TWO ESSAYS ON CONSUMERS' GOAL PROXIMITY AND INTER-TEMPORAL CHOICE

by

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Two Essays on Consumers' Goal Proximity and Inter-temporal Choice

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Any consumer behavior can be understood as a process of pursuing a goal. Since many consumer goals require one to complete multiple steps along the way, it has been an interesting topic for both marketers and consumers how to maintain motivation level throughout the process of goal pursuit. Despite the importance of the topic and the increasing amount of research, findings are diverse and sometimes look contradictory. In my two-essay dissertation, I distinguish different types of goals and propose two separate theoretical frameworks on goal proximity and its consequences (e.g., perception of spare time, inter-temporal choice, goal persistence, etc.). In my first essay, I examine a complex goal that consists of multiple distinct steps. Using an experimental approach, I show that in pursuing complex goals, people generate subgoals and shift their reference to the subgoals so that proximity to a subgoal changes perception of spare time and in turn influences inter-temporal choices. In my second essay, I study relatively simple goals involving repeating the same activity or very similar activities. I propose a mathematical model called a 'Similarity-Proximity model' from which previous diverse findings in goal pursuit literature can be deduced. I show both mathematically and experimentally that in pursuing relatively simple goals, people become satiated and project their expected hedonic utility to the other task as a function of similarity, and thus both proximity to a goal and similarity of interruption affect goal persistence. I supplement the existing literature on goal pursuit by demonstrating that causal psychological mechanisms by which goal progress affects goal persistence are entirely different depending on the nature of goal. In complex multi-stage goals, the key variable that dictates willingness to be interrupted is subgoal proximity. In simple, repetitive, goals, the key variables are satiation from repetition and similarity between the focal activity and some interruption.

To my parents…

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Chapter 1. Background

1.1 Introduction

Goals, either consciously or unconsciously, guide judgment and choices (e.g., van Osselaer and Janiszewski, 2012). Goals encourage goal-consistent behavior (e.g., Shah and Kruglanski 2003; Chartrand, Huber, Shiv, and Tanner 2008), and people evaluate goal-related objects or activities more highly than goal-unrelated ones (e.g., Lewin 1935; Brendl, Markman, and Messner 2003). For example, a health conscious person avoids junk food and a financially minded person opens a new savings account. Moreover, once set, goals serve as strong motivators so that people regulate themselves to maintain their goal pursuit (e.g., Fishbach, Friedman, and Kruglanski 2003). The importance of goals in consumer behavior cannot be exaggerated. Thus, for the past decades, researchers in psychology and marketing have demonstrated how goals powerfully shape consumer behavior in many domains (e.g., Fitzsimons and Bargh 2003; Kivetz, Urminsky, and Zheng 2006).

Research on goals has explored many facets of their nature and function. Increasingly, research has examined the relationship between goal pursuit and motivation (e.g., Kivetz et al. 2006; Fishbach and Dhar 2005). Although researchers have identified various important variables (e.g., perceive velocity of goal progress or goal attainability) that affect motivation in the pursuit of goal (e.g., Zhang and Huang 2010; Huang and Zhang 2011), the most important factor examined in goal pursuit literature is proximity to a goal, namely goal progress. For instance, much research effort has been devoted to how proximity to a goal influences goal persistence (e.g., Kivetz et al. 2006; Nunes and Dreze 2006; Fishbach and Dhar 2005).

The extant literature, however, has not taken into account pursuit of different types of goals that could potentially require quite different theoretical explanations. In my dissertation, I develop two separate models explaining how proximity to a (sub)goal changes perception and choices. My models supplement the existing literature by identifying psychological processes in pursuing different types of goals: those that involve subgoals chaining together complex behaviors, and those that involve repetition of the same behavior or very similar behaviors. In both cases, my focal concern is whether people pursuing a goal are willing to be interrupted by some alternative activity. In two essays, I examine these two types of goals. In the first essay, I examine how, when an overarching goal requires completion of a series of subgoals, proximity to a subgoal distorts the thoughts about the present, changes perception of spare time, and thus influence inter-temporal choice. In the second essay, I examine how, when pursuing a goal requiring repetition of the same behavior, similarity of interruption moderates the effect of goal proximity on goal persistence.

1.2 Two Types of Goal Pursuit

Goals are defined as desired end states (Custers and Aarts 2005). Thus, any desired end states can be conceptualized as goals, but how to make progress in and achieve the goals may vary. I propose two types of consumer goals because these subtle differences are critical to understand the dynamics of goal pursuit. The first type of consumer goal is a goal that can be attained by repeating similar behaviors. In other words, there exists a constraint to the means to achieve a goal. Various consumer reward programs belong to this category. For instance, an individual needs to purchase 15 Starbucks drinks to get a free drink; that is the only way to achieve a goal.

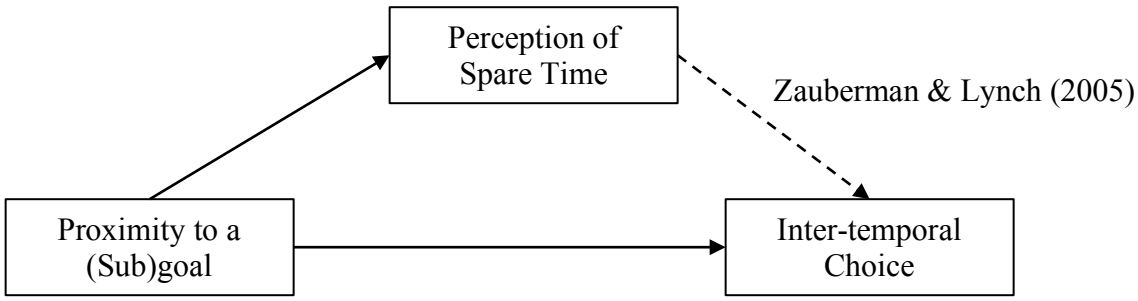
In contrast, the second type of consumer goal is a goal that cannot be attained by simply repeating similar behaviors. Instead, this type of consumer goal requires chaining together complex behaviors or steps that are quite distinct. In other words, there exist many different steps along the path to achieve the goal that are not substitute means to the same end but rather complements --- individually necessary but not sufficient steps that unfold to achieve the overarching goal. For example, taking a flight to some destination requires a series of steps: buying an airline ticket, driving to the airport, finding a parking place, etc. I would distinguish subgoals in these chains of complex behaviors from Amir and Ariely's (2008) concept of discrete progress markers in tasks involving repetition of similar behavior, with no explicit competition. I am interested in the competition between focal goals with defined end points and attractive interruptions.

1.3 Conceptual Framework

The objective of my dissertation is to develop two separate theoretical frameworks that explain dynamics of each type of goal pursuit. In my first essay, I examine the second type of goal. I posit that people generate subgoals en route to pursuing this type of goal because it requires for an individual to complete different subgoals to reach the overarching goal. For instance, to publish a journal article, one may design and run experiments, write a manuscript to submit, pass the first-round review, and so on. Each sub-step requires different skill sets and they are not at all similar to each other. In a series of studies, I propose and show that endogenously generated subgoals change perception of spare time and subsequently influence inter-temporal choices. Specifically, I propose that when close to attaining a subgoal, people feel quite busy,

and in turn, prefer to delay pursuit of competing activities even when they would have no effect on completing the overarching goal (see Figure 1.1).

Figure 1.1 Conceptual Framework of Chapter 2



In my second essay, I examine the first type of goal involving repetitive behaviors. Unlike the second type of goal with complex and heterogeneous steps, when pursuing the first type of repetitive goal, people would be less likely to generate subgoals.[1] Instead, I posit that making progress would not only reduce the distance to a goal but also reduce the enjoyment from the focal task (e.g., eating pizzas in pizza reward program), because it requires an individual to repeat similar consumption behavior to achieve the goal, leading to satiation.

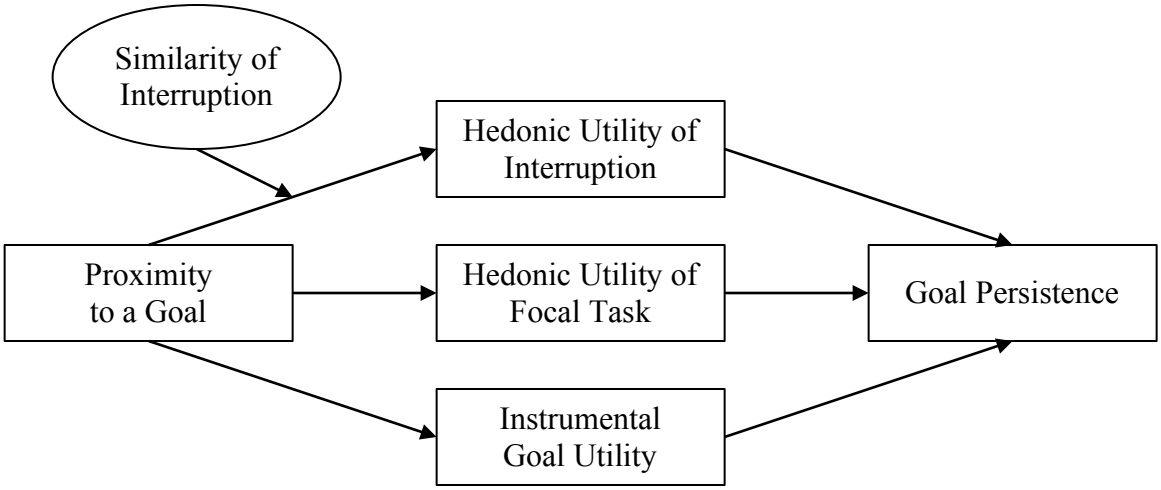
Therefore, in pursuing the first type of goal involving repetitive behaviors, making progress has contrary effects on goal persistence. Enjoyment decreases with progress, causing a negative impact on persistence. On the other hand, instrumental value of the reward increases with progress, which increases goal persistence.

On the basis of this dual effect of goal progress, I propose a simple model that combines proximity to a goal and similarity of interruption to explain dynamics of goal pursuit.

[1] Some may argue that people could generate subgoals like getting 7 stamps in pizza reward program. But, in pursuit of this type of goal, any generated subgoals are arbitrary.

Specifically, I propose and show that goal persistence is a function of two utilities: the utility from focal goal pursuit and the utility from an interrupting option. According to my model, people would stay (vs. switch) as long as they expect the utility from focal goal pursuit to be bigger (vs. smaller) than utility from an interrupting option. Additionally, the similarity between a focal and interrupting option plays a critical role in this utility comparison by affecting he hedonic utility of interruption (see Figure 1.2).

Figure 1.2 Conceptual Framework of Chapter 3



1.4 Organization of the Dissertation

The rest of this dissertation is organized as follows. In chapter 2, I report my first set of studies that examine how proximity to a subgoal affects perception of spare time and inter-temporal choices. In chapter 3 where I propose a 'Similarity-Proximity model,' I present mathematical analyses and a second set of studies that examine how proximity to a goal and similarity of interruption interplay to affect goal persistence. I conclude in chapter 4.

Chapter 2. Essay1: Proximity to a (Sub)goal Shapes Perceived Spare Time and Inter-temporal Choice

2.1 Motivation

In our daily lives, we pursue many goals in parallel, with new attractive options arising that dissuade us from continuing to persist in pursuing some current focal goal. Any single behavior can be interpreted in terms of goal pursuit. For instance, meeting with a client, making a phone call, reading an article, sending emails, and even surfing internet can be understood as goal pursuit behavior.

