every hour spent, when the number of hours left is equal to or less than the minimum number of hours needed to attain the minimally acceptable level on the second project, participants should not switch projects. They should only switch projects when they have more than the minimum number of hours needed to attain the minimally acceptable level on the second project.

I tested Hypothesis 7 with a logistic mixed effects model predicting switch. I limited the analysis to only the trials on which participants first attained the minimally acceptable level on one project. The predictor was the difference between the number of hours left and the minimum number of hours needed to attain the minimally acceptable level on the second project. For example, if a participant had 10 hours left and had to complete another 4 items to attain the minimally acceptable level, the difference would be 6. A difference of zero indicated that the number of hours left was equal to the minimum number of hours needed. A positive difference indicated that the number of hours left was greater than the minimum number of hours needed. A negative difference indicated that the number of hours left was smaller than the minimum number of hours needed.

Results showed that when the number of hours left was equal to the minimum number of hours needed (i.e., when the difference is zero), participants were unlikely to switch priorities ($\gamma = 0.170$, $SE = 0.120$, $p = .157$, 95% CI [-0.066; 0.406]). The odds of switching was 1.185, which was not significantly different from 1 (95% CI [0.937; 1.500]). Thus, participants were not more likely to switch when they had just enough resources to attain the minimally acceptable level. However, difference predicted switching ($\gamma = 0.072$, $SE = 0.009$, $p < .001$). For every extra hour participants had available to attain the minimally acceptable level over and above the minimum number of hours needed, the odds of switching increased by 7.5% (OR = 1.075; 95% CI [1.055; 1.094]). The results support Hypothesis 7 that if participants had just sufficient resources to attain the minimally acceptable level, they were not more likely to switch. Instead, participants were only more likely to switch when they had more than just sufficient resources.

Chapter 8: Additional Simulation

One key assumption of the MGPME is that the gain associated with the minimally acceptable level is larger than the gain associated with the aspiration level. However, it is unclear whether the inclusion of this assumption in the model was necessary. Would the MGPME predictions be the same if the gain associated with the minimally acceptable level was equivalent to the gain associated with the aspiration level? If the predictions are the same, then it would imply that there is no need to make this assumption. If the predictions are different, then would this alternative model provide a better account of participants' behavior? To answer these questions, I examined an alternative model, the MGPME-Alternative.

The MGPME-Alternative is identical to the MGPME except that the gain associated with the minimally acceptable level was equivalent to the gain associated with the aspiration level (i.e., $k_{\mathrm{MR}} = k_{\mathrm{AL}} = 0.5$). I conducted an additional simulation with four simulation conditions (i.e., MGPME-Alternative *Least*, MGPME-Alternative *Less*, MGPME-Alternative *More*, and MGPME-Alternative *Most*). Similar to the main simulation study, I conducted 1,000 replications for each condition. The results of the simulation are presented in Figure 12. In Figure 12, I plotted the proportion of smaller d_{AL} project chosen as a function of the number of hours left by resource conditions. A solid line represents the *Least* condition, a dotted line represents the *Less* condition, a dashed line represents the *More* condition, and the dash-dot line represents the *Most* condition.

I first examined whether equating the value of the gain associated with the minimally acceptable level with the value of the gain associated with the aspiration level (k_{MR} = k_{AL} = 0.5) led to different predictions from the MGPME. A visual comparison between Figure 12 (simulation results for the MGPME-Alternative condition) and Figure 10 (simulation results for the MGPME condition) indicates that the MGPME-Alternative makes the same prediction as the MGPME in the *Least* condition but it makes different predictions as the MGPME in the *Less*, *More*, and *Most* conditions. Figure 12 shows that in the *Least* (i.e., solid line) condition, the MGPME-Alternative predicts no relationship between the number of hours and choice of the smaller d_{AL} project. That is, regardless of the number of hours remaining, participants would choose the smaller d_{AL} project. This prediction is the same as the null relationship predicted by the MGPME. In the *Less* (i.e., dotted line) condition, the MGPME-Alternative predicts a negative relationship between the number of hours and choice of the smaller d_{AL} project. That is, at the beginning of the task, the MGPME-Alternative predicts that participants would choose the larger d_{AL} project. As the number of hours remaining decreases, participants would be more likely to choose the smaller d_{AL} project. This prediction differs from the curvilinear relationship predicted by the MGPME. The MGPME predicts that participants would first choose the smaller d_{AL} project. As the number of hours remaining decreases, participants would switch to choosing the larger d_{AL} project and then switch back to choosing the smaller d_{AL} project. In the *More* (i.e., dashed line) and the *Most* (i.e., dash-dot line) conditions, the MGPME-Alternative does not predict a clear relationship between the number of hours and choice of the smaller d_{AL} project. Instead, it predicts that at the beginning of the task, participants would choose the smaller d_{AL} project. As the number of hours remaining decreases, participants would switch frequently between choosing the smaller d_{AL} project and choosing the larger d_{AL} project. These predictions differ from the curvilinear relationships predicted by the MGPME. Instead of the frequent switches between the smaller d_{AL} project and the larger d_{AL} project, the MGPME predicts that participants would switch specifically at two time points. The first time point is when they attained the minimally acceptable level for one project. The second time point is when they attained the minimally acceptable level for the second project.

To summarize, the comparison between the MGPME-Alternative and the MGPME shows that equating the gain values associated with the minimally acceptable level and the aspiration level (k_{MR} and k_{AL}) changed the predictions in three of four conditions (i.e., *Less*, *More*, and *Most*): In the *Less* condition, the MGPME predicts a curvilinear relationship between the number of hours and choice of d_{AL} project whereas the MGPME-Alternative predicts a negative linear relationship. In the *More* and *Most* condition, the MGPME predicts two switches between the smaller d_{AL} project and the larger d_{AL} project whereas the MGPME Alternative predicts frequent switching between the smaller d_{AL} project and the larger d_{AL} project.

Next, I examined whether the MGPME-Alternative predictions matched actual participants' prioritization patterns. The MGPME-Alternative failed to account for participants' behavior in all four conditions. In the *Least* condition, the MGPME-Alternative predicts no relationship between the number of hours and choice of the smaller d_{AL} project. However, as discussed in the Results section, a curvilinear relationship between the number of hours and choice of the smaller d_{AL} project was observed in the data. In the *Less* condition, the MGPME-Alternative predicts a negative relationship between the number of hours and choice of the smaller d_{AL} project. However, a curvilinear relationship between the number of hours and choice of the smaller d_{AL} project was observed in the data. In the *More* and *Most* conditions, the MGPME-Alternative predicts frequent switches between the smaller d_{AL} project and the larger d_{AL} project. However, participants in the study typically switched projects at two time points: when they first attained the minimally acceptable level for one project and when they attained the minimally acceptable level for the second project. Thus, in all four conditions, the MGPME-Alternative predictions were not supported. Instead, the MGPME better accounted for these prioritization patterns.