Although some goals have pre-defined structure (e.g., reward programs) and are relatively easy to achieve with repetitive simple behaviors (e.g., buying a coffee), other goals do not (e.g., writing a paper). Usually, this latter type of goal is more complex and hard to achieve than the former, and component activities are complementary. Additionally, it generally takes some amount of time to make progress in this type of goal. Thus, it is very important for people to allocate limited time wisely across competing forms of goal pursuit. But, even with a well-defined plan, it is not easy to pursue goals because there will always be unexpected interruptions that might be called "temptation" or "competing goals." This complex environment along with the inherent scarcity of time requires us to keep choosing one task over the other task by trading off between costs and benefits over time (i.e., inter-temporal choices).

Although these concepts (i.e., multiple goal pursuit, perception of spare time, and inter-temporal choices) are very important and closely related to one another, surprisingly, no research has examined these concepts together. Thus, in chapter 2, I investigate relationship among these concepts. Specifically, I examine how people change their reference point (i.e., goal) over the

complex goal pursuit, how distance to the reference point influences perception of spare time, and how it is related to our choice over time.

2.2 Conceptual Background

Like goals, time is a very important dimension that influences a wide range of human behaviors (e.g., Carstensen, 2006). Because of its importance and relevance to human lives, time has enjoyed considerable attention from researchers across multiple disciplines. In social science, time has been examined from several different perspectives such as *time as a construct* ("What associations are co-activated?" e.g., Mogilner and Aaker 2009), *perception of time duration* ("How long has it been?" e.g., Vohs and Schmeichel 2003; Zauberman et al. 2010), *temporal orientation* ("Am I focused on the past, present, or future?" e.g., Holman and Silver 1998; Trope and Liberman 2003), and *inter-temporal choice* ("Should I choose it now or later?", e.g. Loewenstein and Elster 1992). Most germane to the present research is *inter-temporal choice*.

2.2.1. Inter-temporal Choice

Many decisions involve trading off costs and benefits over time (Lynch and Zauberman 2006). For instance, we can opt for smaller-sooner rewards or wait for larger-later rewards. When facing needed investments or costs, we can choose between smaller sooner investment and larger later investment. One of the most robust findings in the inter-temporal choice literature is present bias (e.g., Thaler 1981; Zauberman 2003). That is, people tend to prefer the smaller, sooner rewards to the larger, later one while they prefer the larger, later investment to the smaller, sooner one, and these preferences grow stronger when the dates of the sooner and later consequences draw nearer in time. This 'present bias (or hyperbolic discounting)' has been

attributed to several factors including impulsivity, individual differences in time orientation, and insensitivity to time perception (e.g., Lowenstein 1996; Zimbardo and Boyd 1999; Zauberman, Kim, Malkoc, and Betman 2009).

2.2.2 Time Slack

Zauberman and Lynch (2005) attributed these tendencies to discount future consequences to individuals' different perceptions of "spare" or "slack" resources over time. They argued that people discount the value of future time investments starkly, due to perceptions that they are especially busy today but will be less busy in the future. This makes people willing to undertake activities in the future but not in the present. Zauberman and Lynch's (2005) "Yes…Damn! Effect" describes an interesting pattern of people that people agree to activities in the future (e.g., a month later) that they would decline today because they feel so busy; but later people curse themselves because they discover that they are just as busy as they were when they agreed to the activities. Along the same line, Shu and Gneezy (2010) found that one-year residents of Chicago, Dallas, and London had visited fewer landmarks than tourists who visited for two weeks because one-year residents imagine they will have more spare time in the future. Residents continually tell themselves that today they are too busy, but that they will be less busy in a few weeks or months.

Prior research on "resource slack" had attributed these inter-temporal decisions to distorted thinking about the future. But interesting patterns of inter-temporal preferences can as readily be framed in terms of distorted perceptions of the present. Any discounting behavior simply shows an asymmetry between thoughts about the present and the future (cf. Kim and Zauberman, 2013; Loewenstein 1996). In this essay, I consider that the asymmetry is driven by

temporary distortions on our thoughts about the present. That is, we are not as busy as we think we are in the moment, but we devalue an interrupting activity that might otherwise be attractive because of how close we are to some subgoal.

2.2.3 Evolving Subgoals

"Subgoal" in my dissertation refers to steps along the way in a sequential path to some overarching goal, rather than alternate means to achieve the same end (cf. Fishbach, Dhar, and Zhang 2006) or "discrete progress markers" of how many times one must perform some repetitive behavior (Amir and Ariely 2008). Each subgoal is part of a chain of means to an overarching end, and each subgoal is often necessary to achieve the next subgoal. For example, in the course of flying to another city, one might generate subgoals to drive to the airport, find a place to park, get through security, walk to one's gate, board the plane, etc. When one begins one's journey, one does not "unpack" the overall goal into its parts. A given subgoal is generated endogenously only when it becomes relevant, perhaps due to the adoption of an implemental mindset (Gollwitzer, Heckhausen, and Steller 1990; Zhao, Lee, and Soman 2012). For instance, only when approaching the airport might one begin thinking about where to park and how long it will take to find a parking place.

Similarly, when one sets out one's goals for the day, it is not an objective to answer certain emails. But somehow in the course of pursuing larger overall goals, such subgoals become salient. These dynamics make it difficult to explain when and why people can be tempted by attractive distracting activities and how this relates to how close they are to achieving their overarching goals. This is why I think we need to distinguish different types of goals.

2.2.4 Goals and Perception of Spare Time

Goals, once activated, become reference points (Heath, Larrick, and Wu 1999). Falling short of those reference points by a certain amount feels more painful than exceeding those reference points feels pleasurable. Moreover, when one is close to achieving a goal, the value of a unit of progress is quite motivating, as in the classic goal gradient effect (Hull 1932; Miller 1944; Kivetz, Urminsky, and Zheng 2006; cf. Amir and Ariely 2008; Bonezzi, Brendl, and de Angelis 2011). Accepting some attractive opportunity today might mean falling short of one's reference point for already-active goals. Moreover, people anticipate regret from just missing completion of a proximate active goal or subgoal (Gilbert, Morewedge, Risen, and Wilson 2004).

Zauberman and Lynch (2005) speculated – but did not show – that anticipated pain of unfulfilled goals now but no such anticipated pain for the future is what causes people to falsely perceive that they have more spare time in the future than the present and to attach less value to time investments in the distant future than in the near term. They argued that people have goals for the near term but not for the distant future, and that this might explain why they discount the pain of time investments in the future. Lynch, Netemeyer, Spiller, and Zammit (2010) found support in a diary study for the idea that people think more about goals for the near term than the more distant term. This is particularly true for goals for the use of time.

To Zauberman and Lynch's speculation about the role of goals in slack perceptions and inter-temporal choice, I add the idea that pain from unfulfilled subgoals drives perceptions of spare time now. Specifically, I propose that the salience of subgoals drives motivation to avoid interruption and to persist with one's current activities. If goals and subgoals are at the root of perceptions of having more time slack in the future than today, one should observe that people delay or avoid interruptions when they are close to completion of subgoals, independent of how

much there is left to be accomplished in achieving an overall goal. I present laboratory studies 1-3 and field studies 4 and 5, testing the conceptualization just proposed.

In studies 1 and 2, I test the conjecture that subgoal proximity dictates preference to delay pursuing other attractive options. I also show that people perceive less spare time when close to a subgoal. In study 3, I show that when consumers are not in the midst of goal and subgoal pursuit, they underweight the degree to which willingness to be interrupted is affected by subgoal progress rather than overall goal progress. In study 4, I go to Denver International Airport and demonstrate that when closer to naturally evolving subgoals, people perceive less spare time now and are unwilling to be interrupted. In study 5, I return to the same airport and demonstrate that people close to takeoff perceive that they have less spare time in the next three hours than those farther from takeoff.

2.3 Study 1: Effects of Subgoal Proximity on Inter-temporal Choice

Study 1 examines the role of subgoals in inter-temporal choice. Specifically, I focus on how proximity to a subgoal leads people to prefer a larger-later time interruption to a smaller sooner one. In study 1, participants were given a goal to win two of three Nintendo Wii games. While playing the first game, participants were interrupted early or late in the game and told that they needed to play one of two iPad games. Participants were asked to choose to play either a shorter iPad game now or a longer iPad game later – right after the first Wii game. I argue that people would feel exceptionally busy and unwilling to be interrupted near subgoal completion. Thus, people would prefer to delay interruption and thus choose the larger-later time investment (i.e., play a longer iPad game later) when they are closer to attaining the subgoal of winning the first game, although it would always take less total time to choose the shorter iPad game now.

2.3.1 Method

Participants and Design. Forty-two undergraduates from an introductory marketing class participated individually in partial fulfillment of a course requirement. The independent variable was subgoal proximity at the point of interruption. In the "subgoal far" condition, participants were stopped roughly 25% of the way toward winning the first game, and in the "subgoal near" condition, they were stopped roughly 75% of the way toward winning the first game. When interrupted, participants were asked to choose to either play a 5-minute iPad game now or a different 7-minute iPad game after completing the first Nintendo Wii game. The key dependent variable was the choice of whether to be interrupted now or later from the Nintendo Wii game.

Apparatus. I used a small room with a 32" LCD display panel mounted on the wall. The display was used to present both an online survey and the Wii games. On a whiteboard in the room, I displayed printed screen shots of three different Wii games in a row to ensure that participants knew which games they would play in what order.

Procedure. Participants completed an online informed consent form, read ~20-word descriptions of each of three Wii Sports Resort games (i.e., Speed Slice, Table Tennis, and Swordplay Duel), watched short game-play clips of each, then rated how enjoyable it would be to play each game. Then, the experimenter changed the TV screen input to Nintendo Wii. Participants briefly practiced all three games, then rank-ordered their preferences for the three games in the online survey. The experimenter unobtrusively recorded preference rankings.

Participants then read a paragraph explaining their goal in study; to win a match in two games out of three games in a fixed amount of time. (Most participants won the first two games

within the time limit and all won two of three.) The experimenter then informed participants that he would randomly determine the order of playing. The experimenter shuffled and re-arranged the pictures of the 3 games on the whiteboard, and posted number-magnets from 1 to 3 above the pictures. Although the order appeared random, the experimenter chose the order so that participants always played the games in order of their preference from most to least preferred.

The experimenter sat behind participants pretending to check emails on an iPad while they played the first Wii game. Part way through the first game, he interrupted and asked the participant to pause the game. Depending on the subgoal proximity condition, the interruption occurred at roughly 25% or 75% of point accumulation required to win the first game. The experimenter excused himself for interrupting, asked the participant to pause the game, and told participant that a supervisor sent an email requesting him to test an iPad game. With an iPad in his hands, he said to the participant, "There are two iPad games that we are testing. We need you to play one of them at some point of this experiment in addition to the Wii games. If you choose to play one iPad game *now*, it would take 5 minutes. If you choose to play the other iPad game *after the current game* (i.e., later), it would take 7 minutes. What would you like to do?" (Progress was saved if the participant chose to be interrupted now.) This choice of "now" versus "later" was my main dependent variable to measure propensity to delay time investment.

The timing of subgoal completion is trivially malleable. Delaying completion of the first game does not delay completion of the overarching goal to win two games and in fact facilitates overall goal completion by minimizing time spent on the interrupting iPad game (5 min. vs. 7 min.). I expected that people would prefer to delay interruption when they are closer to winning the first game because it would be more painful for them to be interrupted.