If the MGPME-Alternative had better accounted for participants' prioritization patterns, it would have implied that despite the greater incentive associated with attaining the minimally acceptable level (relative to the incentive associated with attaining the aspiration level), participants still weighted attaining the minimally acceptable level and the aspiration level equally. That the MGPME better accounted for participants' prioritization patterns implies that one reason participants prioritized the minimally acceptable level over the aspiration level is that the consequences of failing to attain the minimally acceptable level is greater than the consequences of failing to attain the aspiration level. Thus, participants weighted the minimally acceptable level more than the aspiration level.

Chapter 9: Discussion

Results from the present study suggests that people can and do consider more than one goal level when pursuing multiple goals. Regardless of the amount of time available (i.e., across all resource conditions), participants prioritized attaining the minimally acceptable level on both goals over the aspiration level. That is, participants initially chose the goal closer to the aspiration level. Upon attaining the minimally acceptable level for that goal, they switched to the goal further from the aspiration level. However, when participants had insufficient time to attain the minimally acceptable levels on both goals, upon attaining the minimally acceptable level for the goal closer to the aspiration level, they did not switch to the goal further from the aspiration level. Instead, they continued prioritizing the goal closer to the aspiration level. These results support the MGPME predictions, which predicted positive quadratic relationships in the *Less*, *More*, and *Most* conditions and a null relationship in the *Least* condition, more than the MGPM predictions, which predicted a null relationship in the *Least*, *Less*, *More*, and *Most* conditions. Thus, it appears that at least in this study, people can use multiple goal levels to guide their goal prioritization decisions when more than one goal level is available. The current study is consistent with previous findings that people stop prioritizing a goal when the goal level (e.g., the aspiration level) is unachievable (Schmidt et al., 2009). More specifically, this study shows that when multiple goal levels (i.e., minimally acceptable level and aspiration level) are available, people relinquish a goal when they cannot attain the minimally acceptable level and not when they cannot attain the aspiration level. Thus, if a person believes the minimally acceptable level is attainable, the person may still prioritize the goal even if she believes the aspiration level is unattainable. However, if a person believes that even the minimally acceptable level is unattainable, she would stop prioritizing that goal and instead prioritize the more achievable goal.

From this study, it appears that the tendency to prioritize the minimally acceptable level over the aspiration level observed in single-goal pursuit context (e.g., Wang & Johnson, 2012) may generalize to a multiple-goal pursuit context. However, an argument could be made that because participants received $0.75 for attaining the minimally acceptable level whereas they received only an additional $0.25 for attaining the aspiration level, participants prioritized attaining the minimally acceptable levels because they were simply rationally maximizing their expected payout. If participants were behaving rationally though, then in the *Least* and the *Most* conditions, they should not have prioritized the minimally acceptable level. As shown in Table 1, in the *Least* condition, participants had only a 4% chance of attaining the minimally acceptable level on both projects. If participants were maximizing expected payout, upon attaining the minimally acceptable level on the project closer to the aspiration level, the rational course of action is to continue prioritizing the project closer to the aspiration level. However, 42% of the participants (Table 2) still chose to prioritize the project further from the aspiration level instead. Thus, in the *Least* condition, participants did not appear to be rationally maximizing their expected payout. In the *Most* condition, participants had a 100% chance of attaining the minimally acceptable level on both projects *and* the aspiration level on one project. If participants were maximizing expected payout, upon attaining the minimally acceptable level on the project closer to the aspiration level, they should be indifferent to prioritizing either project. That is, participants should be equally likely to prioritize the project closer to the aspiration level and the project further from the aspiration level because regardless of their choice, they were certain to attain both the minimally acceptable levels and one aspiration level. Despite this certainty, 79% of the participants (Table 2) still chose to prioritize the project further from the aspiration level. Thus, in the *Most* condition, participant did not appear to be rationally maximizing their expected payout. The results in all four conditions imply that when pursuing multiple goals, people focus on securing the minimally acceptable level on the multiple goals first, even when the chances of attaining the minimally acceptable levels is very slim or when attaining the minimally acceptable levels is certain.

An argument could also be made that participants prioritized the minimally acceptable level because they were applying the same mental set to all four conditions (i.e., switch to the project further from the aspiration level upon attaining the minimally acceptable level for the project closer to the aspiration level). If this were true, then the proportion of participants switching projects upon attaining the minimally acceptable level on the project closer to the aspiration level should remain the same regardless of the resource conditions. This was not observed. The proportion of participants switching projects ranged from .42 to .82 across the four conditions (see Table 2). Furthermore, if participants were applying a mental set, then regardless of the amount of resources they had upon attaining the minimally acceptable level on the project closer to the aspiration level, they should switch to the project further from the aspiration level. Instead, participants only switched if they had more than the minimally required amount of resources to attain the minimally acceptable level on the project further from the aspiration level. Therefore, participants were not mindlessly applying a mental set while working on the task.

Theoretical Implications

If people prioritize attaining the minimally acceptable level on their multiple goals, as observed in this study, then it would suggest that goals that have not attained the minimally acceptable level may be more salient than goals that have attained the minimally acceptable level. When each goal has a single goal level (i.e., the aspiration level), people tend to disinhibit the goal on which they had attained the aspiration level to focus on the goal on which they had yet attained the aspiration level (Förster, Liberman, & Higgins, 2005). When each goal has a minimally acceptable level in addition to an aspiration level, it is likely that the disinhibition of a goal occurs when a person attains the minimally acceptable level. Dishibition of goals that have attained the minimally acceptable level would allow people to devote resources (e.g., time) to goals that have yet attained the minimally acceptable level.

Although it has been shown that people exhibit a tendency to switch goals after completing a subgoal on a goal, such as finding one word out of 53 words on a word-search task (Payne et al., 2007), the results of this study suggests that the minimally acceptable level on a goal may provide a more defined transition point. Compared to all other time points, people were more likely to switch goals upon attaining the minimally acceptable level on one goal. This suggests that at least in this study, that people use the minimally acceptable level to help prioritize their goals.

If people consider multiple goal levels when pursuing their goals, as observed in this study, then several questions about how multiple goal levels influence goal pursuit arise. First, are there situations in which people prioritize attaining the aspiration level over the minimally acceptable level? For example, is it possible that people would prioritize the aspiration level when the perceived consequence of attaining the aspiration level is so large that the subjective expected utility of prioritizing the aspiration level is greater than the subjective expected utility of prioritizing the minimally acceptable level. If a researcher has a goal of publishing a manuscript where the minimally acceptable level is to publish the manuscript in a third-tier journal whereas the aspiration level is to publish the manuscript in a top-tier journal. Assume that if the researcher publishes in a top-tier journal, her work would be read by at least twenty times more people than if she publishes in a third-tier journal. In this situation, the researcher may choose to prioritize attaining the aspiration level over the minimally acceptable level. Future studies may be conducted to test this hypothesis.