Once a participant chose whether to play the shorter-sooner or longer-later iPad game, the experimenter changed the display input from Wii to an online survey and asked the participant to sit and complete an online survey. The participant answered a series of questions including potential covariates (e.g., perceived progress in the first game, how much they enjoyed the game, how frequently they play video games, and 13-item self-control scale, etc.). Participants then completed another short survey that I report in the discussion of study 3, predicting responses of participants in study 2 to be reported next. After the survey, participants returned to the paused first game and continued to play until they won two Wii games. They did not actually play the chosen iPad game. Every participant achieved the goal of winning two out of three Wii games. Participants were then debriefed, thanked, and dismissed.

2.3.2 Results

Manipulation check. Participants rated themselves to have made less progress in the first game when they were in the subgoal far (M = 23.48%) than subgoal near condition (M = 74.67%; $F(1,40) = 100.60$, $p < .01$, $\eta^2 = .716$).

Willingness to be interrupted now. I expected that people would be less willing to be interrupted if they were closer to finishing the subgoal of winning the current game. A logistic regression analysis confirmed this prediction. More people chose to play the 5-minute iPad game now when they were far from the subgoal rather than near (85.7% vs. 47.6%; $\chi^2(1) = 6.14$, $p < .05$, $\phi = .404$). People prefer to delay interruption when closer to subgoal completion even when this decision causes them delay in overall goal completion, costing them extra time. Any of the covariates (i.e., enjoyment level, gaming frequency, individual difference in self-control measure) were not significant, and their inclusion did not change the results.

2.3.3 Discussion

In Study 1, I showed that people preferred to delay time investment when they were closer to a subgoal, completing the first Wii game. This finding replicates my finding in an earlier study with 94 undergraduates using the similar paradigm; participants were interrupted with another Wii game. As a result, respondents who chose to be interrupted "now" could not return to game 1 at the point of interruption, unlike Study 1 and the remaining studies reported below. Again, in that earlier replication, 51% of those far from the subgoal and 26% of those near the subgoal chose to be interrupted now ($\chi^2(1) = 6.29$, $p < .05$, $\phi = .329$).

In Study 1, if the choice of 'now' indicates lower motivation for the current task, one may argue that these results "just" reflect a classic goal-gradient effect; goals are more motivating as one gets closer (Hull 1932; Miller 1944; Kivetz et al. 2006; Nunes and Dreze 2006). One of the main contributions of my research is to connect goal gradient to inter-temporal preferences involving persisting in one activity versus allowing oneself to be interrupted. To my knowledge, the literature on goal gradient has not connected these ideas to inter-temporal choice, has not explicitly considered goal competition (cf. Amir and Ariely 2008), nor has this work examined effects of goal progress in complex tasks with chained sub-goals.

Although I believe that it is subgoal proximity that drives the results, overall goal proximity is deliberately confounded with subgoal proximity in study 1. That is, those interrupted 75% of the way through the first game rather than 25% were both closer to their subgoals and closer to overall goal attainment. In study 2, I rule out this alternative interpretation by pitting distance from a subgoal against distance from an overarching goal. Thus, I demonstrate in study 2 that subgoal proximity shapes participants' inter-temporal preferences.

Second, it might be argued that the interrupting iPad games are inherently enjoyable and that choosing the longer later iPad game shows patience for that reward rather than inpatience at being interrupted now. In Study 2, therefore, my measure of discounting involves choice of smaller sooner or larger later monetary rewards for completing a 10-minute survey.

Third, I wish to examine how subgoal proximity affects perceptions of spare time. Zauberman and Lynch's (2005) resource slack theory of discounting explains that people might view certain activities as attractive in the future but not in the present due to perceptions of more spare time in the more distant future. I will show that when people interrupted close to a subgoal, they perceive less spare time due to greater pain and irritation at the interruption.

2.4 Study 2: Sub-Goal Proximity Versus Overall Goal Progress

Study 2 aims to test the power of trivially malleable subgoals in inter-temporal choice, disentangling subgoal proximity from overarching goal proximity. I follow a paradigm much like study 1, but pit distance from a subgoal against distance from an overarching goal. Participants are given a goal of winning two of three Wii games, then interrupted. But this time participants were interrupted either when they have accumulated 75% of the points to win the first game (subgoal near condition) or 25% of the points to win the second game (subgoal far condition). Unlike study 1, in study 2 those in the subgoal far condition are closer to attaining their overarching goal of winning two games.

At the point of interruption, participants were offered the opportunity to do another researcher's unrelated 10-minute survey for a monetary reward. By this, I want to test whether the power of trivially malleable subgoal (winning the current game) is strong enough to cause consumers to forgo monetary incentives. Agreeing to do another survey delays but does not

threaten completion of the subgoal (winning the game) and the overarching goal (winning 2 games to complete the experiment). I predict that more people decline the offer to do a survey or delay the interruption at a financial cost when they are closer to their subgoal but not as far along in attaining the overarching goal than when they are farther along to the overarching goal but not near attaining a subgoal.

2.4.1 Method

Participants and Design. Thirty-seven undergraduates from an introductory marketing class participated for a course credit. Participants were tested individually using the same apparatus and the same room as study 1. They were randomly assigned to either the subgoal near or the subgoal far condition.

Procedure. Procedures were the same as study 1 with the following four exceptions. First, participants in the subgoal near condition were interrupted when they had completed about 75% of the first game and those in the subgoal far condition when they had completed about 25% of the second game. Second, all participants were interrupted when they were playing their favorite game; participants began with their favorite game in the subgoal near condition, but participants began with their 2nd favorite, then moved to the favorite game in the subgoal far condition.

Third, a different dependent variable was measured. In study 1, participants were only given the choice of when to be interrupted (i.e., ‘now’ or ‘later’), but in study 2, they were given a choice of whether to be interrupted (i.e., ‘now’, ‘later’, or ‘no’). Specifically, the experimenter said, “My colleagues are conducting online surveys that would take about 10 minutes. Although those studies are not related with the current study or your credit, if you participate in the one

survey *now*, you will get $1.50. If you participate in the other survey *right after this experiment*, you will get $1.00. Of course, you don't need to participate if you don't want to. What would you like to do?" This choice of "now", "later" or "no" was the main dependent variable to measure propensity to delay time investment. I also measured 1) how much progress participants thought they had made in the overarching goal, 2) how much they were bothered when they were asked to stop playing the game, and 3) how much spare time they would have for the next 30 minutes and for the next 2 hours.

2.4.2 Results

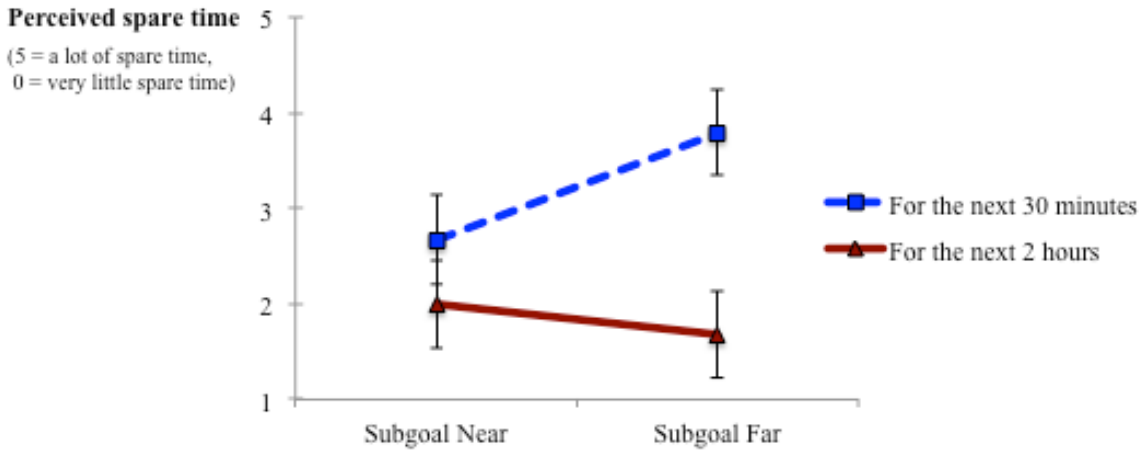
Manipulation check. Participants rated themselves to have made less progress in the overarching goal when they were in the subgoal near (M = 37.28%) than subgoal far condition (M = 62.37%, $F(1,35) = 22.90$, $p < .01$, $\eta^2 = .376$).

Willingness to take the offer to be interrupted now. I expected that people would be less willing to take the offer to do an interrupting survey for $1.50 now when they are closer to their subgoal. The dependent variable was re-coded as binary response; the 'later' and 'no' responses were collapsed and coded as zero. (I expected and found no treatment effects on relative frequency of agreeing to do the $1.00 survey at the end of the study versus declining to do either survey.)

A logistic regression analysis confirmed the hypotheses. Fewer participants agreed to do the immediate interrupting survey for $1.50 when interrupted about 75% of the way through their first game ($M_{\text{Subgoal Near}}$ = 28%) than when interrupted about 25% of the way through their second game ($M_{\text{Subgoal Far}}$ = 63%; $\chi^2(1) = 4.66$, $p < .05$, $\phi = .355$).

Experienced pain and perceived spare time. Results also showed that the interruption bothered participants more when they were closer to the subgoal ($M = 3.00$) than when far from the subgoal ($M = 1.89$; $F(1,35) = 4.40$, $p < .05$, $\eta^2 = .112$). As shown in Figure 2.1, ratings of spare time were affected by both subgoal proximity and whether the participant was rating spare time for the next 30 minutes or next 2 hours. Most participants had classes and other commitments immediately following the study; so, on average, participants said they had more spare time in the next 30 minutes than in the next 2 hours ($M_{30minutes} = 3.24$ vs. $M_{2hours} = 1.84$; $F(1,35) = 18.31$, $p < .001$).

Figure 2.1. Effect of Subgoal Proximity on Perceived Spare Time in Study 2



Critically, however, there was a significant interaction of time period referenced with subgoal proximity on ratings of spare time ($F(1,35) = 4.93$, $p = .033$). Participants' expected spare time for the next 30 minutes was marginally greater in the subgoal far ($M = 3.79$) than subgoal near condition ($M = 2.67$; $F(1,35) = 3.42$, $p = .07$, $\eta^2 = .089$). This is particularly surprising because more people in the subgoal far condition had committed to a 10-minute

survey in the next half hour as noted above. There were no effects on expected spare time for the next 2 hours ($M_{SubgoalNear}$ = 2.00 v. $M_{SubgoalFar}$ = 1.68; $F < 1$, NS).

Mediation analysis showed that the expected pain mediates the effect of subgoal proximity on spare time in the next half hour (95% bootstrap confidence interval for indirect effect does not include zero; .055 to 1.34). These results are consistent with Zauberman and Lynch's (2005) conjecture that people would feel pain at being diverted by some attractive competing task, that this pain drives perceptions of less time slack, and that pain is greater when closer to a proximate goal. Moreover, these results support my hypothesis that it is a subgoal rather than an overarching goal proximity that affects perceived spare time and propensity to delay time investment.

2.4.3 Discussion

In study 2, I demonstrated that when people were closer to a subgoal but farther from an overarching goal, they perceived less spare time, experienced more pain at being interrupted, and delayed or rejected the chance to gain monetary rewards for investing time now in an interrupting survey. Even though more of those in the subgoal far condition had committed to spend extra time on a 10-minute survey, those in the subgoal near condition perceived that they had marginally less spare time in the next half hour.