Second, in this study, I only examined the minimally acceptable level and the aspiration level. However, there are other psychologically meaningful goal levels, such as status quo (i.e., the goal level a person typically attains) and the normative goal level (i.e., the goal level people typically attain). How do these goal levels affect goal prioritization decisions? For example, between the aspiration level and the status quo, would people prioritize the aspiration level or the status quo? In single-goal pursuit, people appear to prioritize attaining the aspiration level over the status quo, purportedly because the consequences of attaining the aspiration level are larger than the consequences of attaining the status quo (Wang & Johnson, 2012). Again, future studies may be conducted to examine if the tendency to prioritize the aspiration level over the status quo extends to multiple goal-pursuit contexts.

Third, in this study, there were consequences to attaining the goal levels (i.e., participants received $0.75 for attaining the minimally acceptable level and an additional $0.25 for attaining the aspiration level). Although in this study, the consequences were external (i.e., in the form of monetary incentives), consequences may also be internal (e.g., in the form of a feeling of satisfaction from attaining the goal level). It may be interesting to examine if the goal levels have to have consequences for people to use them to guide their behaviors? Would people use goal levels that have no consequences associated with them to guide their behaviors? From the MGPME standpoint, the answer appears to be no. This is because if there are no consequences associated with a goal level, the subjective expected utility associated with attaining the goal level is zero. Thus, even if the goal level is salient, if there are no consequences to attaining that goal level, the person is unlikely to use that goal level.

In this dissertation, I only examined if people can consider two goal levels. If more than two goal levels exist, would people consider all the goal levels? Given that people have limited cognitive resources, it is unlikely that people would consider all available goal levels. Instead, they may focus on a select few goal levels (e.g., the goal levels with the greatest perceived consequences or the goal levels that have the greatest expectancies). Future studies are needed to determine the number of goal levels people can focus on and the factors that influence their choice.

The finding that people consider multiple goal levels when pursuing their goals has theoretical implications for other goal-related research areas. One such area is goal revision, which is the process of changing one's goal levels in response to failures and successes on the goal (Ilies & Judge, 2005). People can revise their goals downwards by adopting a lower goal level than before, or they can revise their goals upwards by adopting a higher goal level than before.

Although there is little contention that people revise their goals downwards, there are competing views on whether people revise their goals upwards, that is, adopt higher goal levels when they successfully attained a goal level (Phillips, Hollenbeck, & Ilgen, 1996; Scherbaum & Vancouver, 2010). On the one hand, socio-cognitive theorists argue that when people attain the goal level, they increase self-efficacy on the goal, which in turn leads them to adopt a higher goal level. On the other hand, control theorist argues that even if people are successful in attaining the goal level, they may not necessarily adopt higher goal levels if they need to divert resources to their other valued goals. Although I did not test goal revision in this dissertation, results from this study suggest that whether upward goal revision occurs may depend on the total amount of resources (e.g., time) available for *multiple goals*. When resources are limited so that the lower goal level (e.g., minimally acceptable level) on one goal cannot be attained, people may abandon that goal and pursuing a higher goal level for the remaining goal. However, when resources are less limited, people may try to first attain the minimally acceptable levels on the multiple goals before pursuing higher goal levels.

Results also have implications on goal setting. A large body of work has demonstrated that employees assigned to more difficult goals perform better than those assigned to easier goals (Locke & Latham, 2002). Although setting high work goals may improve performance, caution is warranted when applying these recommendations in a multiple-goal pursuit setting. Although people may have enough resources to attain the higher goal levels on each goal when the goals are pursued in isolation, they may have enough resources to attain the higher goal levels when the goals are pursued in tandem. Results from this dissertation suggest that in such situations, people may settle for attaining the lower goal level (e.g., minimally acceptable level) instead. Put differently, because of low expectancy of attaining the higher goal levels on these multiple goals, employees may not be committed to attaining these more difficult goals. Thus, even if individuals are assigned difficult goals, they may not necessarily perform better in a multiple-goal pursuit setting.

Limitations

A key limitation of this study is the incentive structure that was used. As mentioned earlier, in line with previous research (Wang & Johnson, 2012) showing that people value attaining the minimally acceptable level over the aspiration level, I designed the incentive structure such that participants received more incentives for attaining the minimally acceptable level than for attaining the aspiration level. This allowed me to show that when goals have multiple goal levels, people prioritize their goals differently than when goals have only one goal level. However, because of the unequal incentive structure, it appears natural that participants would prioritize the minimally acceptable level over the aspiration level. If participants received equal incentives for attaining the minimally acceptable level and the aspiration level, as shown in the additional simulation, they would be unlikely to exhibit the tendency to prioritize the minimally acceptable level. Thus, the tendency to prioritize the minimally acceptable level is likely due to the larger consequences associated with the minimally acceptable level. Future research should be conducted to examine how participants would prioritize their goals if they received more incentives for attaining the aspiration level than for attaining the minimally acceptable level,

In this study, instead of actively doing a task (e.g., data entry), participants only had to decide which project they wanted to work on for each hypothetical hour given. This design was chosen because I wanted to hold all parameters constant to isolate the effect of resource availability on participants' prioritization decisions. If participants had been actively doing a task, it would have been more difficult for the computational models (the MGPM and the MGPME) to predict participants' prioritization decisions because different participants had different task abilities. However, it is possible that participants' thought and emotional processes may differ when they are actually performing a task than when they were simply making a decision. For example, they may enter flow state, rendering other goals less salient and reducing their tendency to switch goals even when they have attained the minimally acceptable level on a goal. Alternatively, they may experience negative emotions such as frustration or boredom that would push them to switch goals even when they have not attained the minimally acceptable level on a goal. These processes were unlikely to have occurred when participants were purely making a decision. Future research should consider examining whether participants exhibit the tendency to prioritize attaining the minimally acceptable level when actively working on a task.

In this study, the consequences for both goals are fungible. For example, the consequences that a person experiences from attaining the aspiration level for one goal (i.e., receiving $0.25) can partially compensate for the consequences a person experiences from not attaining the minimally acceptable level for the second goal (i.e., not receiving $0.75). However, the consequences for some goals may not be directly fungible. Assume that a woman has two goals: a career advancement goal and a childbearing goal. The consequences of receiving a promotion (attaining the aspiration level on the career advancement goal) may not be able to directly compensate for the inability to conceive (failing to attain the minimally acceptable level on the childbearing goal). When the consequences of the goals are non-fungible, despite limited resources to attain the minimally acceptable level on the multiple goals. we might observe an even stronger tendency to prioritize the minimally acceptable level than observed in this study.