Zauberman and Lynch (2005) argued that discounting of future time is a function of the comparison of spare time now and in the future. The findings in Figure 2.1 imply that these comparisons of perceived spare time in the nearer versus more distant future are malleable and influenced by subgoal proximity. Simple effects tests showed that perceived time in the next 2 hours was less than perceived time in next 30 minutes in the subgoal far condition ($p < .001$) but

the difference was not significant in the subgoal near condition ($p = .16$). Parenthetically, these differences seem on the surface to be opposite to Zauberman and Lynch's empirical finding that for most people, spare time is less in the short run than the long run. But at a deep level they support their speculation that perceptions of spare time depend on goals. Had I given my participants a choice of whether to complete the 10 minute study now or in an hour, the pattern of rated spare time suggests that they would have been indifferent about timing in the subgoal near condition but had a strong preference to accelerate (not delay) the interruption when far from a subgoal.

In study 2, open-ended responses for the reasons for agreeing or declining to do another researcher's study showed how proximity to a subgoal causes discounting of the value of competing activities. Those interrupted 75% of the way through the first game explained their rejection of the interrupting study by their lack of time; those interrupted a minute or two later, 25% of the way through the second game agreed to do the second study based on the availability of time and the monetary reward.

One might argue that it is sensible to be less willing to be interrupted now when 75% finished with the first game than when 25% finished with the second game because, in the latter case, it is clearer that interruption will not block completion of the overarching goal. Those in the latter condition have less remaining things to do. This account is refuted by the results of study 1, where people were more willing to be interrupted when farther from completion of the overarching goal.

The results of study 1 and 2 are not explained in a straightforward way by traditional goal gradient concepts that operate at the level of an overarching goal, for reasons explained in the introduction. I would argue that goal gradient, stuck in the middle, and like concepts are relevant

to complex tasks of the sort I study, but one cannot use these concepts to predict complex behaviors and discounting of attractive distractions without understanding how people represent some overarching goal in terms of endogenously generated subgoals.

Past work on retrospective evaluations of hedonic experiences shows that the psychology of remembrance changes dramatically depending on whether some chain of experiences is represented as a single experience or is broken up into segments (Ariely and Zauberman 2000). My conjecture is that something parallel operates when people prospectively represent a behavioral stream. People endogenously generate subgoals in the course of overall goal pursuit that are not salient at the time of action initiation. When participants start to play a Wii game, for instance, there is an overall goal of winning two of three Wii games. But they unpack the larger activity (cf. Tsai and Zhao 2011) and generate subgoals that are naturally more proximate than the overarching goal: they want to win the current game. When this process unfolds, perceived goal progress changes to reference subgoal proximity rather than proximity to an overall goal. This is somewhat related to the argument of Bonezzi et al. (2011) that people change salient reference points in the course of overall goal pursuit. Although the endogenously generated subgoal can often be trivially malleable, once activated, it can produce strong unwillingness to change plans in the face of an attractive opportunity.

In sum, results suggest that it is not the overarching goal but the proximate subgoal that affects perceived spare time and shapes inter-temporal choice. I argue that this occurs because even a trivially malleable subgoal reduces the relative weight of the overarching goal. Without immersion into a subgoal, people are more sensitive to overarching goal progress. Study 3 examines this conjecture.

2.5 Study 3: Lay Intuitions about the Roles of Sub-Goal Progress and Overarching Goal Progress

The purpose of study 3 is to demonstrate that people do not appreciate the power of a subgoal if they are not immersed in goal pursuit. I used the "interpersonal replication" technique (Bem 1967) in which participants were asked to predict the behavior of participants in tasks used in study 2.

2.5.1 Method

Participants. Ninety-nine undergraduates from the same introductory marketing pool as in studies 1 and 2 participated in partial fulfillment of a course requirement.

Design and procedure. Participants read a detailed description of the same Wii experiment just reported as study 2, describing events from the beginning to the moment that the experimenter interrupted a participant and suggested three options; to do an unrelated 10-minute survey now for $1.50, to do a different 10-minute survey at the end of the session for $1.00, or to decline to do either survey. Participants were asked to predict what option the person would choose depending on the point where he is interrupted. Participants were asked to answer for each of four possible interruption points in a one-factor within-subject design: interruption timing: 25% of the way to winning the first game, 75% of the way to winning the first game, 25% of the way to winning the second game, or 75% of the way to winning the second game. Each subject saw these four possible interruption points on four successive randomly ordered pages, each showing the same row of three games shown to the real subjects and depicting one of the four different points of interruption (see Appendix A).

2.5.2 Results

As in study 2, the 'later' and 'no' responses were collapsed and coded as zero. In the actual behavior in studies 1 and 2, participants were less willing to be interrupted "now" when they were 75% of the way through the first game than 25% of the way through the 1st or 2nd game. I expected that participants would predict that the person would be less willing to take the offer now ($1.50) when he is closer to the overarching goal.

A repeated measures logistic regression confirmed the prediction; participants' prediction for the person's willingness to take the offer now was highest at the 'early in 1st game' (M = 55%) followed by 'later in 1st game' (M = 33%), 'early in 2nd game' (M = 30%) and 'later in 2nd game' (M = 19%). All pairwise comparisons were significant except there was no difference between 'later in 1st game' and 'early in 2nd game' ($\chi^2(1) = .311$, *NS*).

2.5.3 Discussion

In study 3, I showed that people mispredict the real behaviors observed in study 2. Specifically, participants expected those actually pursuing the goals in study 2 to be equally willing to be interrupted now to do a 10-minute survey for $1.50 at the interruption point 75% through the first game and 25% through the second game; real subjects were much less willing to be interrupted 75% through the first game. People not immersed in goal pursuit do not appreciate how much stronger is the impact of a subgoal than an overarching goal in shaping real behavior.

More dramatically, I replicated these findings with a second set of participants who had just completed study 1. They were asked to predict how respondents would react in study 2. Their prediction for the person's willingness to take the offer now was highest at the 'early in 1st game' (M = 81%) followed by 'later in 1st game' (M = 52%), 'early in 2nd game' (M = 60%) and

'later in 2nd game' (M = 26%). All pairwise comparisons were significant except there was no difference between 'later in 1st game' and 'early in 2nd game' ($\chi^2(1) = .433$, *NS*). Thus, it is not sufficient to have (recently) experienced events very similar to those in the interpersonal replication to predict how people would react. The power of subgoals is surprising!

I conjecture that people have poor intuition about real inter-temporal choice behavior in complex tasks. Because subgoals are generated endogenously in the course of overall goal pursuit, people do not simulate their power if not immersed themselves.

In study 4, I examine the conjecture from study 2 that perceived spare time decreases with proximity to subgoals and show how it links to unwillingness to delay subgoal pursuit to take on an interrupting task. In study 5, I show more clearly that perceived spare time is a function of subgoal proximity not a response language. Both studies are conducted in Denver International Airport.

2.6 Study 4: The Role of Subgoal Proximity in a Field Setting

In study 4, travelers at Denver International Airport were interviewed at one of the three locations in the airport. They were approached 1) at the train station carrying passengers from security to one of three terminals, 2) at the top of the escalator as one enters a terminal by the flight board, or 3) at their gate.

These three interview locations were intended to mimic the design of study 2, where interruptions closer to subgoals were farther from overarching goals. The train station and the terminal are analogous to the 'later in 1st game' and 'early in 2nd game' conditions, respectively. Presumably, the overarching goal of all our travelers was to board their planes and get to their destinations. I presume that travelers at the train station have a proximate subgoal of boarding the

train, that those in the terminal have a (more distant) subgoal of getting to their gate, and that those sitting at the gate have a (yet more distant) subgoal of boarding their planes. On the other hand, those in the train station are farthest from their overarching goal and those in the gate are closest.

Thus, as in study 2, I expected that people entering the boarding area to catch a train to their terminal would report less spare time because of the proximate goal of catching the train. The subgoal is trivially malleable. Another train comes along every 120 seconds. Our respondents were more than 100 minutes from departure, on average, so there should be no question of overall goal attainment (cf. Amir and Ariely 2008). In contrast, when our travelers ascended the escalator from the train to their terminal, they would be further from their proximate sub-goal (getting to their gate) than they were when they were a minute from catching their train to get to the terminal. I expected that they would report having more spare time now than would have reported two minutes earlier, and even more spare time when they reached their gates – even though they would on average have longer time to the more superordinate goal of departure in the train area or in the terminal than in the gate.

In study 4, I also measured the goals people reported thinking about in the last five minutes to test their mediating role. I hypothesized that when people say that they have little spare time now but more in the future, it is because they have been thinking about proximate subgoals for now but not for the future. Those in the same locations who thought more about their subgoals will feel less spare time now, despite being in objectively similar circumstances to those who thought less about subgoals.

2.6.1 Method

Design. Travelers in the airport were interviewed. I had two primary dependent variables: a) turndown rate (1 = decline, 0 = agree to participate) when asked to complete the survey, and b) for those who agreed to participate, ratings of perceived spare time at three points in time: now, that evening at one's destination, and the evening of the same day next week. Perceived spare time was measured on a five-point scale (*1 = very little spare time; 5 = a lot of spare time*).

For the analysis of turn-down data, the design was a three-group between-subject design comparing three interviewer locations: train versus terminal entrance versus gate. In order to avoid any interviewer effects, the three research assistants rotated among the three locations every hour according to a Latin square design and varied which of the three airport terminals they used for terminal and gate locations. For analysis of the spare time perceptions, that between subjects factor was crossed with a three level within subjects factor in a 3 x 3, interview location x time period rated mixed factorial design. I also measured travelers' self-reports of goals they had thought about in the last five minutes for use in a mediation analysis. Finally, I measured time to departure and several other variables used as covariates in the analyses.

Participants and procedure. Six hundred and three people were approached by one of three undergraduate research assistants in one of three different locations at Denver International Airport. In this airport, one goes through security, then down an escalator to take a train to one of three terminals with 139 total gates. Trains arrive every two minutes. When the train reaches one's terminal (roughly 2 minutes), one gets off and ascends an escalator to the terminal where there is a large flight board, then one proceeds to one's gate.

I stationed research assistants a) in the train station close to where travelers come down the escalator from security to catch the train to terminals; b) in the entrance to each terminal by

the flight board by the top of the escalator; and c) in the gate areas of the terminals. They interviewed the first person who entered the interview area every minute after concluding an interview. If that person declined, the research assistant would wait for one minute, then ask the next person who approached the area. By doing this, research assistants were able to approach people in each area who were representative of travelers in that area in any given time block.

If a respondent agreed to answer the survey, the research assistant read off questions from the survey and recorded answers. The following three questions were asked: spare time for now, this evening at the destination, and the evening of the same day next week. Additionally, respondents were asked to check which of several goals they had thought about in the last five minutes (catching the train to the terminal, getting to your gate, boarding the plane, evening activities at your destination, things you have to do next week, none of the above). Finally, respondents were asked to provide the time of: passing through security, flight departure, and arrival at destination (local time). Research assistants recorded the current time and location of the interview.