Finally, in this dissertation, I assumed that people have quantifiable goal levels, such as completing 17 work items for a project. Thus, it is clear whether a person has attained a goal level and whether she needs to continue prioritizing the goal. However, some goals may be hard to quantify. For example, it is not clear what the minimally acceptable level on a manuscript is. When the goal level is ill-defined, people may not be able to effectively use the goal level to prioritize their goals. That is, even if a person has attained the minimally acceptable level that she previously determined, she may continue prioritizing that goal instead of switching to attain the minimally acceptable level on another goal because she is uncertain if she had correctly determined the minimally acceptable level. Further research needs to be conducted about how people prioritize their goals when goal levels are unquantifiable.

Conclusion

To my knowledge, the present study is the first attempt at examining the effect of multiple goal levels on goal prioritization in a dynamic multiple-goal pursuit context. The results provide initial evidence that people can and do use multiple goal levels when pursuing multiple goals. Specifically, people first strived for the minimally acceptable level on one goal. When they attained the minimally acceptable level on that goal, they switched to striving for the minimally acceptable level on the second goal. Only when people attained the minimally acceptable levels for both goals did they strive for the aspiration level (on one of the goals). The research here is just the first step towards uncovering the effects of multiple goal levels on people's goal pursuit behaviors.

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Table 1

Probability of Attaining the Minimally Acceptable Level and the Aspiration Level in Each Resource Condition

	Resource Condition			
	Least (Work hours = 14)	Less (Work hours = 18)	More (Work hours = 27)	Most (Work hours = 35)
Attain 1 MAL and 0 AL	1.00	1.00	1.00	1.00
Attain 1 MAL and 1 AL	.70	.98	1.00	1.00
Attain 2 MAL and 0 AL	.04	.72	1.00	1.00
Attain 2 MAL and 1 AL	.00	.00	.71	1.00
Attain 2 MAL and 2 AL	.00	.00	.00	.60

Note. MAL = Minimally acceptable level; AL = Aspiration level.

Table 2

Proportion of smaller dAL project chosen By Resource Condition and Number of Minimally acceptable levels Attained

Resource Condition	Proportion chose smaller d_{AL} project		
	Attained No MAL	Attained 1 MAL	Attained 2 MALs
Total	.77 (6,140)	.28 (3,550)	.91 (3,319)
Least	.84 (1,543)	.58 (1,413)	
Less	.77 (1,547)	.24 (3,139)	.71 (69)
More	.79 (1,538)	.18 (659)	.94 (1,585)
Most	.71 (1,512)	.21 (716)	.89 (1,665)

Note. N = 316 individuals (24,160 observations across 4 conditions). Frequencies are in parentheses. MAL = Minimally acceptable level; d_{AL} = discrepancy from the aspiration level.

Table 3

Proportion of Switching By Resource Condition and Trial Type

Resource Condition	All other trials		Attained MAL for project with smaller discrepancy	
	Proportion of non-switches	Proportion of switches	Proportion of non-switches	Proportion of switches
Total	.93 (21,401)	.07 (1,505)	.36 (456)	.64 (798)
Least	.95 (3,788)	.05 (192)	.43 (131)	.57 (177)
Less	.94 (4,617)	.06 (305)	.33 (103)	.67 (211)
More	.94 (6,477)	.06 (422)	.28 (89)	.72 (227)
Most	.92 (6,519)	.08 (586)	.28 (87)	.72 (229)

Note. *N* = 316 individuals (24,160 observations across 4 conditions). Frequencies are in parentheses. MAL = Minimally acceptable level.

Table 4

Effect of Number of Hours left and Condition on Choice of the Project with the Smaller Discrepancy from the Aspiration Level

	γ (*SE*)	Odds Ratio	Odds Ratio 95% CI
Fixed effects			
Intercept	6.093* (0.180)	442.615	[310.878; 630.177]
Proportion	-0.258* (0.007)	0.773	[0.763; 0.783]
Proportion-squared	0.002* (0.000)	1.002	[1.002; 1.002]
Least	-5.751* (0.213)	0.003	[0.002; 0.005]
Less	-6.869* (0.216)	0.001	[0.001; 0.002]
Most	3.076* (0.333)	21.661	[11.272; 41.625]
Proportion x Least	0.249* (0.009)	1.283	[1.261; 1.305]
Proportion x Less	0.225* (0.009)	1.252	[1.231; 1.273]
Proportion x Most	-0.040* (0.011)	0.961	[0.940; 0.983]
Proportion-squared x Least	-0.002* (0.000)	0.998	[0.998; 0.998]
Proportion-squared x Less	-0.002* (0.000)	0.998	[0.998; 0.999]
Proportion-squared x Most	-0.000 (0.000)	1.000	[1.000; 1.000]
Random Effects			
Intercept (participant)	0.781* (.087)	2.184	[1.843; 2.588]

Note. N = 316 individuals (24,160 observations across 4 conditions). $ICC(1)_{participants} = .10$ ($p < .001$). Proportion = Proportion of time left; Proportion-squared = Square of the proportion of time left; resource condition (amount of resources: *Least*, *Less*, *More*, *Most*) was dummy coded as three separate variables, with *More* as the reference category (i.e., 0). CI = Confidence interval. A CI that bounds 1.00 reflects a nonsignificant effect of the predictor.

*$p < .001$.

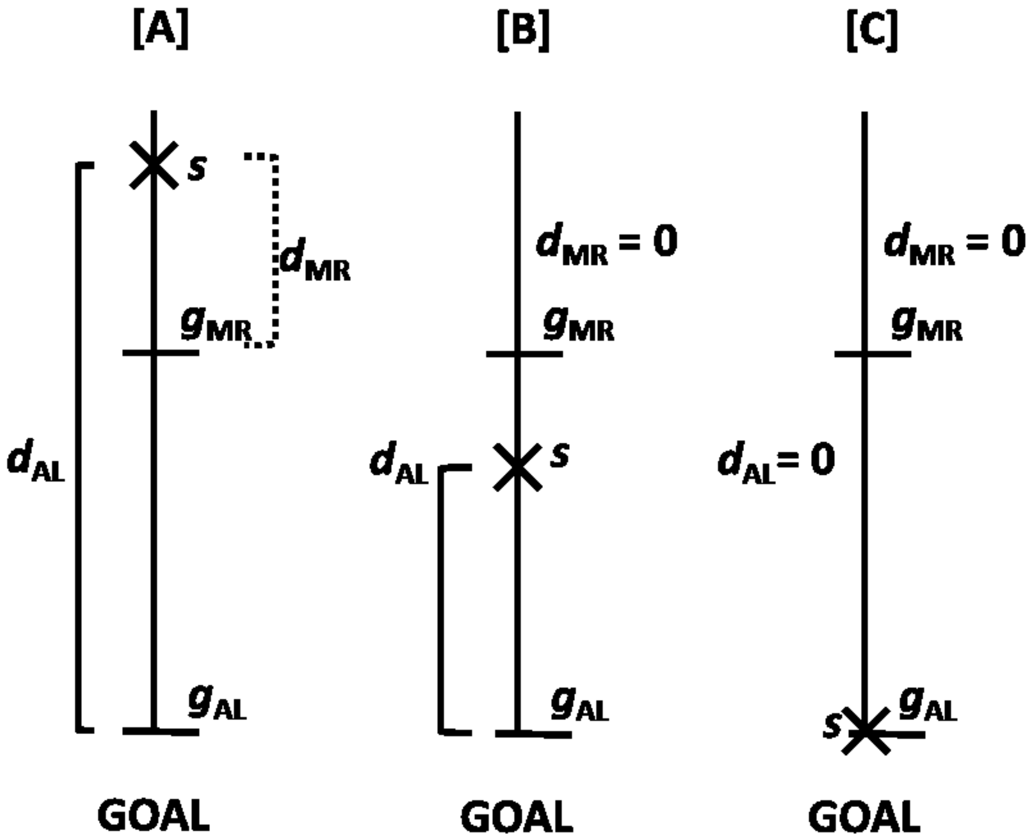

Figure 1. Assume that for a goal, there are two goal levels, the minimally acceptable level (g_{MR}) and the aspiration level (g_{AL}). When the current state (s) on a goal has not reached the minimally acceptable level (g_{MR}) and the aspiration level (g_{AL}, see [A]), there are two discrepancies—the discrepancy from the minimally acceptable level (d_{MR}) and the discrepancy from the aspiration level (d_{AL}). When the when the current state (s) has reached the minimally acceptable level (g_{MR}) but not the aspiration level (g_{AL}, see [B]), there is no discrepancy from the minimally acceptable level ($d_{MR} = 0$) and discrepancy from the aspiration level (d_{AL}). Finally, when the current state (s) has reached the aspiration level (g_{AL}, see [C]), there is no discrepancy from the minimally acceptable level ($d_{MR} = 0$) and no discrepancy from the aspiration level ($d_{AL} = 0$).

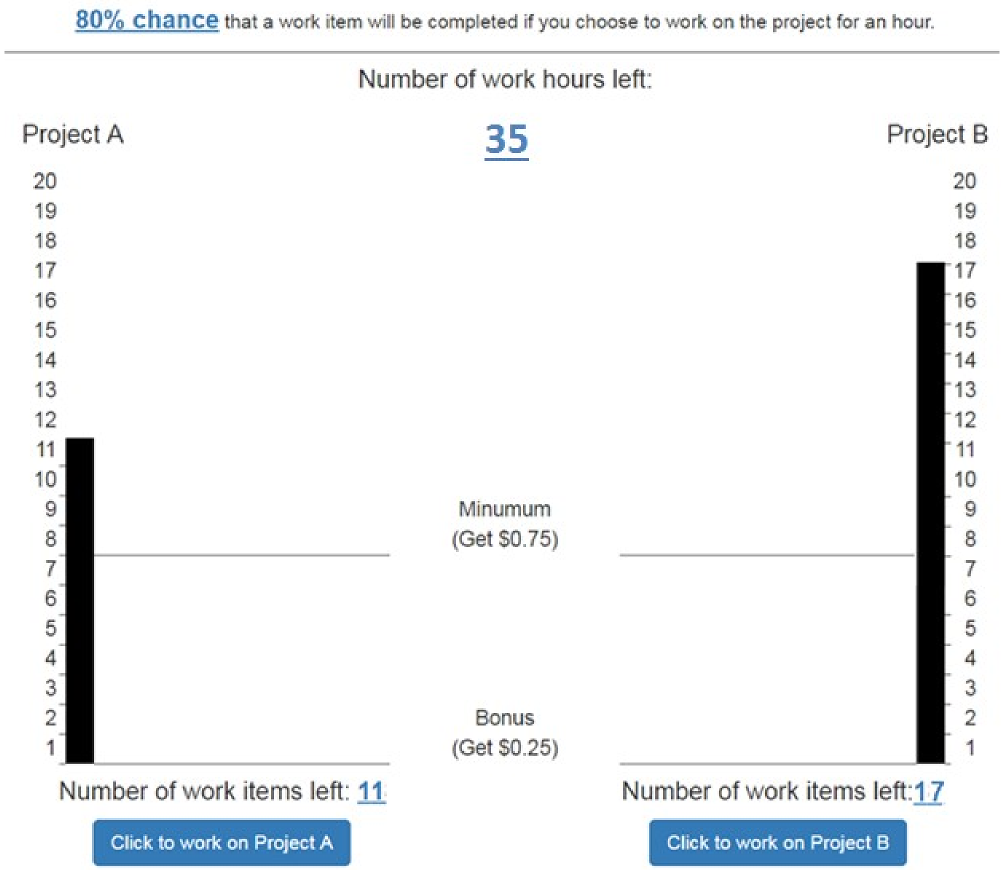

Figure 2. Screenshot of the decision-making task used in the experiment.

Condition	Participant	Trial	TL	α	dA	dB	kA	kB	SEUA	SEUB	Choice	Item Completed
MGPM More	John	1	27	1.25	11	17	1.00	1.00	145.75	97.75	A	1
MGPM More	John	2	26	1.25	10	17	1.00	1.00	135.00	80.75	A	1
MGPM More	John	3	25	1.25	9	17	1.00	1.00	123.75	63.75	A	1
MGPM More	John	4	24	1.25	8	17	1.00	1.00	112.00	46.75	A	1
MGPM More	John	5	23	1.25	7	17	1.00	1.00	99.75	29.75	A	1
MGPM More	John	6	22	1.25	6	17	1.00	1.00	87.00	12.75	A	1
MGPM More	John	7	21	1.25	5	17	1.00	1.00	73.75	0.00	A	1
MGPM More	John	8	20	1.25	4	17	1.00	1.00	60.00	0.00	A	1
MGPM More	John	9	19	1.25	3	17	1.00	1.00	45.75	0.00	A	1
MGPM More	John	10	18	1.25	2	17	1.00	1.00	31.00	0.00	A	1
MGPM More	John	11	17	1.25	1	17	1.00	1.00	15.75	0.00	A	1
MGPM More	John	12	16	1.25	0	17	1.00	1.00	0.00	0.00	B	1
MGPM More	John	13	15	1.25	0	16	1.00	1.00	0.00	0.00	B	1
MGPM More	John	14	14	1.25	0	15	1.00	1.00	0.00	0.00	B	1
MGPM More	John	15	13	1.25	0	14	1.00	1.00	0.00	0.00	B	0
MGPM More	John	16	12	1.25	0	14	1.00	1.00	0.00	0.00	B	1
MGPM More	John	17	11	1.25	0	13	1.00	1.00	0.00	0.00	B	1
MGPM More	John	18	10	1.25	0	12	1.00	1.00	0.00	0.00	B	1
MGPM More	John	19	9	1.25	0	11	1.00	1.00	0.00	0.00	B	1
MGPM More	John	20	8	1.25	0	10	1.00	1.00	0.00	0.00	B	1
MGPM More	John	21	7	1.25	0	9	1.00	1.00	0.00	0.00	B	1
MGPM More	John	22	6	1.25	0	8	1.00	1.00	0.00	0.00	B	1
MGPM More	John	23	5	1.25	0	7	1.00	1.00	0.00	0.00	B	1
MGPM More	John	24	4	1.25	0	6	1.00	1.00	0.00	0.00	B	1
MGPM More	John	25	3	1.25	0	5	1.00	1.00	0.00	0.00	B	1
MGPM More	John	26	2	1.25	0	4	1.00	1.00	0.00	0.00	B	1
MGPM More	John	27	1	1.25	0	3	1.00	1.00	0.00	0.00	B	1

Figure 3. Simulation set-up for the MGPM *More* condition.