2.6.2 Results

Turndown rates. Research assistants neglected to record the interview location for three travelers, yielding an effective sample size of 600 for analysis of turndown rate. When waiting to take the train to the terminal, 96 of 233 (41 %) travelers refused. When coming off the escalator, 61 of 183 (33%) refused. When at the gate waiting for their flights, 23 of 184 (12%) refused. Turndown rates in the train and terminal areas differed marginally ($\chi^2(1) = 2.70$, $p = .10$), and turndown rates were significantly lower in the gate area than in the train ($\chi^2(1) = 41.5$, $p < .01$) or the terminal entrance ($\chi^2(1) = 22.60$, $p < .01$). These results suggest that those close to a

proximate subgoal were more likely to refuse to be distracted by an unrelated activity, consistent with the findings of study 2. Those in the train or terminal areas declined more than those in the gate areas whose active goal of boarding the plane was less proximate, despite the fact that those in the gate areas were closer to their overarching goal than those in the other two locations.

Spare time now. For perceived spare time now, I began with a pool of 420 (i.e., 600−180) travelers who agreed to participate. I additionally excluded 37 travelers who failed to provide complete departure data or whose flight was delayed because I needed to use the remaining time to departure data for the primary analyses. Thus, 383 travelers were used for analysis of perceived spare time now. When I include the 37 participants, results for mean spare time perceptions are the same with one exception noted below.

First, I present planned contrasts of ratings of spare time now at the three interview locations. As predicted, participants indicated that they perceived less time spare time when they were in the train station ($M = 2.64$) than in the terminal ($M = 3.17$; $F(1,380) = 8.18$, $p < .01$) or at their gate ($M = 3.49$; $F(1,380) = 23.80$, $p < .01$). Ratings of spare time now were marginally lower for those interviewed entering the terminal compared to the gate ($F(1,380) = 3.14$, $p = .07$), a result that becomes nonsignificant when including the aforementioned 37 travelers ($p = .15$).

I juxtapose these data with reported times to departure of our participants' flights. Unsurprisingly, average times to departure were virtually identical for those interviewed before they took the train from security to their terminals ($M = 109$ minutes) and those interviewed after the 1-2 minute train ride when they ascended to the terminal from the escalator from their trains ($M = 111$ minutes). Despite this, people felt more spare time when they emerged to the terminal compared to when they were waiting to catch the train a minute or two earlier. I attribute this to the proximity to a subgoal (getting on the train). Furthermore, those interviewed in their

departure gates perceived that they had more spare time even though their time to departure was significantly less (M = 86 minutes; see table 2.1).

Table 2.1 Results of Study 4

Location	Turn down rate	Spare Time Now	Minutes to Departure
Train	41%[a]	2.64[a]	109[a]
Terminal	33%[a']	3.17[b']	111[a]
Gate	12%[b]	3.49[b]	86[b]

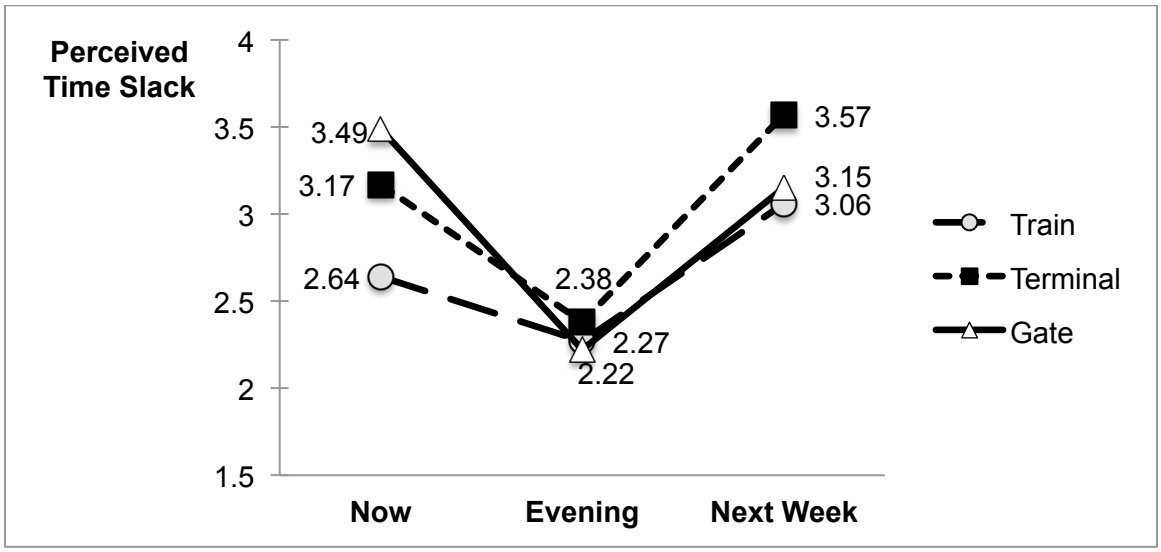
Note: means with different superscripts differed significantly ($p < .05$) and those with the same superscripts but different apostrophes differed marginally ($p < .10$)

Patterns of difference between spare time now and the future. I analyzed ratings of perceived time slack: now vs. evening vs. next week were analyzed in a 3 × 3, time period rated × interview location mixed-model ANOVA. The main effect of time period rated was significant ($F(2, 760) = 56.86$, $p < .01$); participants perceived less time slack for the evening ($M = 2.28$) than for now ($M = 3.11$, $F(1, 380) = 63.40$, $p < .01$) and for the next week ($M = 3.24$, $F(1, 380) = 116.48$, $p < .01$). More importantly, the main effect of time period rated was qualified by the predicted two-way interaction of time period rated and interview location ($F(4, 760) = 5.30$, $p < .01$).

Simple effects tests show that people in the gate perceived more time slack for now (M = 3.49) and for next week ($M = 3.15$) than for that evening ($M = 2.22$, $F(1,142)$'s > 37.60, *all p's* < .01). People in the train station perceived more spare time for now ($M = 2.64$) and for next week ($M = 3.06$) than for this evening ($M = 2.27$, $F(1,127)$'s > 4.67, *all p's* < .05). What changed were the perceptions of spare time "now"; those in the train station perceived themselves to have

less spare time now (M = 2.64) than next week (M = 3.06, $F(1,127) = 6.09$, $p < .05$). Those entering the terminal perceived more spare time for next week (M = 3.57) and for now (M = 3.17) than for evening (M = 2.38, *all pairwise* $F(1,111)$'s > 14.09, *all p's* < .01; see Figure 2.2).

Figure 2.2 Perceived Time Slack By Interview Location in Study 4



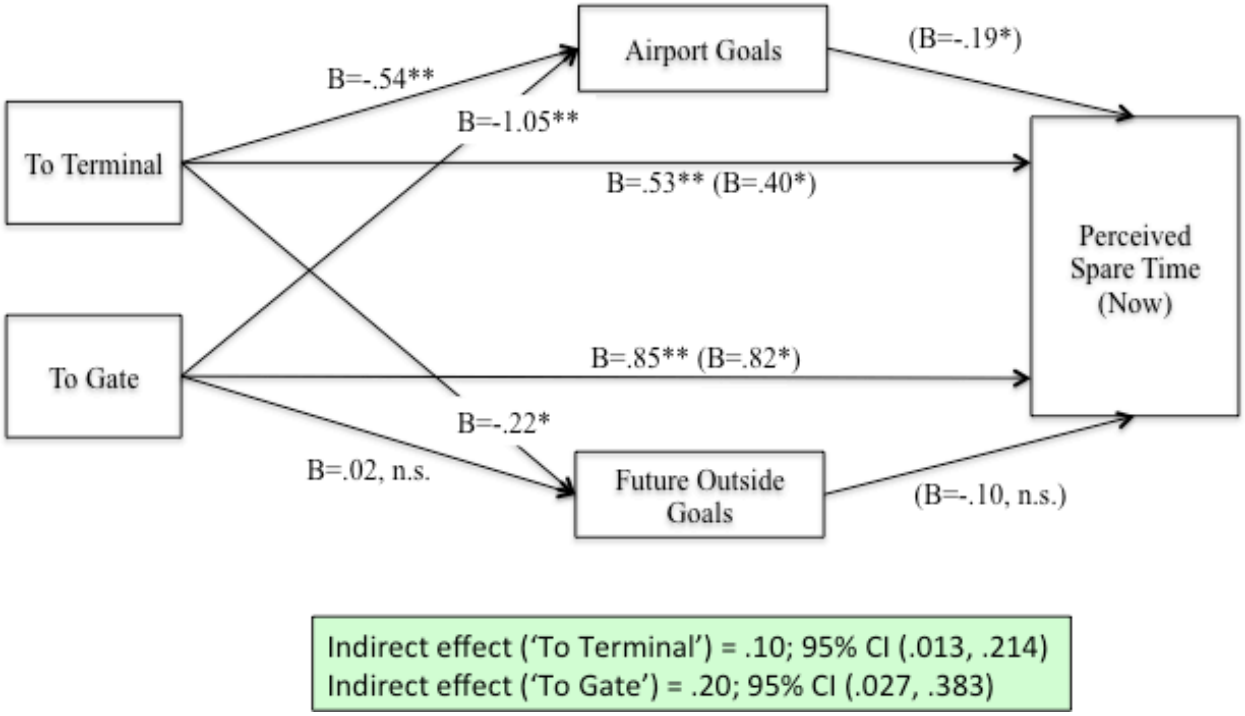
The interaction was as I expected, with the effects driven by the aforementioned simple effects of interview location in ratings of spare time now. The only exception was that we expected no effects of interview location for ratings of spare time this evening or the following week; we found ratings of next week were higher for those interviewed as they entered the terminal.

Mediation analysis. To gain insights into the mediating role of proximate subgoals on perceived spare time now, I coded self-reported thoughts about five different goals into two categories; goals that either can or cannot be attained in the airport, respectively. I labeled the former as airport goals (i.e., catching the train, getting to the gate, and boarding the plane), and the latter as outside goals (i.e., evening activities and things to do next week).

I predicted that the effect of locations on spare time now would be mediated by variation in implemental thinking about airport goals but not by outside goals. The more a traveler is preoccupied by airport goals, the less spare time he or she should perceive. Outside goals, however, should not mediate the effect of locations on spare time now because they are not proximate. I conducted meditation analysis using SPSS syntax MEDIATE (Hayes and Preacher 2011), allowing to test multiple mediators (i.e., airport and outside goals) and a multi-categorical independent variable (i.e., 3 locations) simultaneously. The independent variable was treated in the model as two dichotomous variables; To Terminal (train = 0, terminal = 1, gate = 0) and To Gate (train = 0, terminal = 0, gate = 1). Thus, the first dummy variable contrasts train and terminal and the second train and gate.

Consistent with the prediction, when controlling for time to departure, I found positive and significant indirect effects of interview location on rated spare time now (To Terminal: .10; To Gate: .20), with 95% confidence intervals excluding zero (.013 to .214, .027 to .383, respectively). Indirect effects through outside goals, however, were not significant, indicating that only implemental thinking about airport goals mediates the effect of locations on spare time now. Each variable retained a significant direct effect on spare time now (b(To Terminal) = .40, $t = 2.20$, $p < .01$; b(To Gate) = .82, $t = 4.38$, $p < .01$), perhaps indicating some omitted positive mediator (such as unmeasured inside goals to stop in the restroom, get a newspaper, eat a meal, etc.), consistent with "complementary" mediation (Zhao, Lynch, and Chen 2010).