Condition	Participant	Trial	TL	α	dALA	dALB	kALA	kALB	SEUALA	SEUALB	dMRA	dMRB	kMRA	kMRB	SEUMRA	SEUMRB	SEUA	SEUB	Choice	Item Completed
MGPME More	Jane	1	27	1.25	11	17	1.00	1.00	145.75	97.75	4	10	0.75	0.75	66.00	108.75	145.75	108.75	A	1
MGPME More	Jane	2	26	1.25	10	17	1.00	1.00	135.00	80.75	3	10	0.75	0.75	50.06	101.25	135.00	101.25	A	1
MGPME More	Jane	3	25	1.25	9	17	1.00	1.00	123.75	63.75	2	10	0.75	0.75	33.75	93.75	123.75	93.75	A	1
MGPME More	Jane	4	24	1.25	8	17	1.00	1.00	112.00	46.75	1	10	0.75	0.75	17.06	86.25	112.00	86.25	A	1
MGPME More	Jane	5	23	1.25	7	17	0.25	1.00	24.94	29.75	0	10	0.75	0.75	0.00	78.75	24.94	78.75	B	1
MGPME More	Jane	6	22	1.25	7	16	0.25	1.00	23.19	32.00	0	9	0.75	0.75	0.00	72.56	23.19	72.56	B	1
MGPME More	Jane	7	21	1.25	7	15	0.25	1.00	21.44	33.75	0	8	0.75	0.75	0.00	66.00	21.44	66.00	B	1
MGPME More	Jane	8	20	1.25	7	14	0.25	1.00	19.69	35.00	0	7	0.75	0.75	0.00	59.06	19.69	59.06	B	1
MGPME More	Jane	9	19	1.25	7	13	0.25	1.00	17.94	35.75	0	6	0.75	0.75	0.00	51.75	17.94	51.75	B	1
MGPME More	Jane	10	18	1.25	7	12	0.25	1.00	16.19	36.00	0	5	0.75	0.75	0.00	44.06	16.19	44.06	B	1
MGPME More	Jane	11	17	1.25	7	11	0.25	1.00	14.44	35.75	0	4	0.75	0.75	0.00	36.00	14.44	36.00	B	1
MGPME More	Jane	12	16	1.25	7	10	0.25	1.00	12.69	35.00	0	3	0.75	0.75	0.00	27.56	12.69	35.00	B	1
MGPME More	Jane	13	15	1.25	7	9	0.25	1.00	10.94	33.75	0	2	0.75	0.75	0.00	18.75	10.94	33.75	B	1
MGPME More	Jane	14	14	1.25	7	8	0.25	1.00	9.19	32.00	0	1	0.75	0.75	0.00	9.56	9.19	32.00	B	1
MGPME More	Jane	15	13	1.25	7	7	0.25	0.25	7.44	7.44	0	0	0.75	0.75	0.00	0.00	7.44	7.44	B	0
MGPME More	Jane	16	12	1.25	7	7	0.25	0.25	5.69	5.69	0	0	0.75	0.75	0.00	0.00	5.69	5.69	B	1
MGPME More	Jane	17	11	1.25	7	6	0.25	0.25	3.94	5.25	0	0	0.75	0.75	0.00	0.00	3.94	5.25	B	1
MGPME More	Jane	18	10	1.25	7	5	0.25	0.25	2.19	4.69	0	0	0.75	0.75	0.00	0.00	2.19	4.69	B	1
MGPME More	Jane	19	9	1.25	7	4	0.25	0.25	0.44	4.00	0	0	0.75	0.75	0.00	0.00	0.44	4.00	B	1
MGPME More	Jane	20	8	1.25	7	3	0.25	0.25	0.00	3.19	0	0	0.75	0.75	0.00	0.00	0.00	3.19	B	1
MGPME More	Jane	21	7	1.25	7	2	0.25	0.25	0.00	2.25	0	0	0.75	0.75	0.00	0.00	0.00	2.25	B	1
MGPME More	Jane	22	6	1.25	7	1	0.25	0.25	0.00	1.19	0	0	0.75	0.75	0.00	0.00	0.00	1.19	B	1
MGPME More	Jane	23	5	1.25	7	0	0.25	0.25	0.00	0.00	0	0	0.75	0.75	0.00	0.00	0.00	0.00	A	1
MGPME More	Jane	24	4	1.25	6	0	0.25	0.25	0.00	0.00	0	0	0.75	0.75	0.00	0.00	0.00	0.00	A	1
MGPME More	Jane	25	3	1.25	5	0	0.25	0.25	0.00	0.00	0	0	0.75	0.75	0.00	0.00	0.00	0.00	A	1
MGPME More	Jane	26	2	1.25	4	0	0.25	0.25	0.00	0.00	0	0	0.75	0.75	0.00	0.00	0.00	0.00	A	1
MGPME More	Jane	27	1	1.25	3	0	0.25	0.25	0.00	0.00	0	0	0.75	0.75	0.00	0.00	0.00	0.00	A	1

Figure 4. Simulation set-up for the MGPME *More* condition.

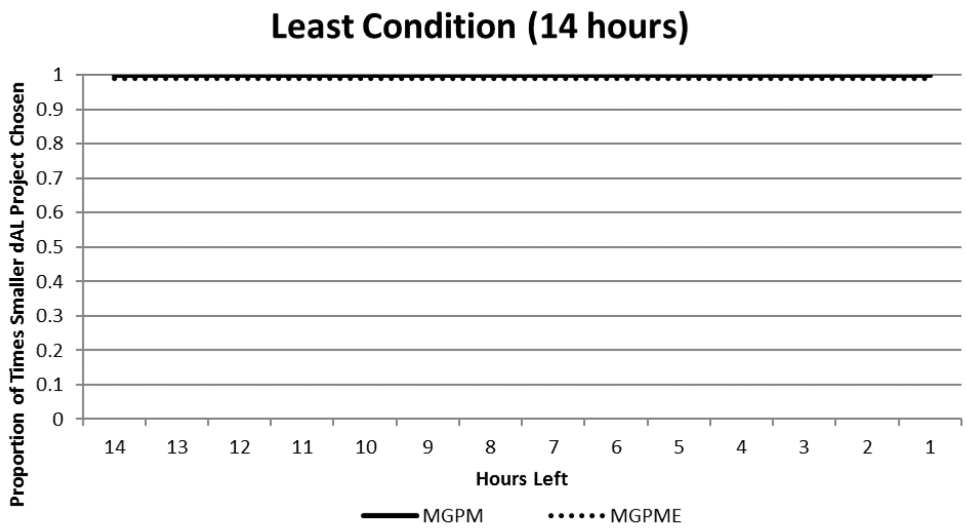

Figure 5. Model predictions for the MGPM and the MGPME in the *Least* resources condition. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left.

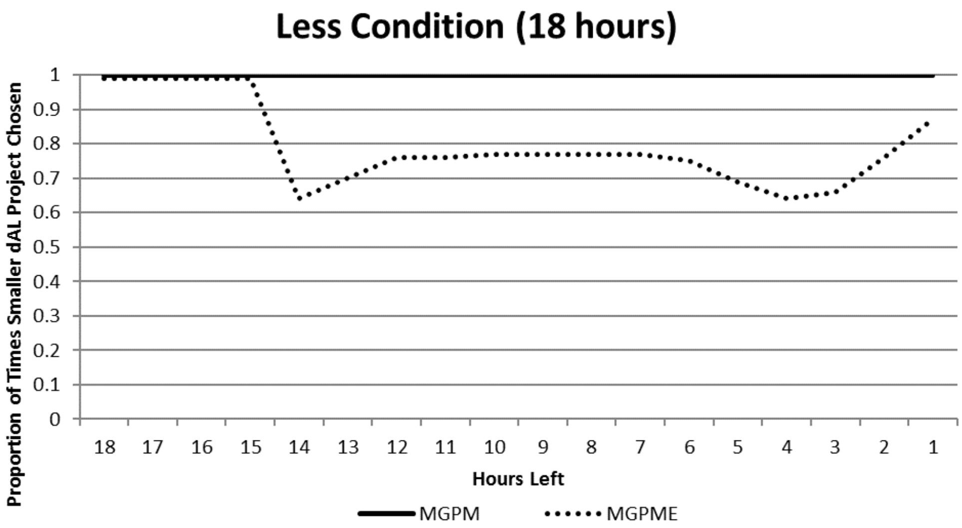

Figure 6. Model predictions for the MGPM and the MGPME in the *Less* resources condition. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left.

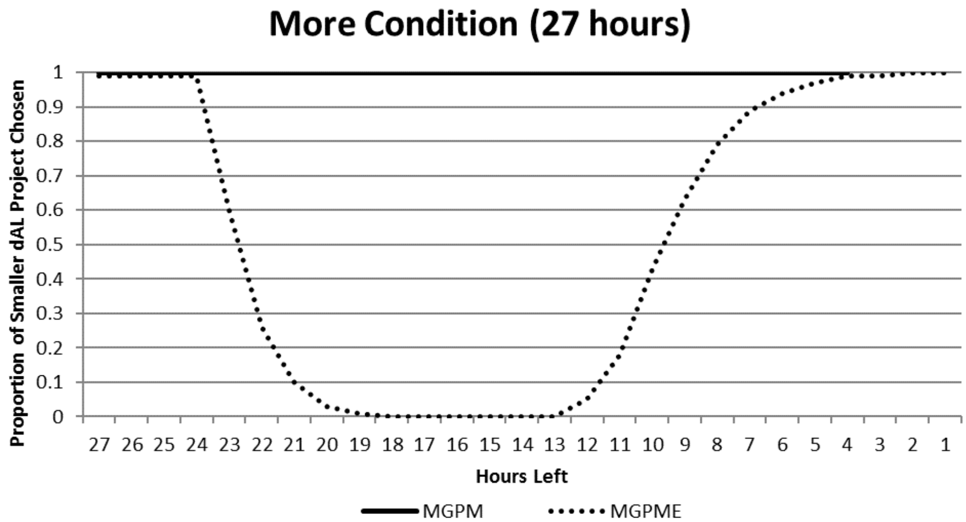

Figure 7. Model predictions for the MGPM and the MGPME in the *More* resources condition. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left.

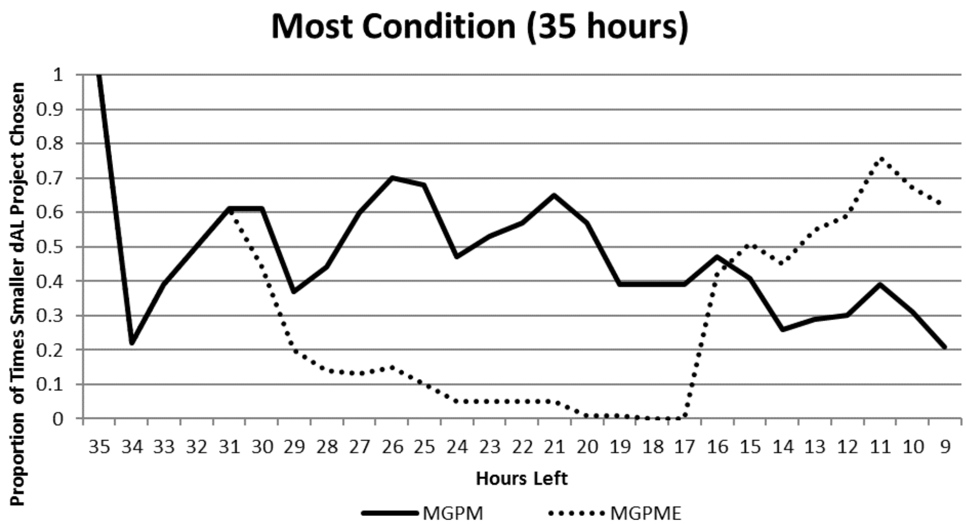

Figure 8. Model predictions for the MGPM and the MGPME in the *Most* resources condition. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left.