Figure 2.3 Mediation Analysis 1 in Study 4

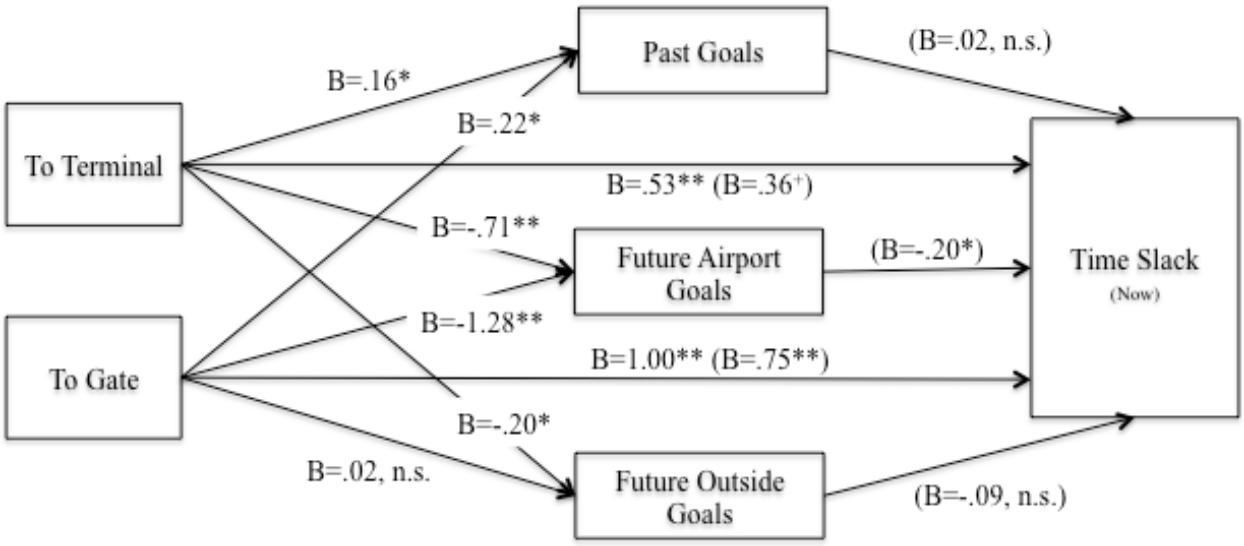


I also ran a slightly different mediation analysis using three categories of goals; goals already attained in the airport (i.e., past goals), goals that can be attained in the airport (i.e., future airport goals), and goals that cannot be attained in the airport (i.e., future outside goals). For instance, 'evening activities' or 'things to do next week' are future outside goals, whereas 'getting to the gate' can be either a past goal in gate or a future airport goal in terminal. Thus, if a traveler in the gate checked 'catching the train', 'getting to the gate', and 'evening activities', her score is 2 for past goals, 0 for future airport goals, and 1 for future outside goals. If a traveler entering the terminal gave the same answers, her score would be 1 for past goals, 1 for future airport goals, and 1 for future outside goals. The rationale for this categorization is that goals already attained should not affect time slack for now even if the goals were activated within less

than 5 minutes. I predicted that only future airport goals (i.e., proximate goals that have yet been completed) mediate the effect of locations on time slack.

The only difference between this and the first mediation analysis is the use of three rather than two mediators. I used the same SPSS syntax and controlled for time to departure. Results revealed positive and significant indirect effects through future airport goals (To Terminal: .17; To Gate: .29), with 95% confidence intervals excluding zero (.038 to .340, .078 to .548, respectively). However, indirect effects through past goals or future outside goals were not significant. Taken together, I argue that only proximate goals not yet attained (i.e., future airport goals) are the driver of perceived time slack. In sum, two meditational analyses support the hypothesis that active and proximate goals drive perception of time slack.

Figure 2.4 Mediation Analysis 2 in Study 4



2.6.3 Discussion

The results of study 4 conceptually replicate and enrich results reported in study 2. First, consistent with study 2, people were less willing to engage in a distracting activity (completing our survey) that would momentarily delay attainment of subgoal when they were close to completing that subgoal. Air travelers declined to complete our 1-minute survey more often when waiting to board their train to the terminal than 2 minutes later when they emerged from the escalator from train station to the terminal or several minutes later when they arrived at their gates.

Second, consistent with study 2, people report less spare time "now" when close to a subgoal (in the train rather than 2 minutes later in the terminal or several minutes later in their gate). This is particularly impressive because any selection effects would only strengthen my results. If those turning us down are those who are "cutting it close", then the higher turn down rates in the train station than in the terminal or gate means that we are observing proportionately more ratings for people cutting it close in the gate than in the terminal or train.

Third, mediation analyses supported the role of proximate goals in perception of spare time; the more travelers thought about active and unattained goals, the less spare time they perceived for now. This held only when the goals were proximate (i.e., goals one could attain in the airport). Critically, all of these analyses controlled for actual time to departure.

Finally, people at all three locations perceived themselves to have less spare time that evening at their destinations than now, but the degree to which this was true differed by interview locations due to effects of subgoal proximity on ratings of now. Those in the train station perceived a lesser difference between spare time now and this evening, compared with those entering the terminal or those in the gate. The implication of this finding is that relative

slack perceptions at two points in time are malleable and depend on how close the person is to attaining an active subgoal, conceptually replicating study 2. This result suggests that Zauberman and Lynch's (2005) original finding that people expect greater time slack in the long run than short run is not just a function of temporal distance per se but a malleable function of proximate goals for the short but not the long run.

Some may argue that the result of spare time now just reflects a kind of response language (cf. Lynch, Chakravarti, and Mitra 1991). That is, people's mental representation for spare time "now" may be unchanged by goal proximity, but they may define the actual time window 'now' to be a function of temporal distance to the closest goal. If so goal proximity effects on spare time now may be entirely unsurprising, because the actual amount of time between the moment of question and the endogenously determined end of the "now" window decreases with proximity to a subgoal. I will address this issue in Study 5.

2.7 Study 5: Subgoal Proximity Affects Comparisons of Spare Time at Two Points in Time

The purpose of study 5 is to rule out the alternative explanation and more clearly test whether proximity to a subgoal makes people perceive that they have less spare time. Therefore, I returned to the airport and replaced the question about spare time "now" with a question about spare time "in the next three hours." This time, I only interviewed travelers whose flight was scheduled to take off within three hours so that the "next three hours" would straddle time in the gate and time in the plane. I conjectured that those sitting in the gate would have a salient subgoal to board the plane. The closer they were to departure, the more they would perceive that they had less spare time in the next three hours, notwithstanding that anything that they could do sitting at the gate could be done sitting on the plane. I expected that proximity to take-off would

affect the difference in rated spare time in the next three hours versus at one's destination, controlling for time of departure, conceptually replicating study 2.

2.7.1 Method

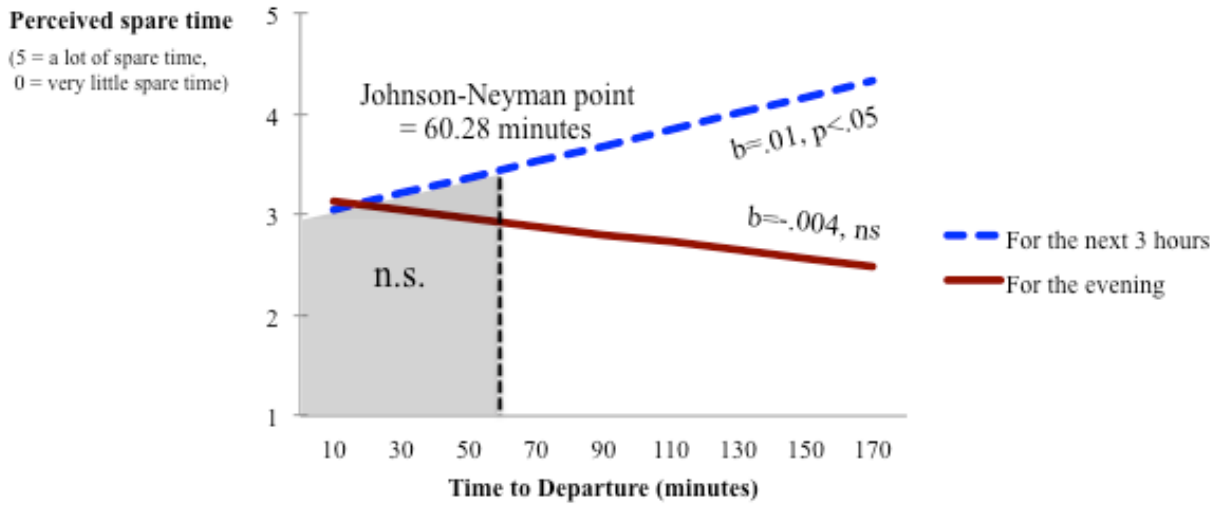
Eighty adults were approached at the gates at Denver International Airport where they waited for a flight. They were asked if they would be willing to fill out a brief survey; 68 agreed. Respondents received a double-sided questionnaire titled "Thinking about your schedules." They read, "We are interested in how much spare time you have at three points of time: for the next 3 hours, this evening when you've arrived at your destination, and the evening of the same day (e.g., Thursday) in three weeks." Then, they rated how much spare time they would have for each point of time on a 5-point scale ranging from *1* (*very little spare time*) to *5* (*a lot of spare time*). On the other side of the questionnaire they reported departure time, and arrival time (in local time). The researcher then recorded the current time and gender. The survey took approximately one minute. Six respondents were dropped from analysis because they indicated that they had more than 3 hours to departure.

2.7.2 Results

Proximity to a subgoal and perceived spare time. I expected that perceived spare time for the next three hours would decrease as the boarding of the flight draws nearer in time because perceived time slack would be driven by proximity to the subgoal of boarding. Regression results confirmed this prediction. Perceived spare time for the next three hours increased with the remaining minutes to departure (b = .01, $t = 2.08$, $p < .05$; See Figure 2.5). Spare time for the evening, however, did not vary with the remaining time to departure (b = -.004; $t = -.89$, *NS*), and

the interaction of reference time period (next three hours versus this evening) with time to departure was significant ($F(1,60) = 4.38$, $p < .05$).

Figure 2.5 Floodlight Analysis in Study 5



I then used spotlight analysis (Irwin and McClelland 2001) to consider the simple effect of time points at different remaining minutes to departure ($M = 76.8$, $SD = 43.0$). I used the Johnson-Neyman technique (Johnson and Neyman 1936; Spiller, Fitzsimons, Lynch, and McClelland 2013) to identify the range of minutes to departure when travelers expected to have significantly more spare time this evening than for the next three hours. The Johnson-Neyman point for the $p < .05$ simple effect of perceiving less spare time this evening than for the next three hours falls at 60.3 minutes to departure, or .38 standard deviations below the mean of 76.8 minutes.

2.7.3 Discussion

In study 5, I found that perceived spare time in the next three hours was an increasing function of time to departure. In addition, people perceive that they have more spare time in the next three hours than that evening at their destinations until departure time was about an hour away, controlling for arrival time at one's destination. This supports the conclusion from study 2 that comparisons of spare time now and the future – central to resource slack theory –are quite malleable and affected by psychological factors in addition to the obvious issues of how much one has to get done in each time interval. Perceptions of spare time now are driven by proximity to subgoals that likely were not salient earlier in the day.

2.8 General Discussion

2.8.1 Summary of Findings

Across five laboratory and field experiments, I demonstrated that the perception of spare time now is a function of active proximate subgoals. Further, I showed that people prefer to delay an interruption when they are close to attaining a subgoal that is only a part of a larger goal. When people are not immersed in subgoal pursuit themselves, they do not anticipate the power of subgoal proximity relative to overall goal proximity to influence willingness to be interrupted.

In studies 1 and 2, I showed that people do not want to be interrupted when they are close to a trivially malleable subgoal. In both studies, participants had a goal to win two of three Nintendo Wii games. When they were closer to a subgoal, participants in study 1 more strongly preferred being interrupted by a longer later than a shorter sooner iPad game, and those in study 2 were more prone to give up a monetary incentive to avoid interruption when they were closer

to a subgoal. The two studies together rule out alternative interpretations that people are less willing to be interrupted because they had more left to do to reach an overarching goal or that overall goal progress and not subgoal progress dictated the effects.

Study 3 showed that when one is not immersed in subgoal pursuit, one does not realize the strength of subgoal proximity relative to overall goal progress. Participants expected another person's willingness to take the attractive offer now to decrease as they are closer to the overarching goal, not subgoals. Taken together, I showed that perceptions that one has little spare time at one point in time but more at another is explained by subgoal proximity, and this in turn explains patterns of inter-temporal preferences.

In two field studies (study 4 and 5), travelers in airports were interviewed. In study 4, I replicated the findings of study 2 and further showed how subgoal proximity affects both willingness to be interrupted and perceived spare time. People were more likely to decline to do a 1-minute survey when they were closer to a subgoal but farther from their overarching goals (in the train to the terminal) than when closer to their overarching goals but farther from the next subgoal (in their terminal or in their gates). Moreover, they rated themselves to have much less spare time when interviewed in the train station than when interviewed two minutes later after emerging from the escalator taking them from train station to their terminal. The effects of interview location on perceptions of spare time now were mediated by degree of thinking about proximate subgoals yet to be accomplished in the airport. In study 5, air travelers in gates expected less spare time in the next three hours the closer they were to departure. Arguably, the set of tasks one can pursue sitting in one's seat in the gate is similar to what one can do in one's seat sitting in the airplane, but people feel more spare time in the next three hours when farther

from takeoff. I argue that this is because the proximate subgoal of boarding loomed larger as departure drew nearer.

2.8.2 Theoretical Contributions

In chapter 2, I explain why people perceive more or less spare time at one point of time or another and why people feel that they are too busy in the moment to allow themselves to be interrupted by some alternate task that might seem attractive under other circumstances. Findings of chapter 2 suggest that people's perception of spare time is not a function of temporal distance per se but of people's anticipated pain from giving up an already-active-proximate goal.

I also provide a new explanation for why people have the present bias (e.g., Laibson 1997; Thaler 1981; Zauberman 2003). I found that proximate goals lead people to value the present time more highly than their future time (i.e., discount delayed time expenditure). These results suggest that, a proximate subgoal, even if trivial to put on hold, drastically distorts the thought about the present, and thus influences people's propensity to discount delayed time expenditure in the future. On this account, the strength of preference to invest at time $t+\Delta$ rather than t to increases as t draws nearer in time because even trivial subgoal proximity makes it seem very costly to forego the goal to pursue the distracting investment opportunity.

Additionally, this work is the first attempt to connect work on goal gradient to inter-temporal choice in complex tasks. It is not straightforward to predict how progress in some larger task affects persistence on that task and discounting of the value of competing tasks. I argue that people endogenously change their representation of tasks as they pursue them, unpacking them and creating subgoals that then control behavior. Many subtle factors can affect how people partition tasks in ways that create what can sometimes seem to be extreme inflexibility and

unwillingness to interrupt one's current activity to take advantage of some attractive distracting opportunity. Work on inter-temporal discounting generally finds preference to delay time investments. My work implies that the reverse can occur when one has goals for the use of time in the distant future but one is not particularly close to attainment of subgoals for the present.

Chapter 3. Essay 2: The Similarity-Proximity Model: How Similarity of Interruption Moderates the Effect of Proximity on Inter-temporal Choice

3.1 Motivation

In chapter 2, I examined how people endogenously generate subgoals in the pursuit of complex goals and how proximity to a subgoal distorts thoughts about the present and in turn shapes inter-temporal choice. In chapter 3, I shift gears to the other type of consumer goals in which consumers need to repeat the same behavior or very similar behaviors to make progress. Many consumer behaviors belong to this category (e.g., coffee reward program, frequent flyer program, car wash reward program, solving a crossword puzzle, etc.). Thus, this type of goal has been dominantly used as stimuli in the goal pursuit literature (e.g., rating music, finding typo, solving anagram, etc.).

However, the previous findings on the effect of goal progress on goal persistence are diverse. For instance, one group of researchers consistently found that making progress decreases motivation (e.g., Fishbach and Dhar 2005), while another group of researchers found the opposite results; making progress increases motivation (e.g., Kivetz, Urminsky, and Zheng 2006). Recently, Bonezzi, Brendl, and De Angelis (2011). showed that motivation is a U-shaped function of progress.

Then, what do we know about goal progress and its impact on motivation? When does making more progress in a focal goal pursuit make people to be more distracted or motivated? The purpose of this essay is to propose a theoretical framework that can explain all of these seemingly contradictory findings. In this chapter, I propose a utility-based model called ‘the

similarity-proximity model' that can deduce all the diverse findings from previous literature on goal pursuit.

3.2 Conceptual Background

3.2.1 Goal Progress and Persistence

A body of literature on goal pursuit describes seemingly contradictory results. One stream of research has shown that goal progress increases motivation for the goal (e.g., Forster, Grant, Idson, and Higgins 2001, Forster, Higgins, and Idson 1998, Hull 1932, Miller 1944, Losco and Epstein 1977, Kivetz, Urminsky, and Zheng 2006, Nunes and Dreze 2006, etc.), while the other stream of research has shown that goal progress decreases motivation (Fishbach and Dhar 2005; Amir and Ariely 2008; Koo and Fishbach 2008).

The former school's findings are called as 'goal-gradient effect' following Hull's (1932) paper where hungry rats run faster as they approach the end of maze where they can eat a food reward. Reasoning from animal behavior research, Kivetz et al. (2006) showed that this goal gradient effect holds for human behavior too. Those enrolled in a reward program (e.g., a café reward program, reward certificates) exert goal-consistent efforts (e.g., purchase coffees, rate songs) more frequently and persistently when they are closer to the reward (i.e., goal). In a similar vein, Nunes and Dreze (2006) demonstrated that, with (vs. without) artificially endowed progress, people are more likely to complete the goal and do it more quickly. All of these findings suggest that compared to less progress, more progress increases motivation.

In contrast, the latter school found the opposite. To name a few, Fishbach and Dhar (2005) showed that those who perceive themselves to have made more progress (e.g., lost more

weight, studied more than their cohorts) are more likely to divert their efforts from focal goal pursuit to goal incongruent behavior (e.g., choose chocolates over apples, express more interest in nonacademic activities). Similarly, Koo and Fishbach (2008) showed, in various contexts, that with certain commitment, people are more motivated when they feel that they didn't make enough progress. These findings imply that compared to less progress, more progress decreases motivation. For the past decade, both schools have accumulated findings consistent with their hypotheses. Thus, it has been an interesting puzzle to many researchers.

There are several obvious differences between two literatures in terms of experimental paradigms and settings. One may argue that the former goal-gradient school showed their effects in single-goal contexts while the latter goal-progress school showed their effects in multiple-goal contexts. Also, one may argue that the decision made in the goal-gradient literature is whether to engage in goal pursuit behavior again (e.g., buying coffee or not) while in the latter literature, the decision is more about whether to keep doing or stop (e.g., keep studying), and so on. I, however, find these arguments unconvincing because the results supporting the goal-gradient hypothesis were found in many field studies where, I believe, participants certainly had multiple goals (e.g., Nunes and Dreze 2006; Kivetz et al. 2006). Further, in the goal progress literature, there are many cases where the decision is about whether to engage in goal-consistent or goal-inconsistent behavior.

There are, however, two research attempts that seemed to provide explanation for when and why more progress decreases or increases motivation (Louro, Pieters, and Zeelenberg 2007; Bonezzi, Brendl, and De Angelis 2011). Although they never claimed to resolve the paradox, it would be worthy of briefly reviewing them to see why their results cannot explain previous findings before I propose my Similarity-Proximity model.

3.2.2 Research Attempts that Look Like Resolving Two Literatures

Louro, Pieters, and Zeelenberg (2007) proposed a multiple goal pursuit model where they examined the interplay between goal-related emotions and goal proximity. They proposed that the effect of goal proximity on motivation is moderated by goal-related emotions, and the moderating effect is mediated by goal-expectancy. Specifically, in a series of studies, they demonstrated that, when near (vs. far from) a focal goal, participants experiencing positive emotions from their progress decreased efforts on the focal goal (e.g., weight loss). Whereas, those experiencing negative emotions increased efforts on the focal goal (See Appendix B). Their proposed mechanism is that, when people are near the focal goal and thus have high goal-expectancy, positive emotions signal that their progress is satisfactory, and thus make people to decrease efforts on the focal goal and increase efforts on the alternative goal. In contrast, when people are near the focal goal, negative emotions (from not making progress with their efforts) encourage people to increase efforts on the focal goal because goal-expectancy is moderate.

At a glance, Louro et al.'s (2007) results in the positive emotions condition look consistent with goal-progress literature and those in the negative emotions condition look consistent with goal-gradient literature. It seems, however, that their model needs an additional assumption in order to explain the findings of prior literature. According to their model, when people are near a focal goal, effort allocation depends on experienced emotions; the goal-gradient pattern emerges when people experience negative emotions, and the goal-progress pattern emerges when people experience positive emotions. Therefore, as people get closer to their focal goal, it should be assumed that people in Kivetz et al (2006) or in Nunes and Dreze (2006) had negative emotions, and those in Fishbach and Dhar (2005) had positive emotions.

However, given that the model of Louro et al. (2007) attributes the genesis of negative emotions to failure to make progress (see Appendix B.), it is ambiguous whether people had negative emotions in Kivetz et al. (2006) and Nunes and Dreze (2006) where making progress is not difficult (e.g., purchasing a cup of coffee or bottles of wine). Moreover, even Louro et al. (2007) never claimed to have resolved the paradox.

Bonezzi, Brendl, and De Angelis (2011)'s psychophysical model is also noteworthy. Building on the assumption that motivation is a function of the perceived marginal value of progress toward a goal, they proposed that relationship between goal progress and motivation depends on which reference point people use to monitor goal progress. According to their model, when people use the end state as a reference point, motivation increases with progress because the perceived marginal value of each unit of progress gets higher as they get closer to the end state. In contrast, when people use the initial state as a reference point, motivation decreases with progress because the perceived marginal value of progress gets lower with progress. Consequently, they found a U-shaped pattern where motivation was higher when people were closer to either the initial or end state than when they were in the middle. Bonezzi et al. (2011) attribute this 'stuck-in-the-middle' pattern to people's tendency to switch in reference points during goal pursuit; people use the initial state as a reference point at the beginning of goal pursuit, while they change it to the end state as they move to it.

At a glance, their results look like resolving the paradox because they showed all of three different patterns (i.e., goal-gradient, reverse goal-gradient, and stuck-in-the-middle pattern) in one study (study 3). They found a pattern consistent with the goal-progress theory when they directed participants' attention to the initial state, a pattern consistent with the goal-gradient

theory when they directed participants' attention to the end state, and a U-shaped 'stuck-in-the-middle' pattern when without manipulating reference point.