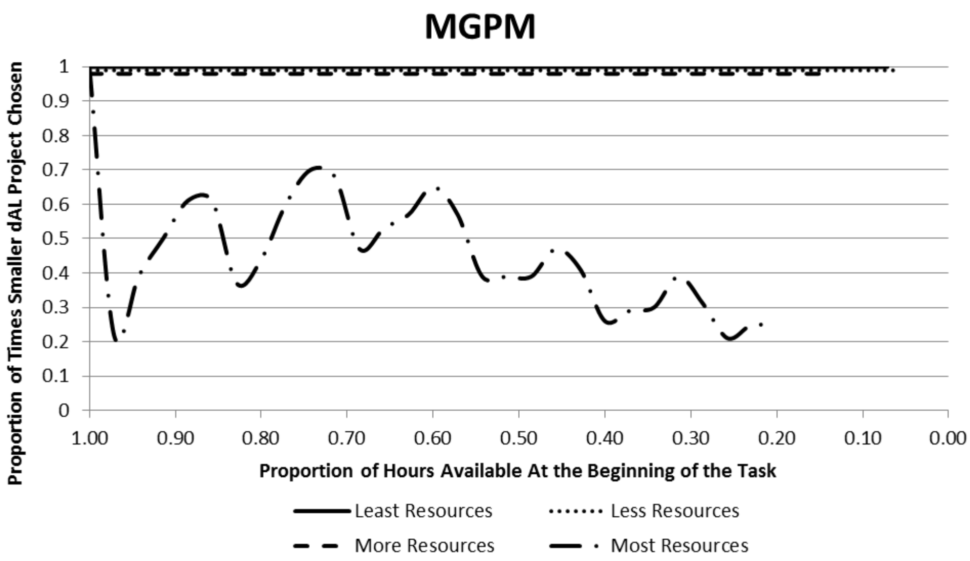

Figure 9. Model predictions for the MGPM in the *Least*, *Less*, *More*, and *Most* resources conditions. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the proportion of hours available at the beginning of the task.

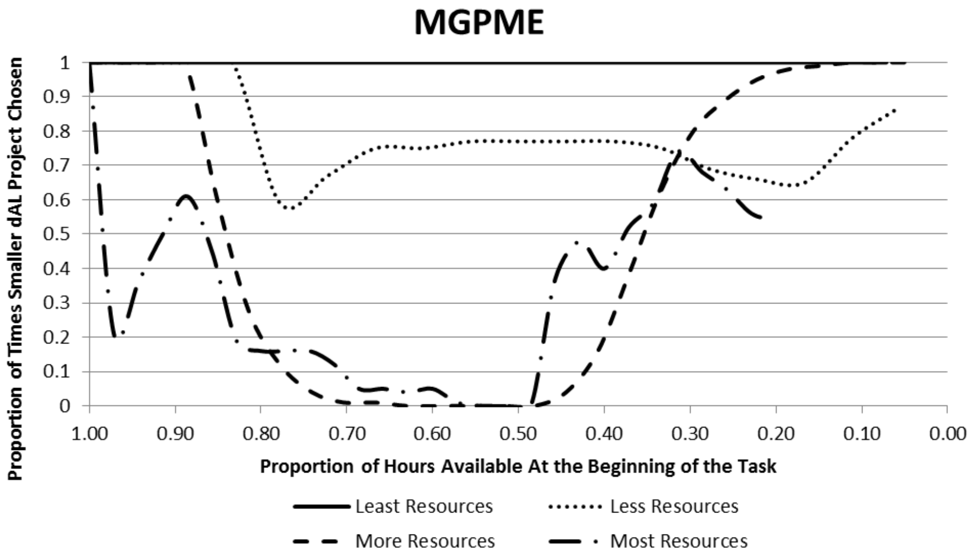

Figure 10. Model predictions for the MGPME in the *Least*, *Less*, *More*, and *Most* resources conditions. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the proportion of hours available at the beginning of the task.

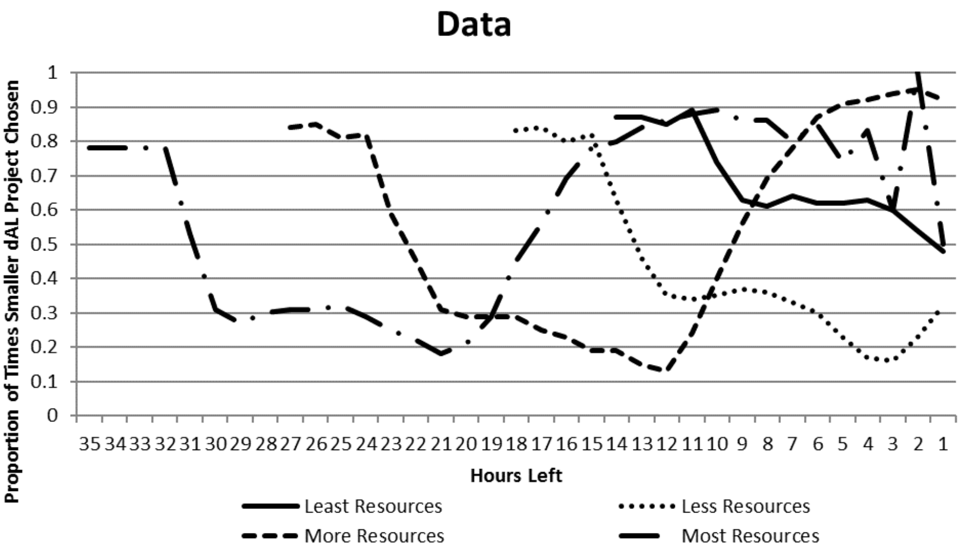

Figure 11. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left in the *Least*, *Less*, *More*, and *Most* resources conditions.

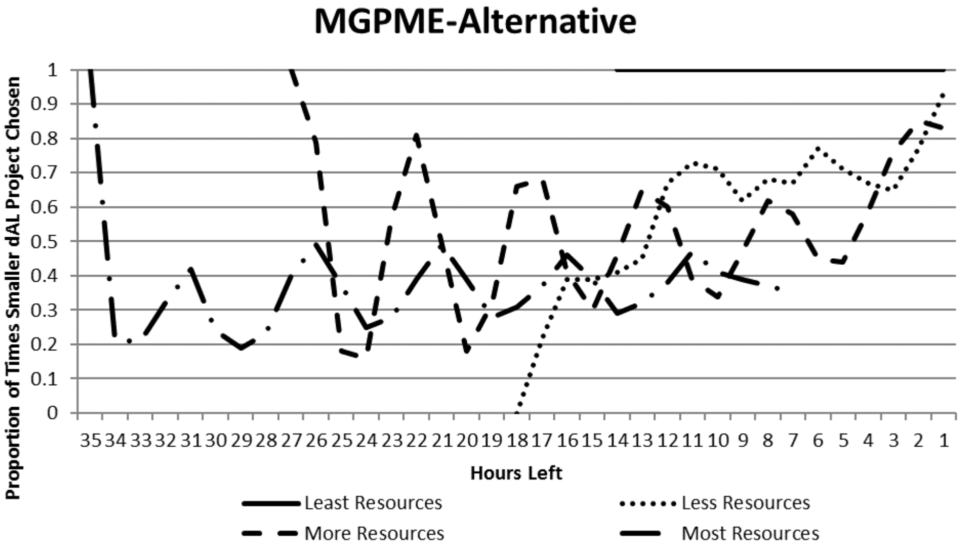

Figure 12. Model predictions for the MGPME-Alternative in the *Least*, *Less*, *More*, and *Most* resources conditions. The proportion of times the project with the smaller discrepancy from the aspiration level was chosen (i.e., proportion of smaller d_{AL} project chosen) as a function of the number of hours left.