Regarding the goal-progress pattern, it seems to be in accordance with the theorizing of Fishbach's and colleagues; when people code their progress as "progress" (by using the initial state as a reference point), motivation decreases[2]. However, their model cannot convincingly explain how Kivetz et al.(2006) or Nunes and Dreze (2006) found the goal-gradient pattern without explicitly manipulating reference point. For instance, Kivetz et al. (2006)'s study material is similar to the material used for the control progress feedback condition (i.e., no reference point) or for the completed progress feedback condition (i.e., initial state as a reference point) in Koo and Fishbach (2010) (see Appendix C). Furthermore, their model cannot explain why Kivetz et al. (2006) or Nunes and Dreze (2006), without a reference point manipulation, did not get the U-shaped pattern. Thus, I think that the Bonezzi et al. model does not resolve two literatures; of course, they never even claimed to have resolved the paradox, either.

Now, what do all these findings mean? What insights can we gain from this research? When do people feel bad with more progress? How and why does directing attention to either what has been done or what has to be done have different impact on goal persistence? How can we parsimoniously explain diverse findings on goal pursuit literature? I propose that we can better understand the dynamics of goal pursuit by considering one important variable that has been neglected in goal pursuit literature – satiation.

[2] In many of Fishbach's experiments, participants were, either implicitly or explicitly, asked to think of the initial state as a reference point (e.g., Fishbach and Dhar 2005; Koo and Fishbach 2008)

3.2.3 Satiation and Similarity

Satiation[3] is defined as decline in liking or enjoyment with more consumption (Coombs and Avrunin 1977). In the past, it is believed that purely physiological factors like feelings of fullness causes satiation (Mook and Votaw 1992). There is, however, growing evidence that satiation is psychological or metacognitive processes (Redden 2008; Galak, Redden, and Kruger 2009; Morewedge, Huh, and Vosgerau 2010). For instance, Redden (2008) demonstrated that people's enjoyment declines less quickly when provided with more refined categories (vs. general category) and that this effect of subcategorization is not limited to just sensory-specific experiences (e.g., eating jelly beans) but extends to more cognitive one (e.g., studying). Galak et al. (2009) showed that consumers recover from satiation more quickly when they recall consuming dissimilar products in the past. More importantly, Morewedge et al. (2010) showed that satiation occurs even with just imagining repetitive consumption.

Satiation easily spreads to other items sharing similar characteristics (McSweeney and Murphy 2000). For instance, McAlister (1982), using consumers' soft-drink consumption diaries, showed that those who have repeatedly consumed a particular soft-drink (e.g., Coke) high in one attribute (e.g., caffeine) and low in the other attribute (e.g., fruit flavor) are less likely to choose other products (e.g., Dr. Pepper, Pepsi) similar in their constituent attributes (i.e., high caffeine and low fruit flavor) but more likely to choose a product (e.g., 7-Up) dissimilar in their constituent attributes (e.g., low caffeine and high fruit flavor); there is a decreasing marginal relationship between the attribute inventory (e.g., caffeine) and the preference for the items high in that attribute (e.g., Coke, Pepsi, or Dr. Pepper). This suggests that once people become

[3] In Chapter 3, I define the concept of satiation more broadly. I define satiation as decline in utility with repetition. Therefore, satiation not only includes decline in enjoyment of candy with repeated consumption but also includes increasing disutility from lifting dumbbell over and over again. By this definition, increasing disutility from repeated regulatory behavior (e.g., studying, exercise) can be satiation.

satiated, they would project their already lowered level of pleasure to similar other options, but not to dissimilar other options. Although their experiments are all about food intake, I argue that the same mechanism could apply to more cognitive domains like working, playing, and studying.

Thus, when people are interrupted with a goal unrelated option while pursuing a goal that requires to repeat similar behaviors, their enjoyment of goal pursuit behavior (e.g., eating pizza) would be lower with more progress, and the extent to which they project their lowered level of enjoyment to the interrupting option (e.g., eating burrito) would depend on how similarly both options are perceived to each other. On the basis of this reasoning, in the following section, I propose a Simliarity-Proximity model where I can explain the diverse findings in goal pursuit literature with two key factors: similarity and proximity[4].

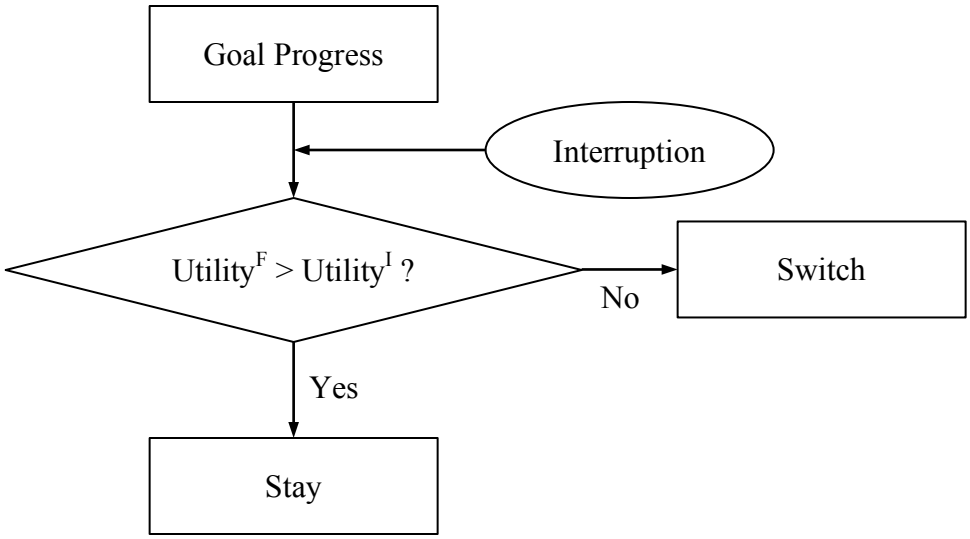
3.3 Model Setup

3.3.1 Conceptual Framework

Figure 3.1 illustrates the dynamics of goal pursuit and interruption, I argue that individual's stay or switch decision would be based on their expected utilities. For instance, an individual would stay in the course of goal pursuit if he expects to obtain higher utility from pursuing a focal goal than from switching to an interrupting option. (That is, $\text{Utility}^F > \text{Utility}^I$.) Otherwise, he would switch to an interrupting option.

[4] Since satiation is a function of repetition (alternatively goal progress or goal proximity).

Figure 3.1 Dynamics of Goal Pursuit and Interruption



Therefore, the utility comparison is a critical component of the Similarity-Proximity model. In the following section, I introduce a basic model based on the utility comparison between one's utility from focal goal pursuit and utility from switching to an interrupting option.

3.3.2 Basic Model

Suppose one who is enrolled in a pizza reward program and eats pizza for every lunch. Whenever he purchases a pizza, at least two different types of utilities he can expect to obtain from his purchase: the immediate pleasure of eating the pizza and the instrumental value of the future reward (e.g., free pizza). Of course, there could be other utilities one can expect. Thus, I first assume that the utility from pursuing a focal goal (U^F) consists of the following three terms: the hedonic utility of a focal option (HU^F), the instrumental goal utility of attaining a goal (GU^F), and the error term (ε^F) that captures all the unobserved factors that affect U^F. GU^F refers to the expected utility of attaining some reward if one attains a particular end state, such as reaching a

required number of coffee-card punches to get a free coffee. Then, the utility that an individual expects to obtain from focal goal pursuit at progress level *t* can be formally stated as follows.

$$U_t^F = HU_t^F + GU_t^F + \varepsilon_t^F \quad (1)$$

, where *t* denotes a fraction of goal progress ($0 \leq t \leq 1$) such that 0 denotes no goal progress and 1 denotes goal completion.

Now, suppose that the individual saw a burrito commercial and starts to consider a burrito instead of a pizza for lunch. To simplify the analysis to highlight the basic tradeoffs captured by my model, I assume that the burrito restaurant does not provide any reward program; there is no goal attached to this interrupting option (Later I will consider relaxing this assumption). Then, what he expects to obtain from choosing a burrito is just the immediate pleasure of eating a burrito. Thus, I assume that the utility from an interrupting option (U^I) consists of the following two terms: the hedonic utility of the interrupting option (HU^I) and the error term (ε^I). Thus, the utility that an individual expects to obtain from an interrupting option at progress level *t* can be formally stated as follows.

$$U_t^I = HU_t^I + \varepsilon_t^I \quad (2)$$

Now, I assume that an individual would choose a focal over an interrupting option if he expects higher utility from the focal than the interrupting option. This can be formally stated as follows.

$$c_t = \begin{cases} F: Focal\ option, & if\ \ U_t^F > U_t^I \\ I: Interrupting\ option, & otherwise \end{cases} \quad (3)$$

, where c_t denotes an individual's choice at progress level *t.*

Now, I define the choice probability $P_t(F|F, I)$ as the probability that an individual chooses a focal over an interrupting option at progress level *t*. Then, by (3), it equals the

probability that the utility of a focal option is greater than the utility of an interrupting option. This can be formally stated as follows.

$$P_t(F|F,I) = Prob\,(c_t = F)$$
$$= Prob\,(U_t^F > U_t^I) \quad (4)$$

When I substitute (1) and (2) for (4), that yields

$$Prob\,(U_t^F > U_t^I)$$
$$= Prob\,[(HU_t^F + GU_t^F + \varepsilon_t^F) > (HU_t^I + \varepsilon_t^I)]$$
$$= Prob\,[(HU_t^F - HU_t^I) + (GU_t^F) > \varepsilon_t^I - \varepsilon_t^F] \quad (5)$$

In (5), the left hand side term of the inequality can be decomposed into two parts. The first part (i.e., $HU_t^F - HU_t^I$) is the hedonic utility difference between a focal and an interrupting option, and the second part (i.e., GU_t^F) is the instrumental goal utility of a focal goal. Now, the choice probability is the probability that the random error term $\varepsilon_t^I - \varepsilon_t^F$ is less than the sum of hedonic utility difference and the focal goal utility (i.e., $(HU_t^F - HU_t^I) + (GU_t^F)$). Without loss of generality, I assume that the random error term follows the standard normal distribution.

$$\varepsilon_t^I - \varepsilon_t^F \sim N(0,1)$$

Then, rearranging (5) yields,

$$Prob\,[(HU_t^F - HU_t^I) + (GU_t^F) > \varepsilon_t^I - \varepsilon_t^F]$$
$$= Prob\,[\,\varepsilon_t^I - \varepsilon_t^F < (HU_t^F - HU_t^I) + (GU_t^F)]$$
$$= \Phi\,[(HU_t^F - HU_t^I) + (GU_t^F)] \quad (6)$$

, where Φ is the cumulative distribution function of the standard normal distribution.

Before proceeding to functional forms of each term in (6), I briefly explain how I model the hedonic utility part and the goal utility part. Specifically, in the following sections, I discuss

the properties of the three terms (i.e., HU_t^F, HU_t^I, and GU_t^F). For expository simplicity of notation, I will drop the U below and, let $h_F(t) = HU_t^F, h_I(t) = HU_t^I, and\ G_F(t) = GU_t^F$.

3.3.2.1 Hedonic Utility of a Focal Option (HU_t^F)

On the basis of previous literature on satiation (Redden 2008; Galak, Redden, and Kruger 2009), I assume that the hedonic utility of a focal option ($h_F(t)$) is a monotonically decreasing function of *t*. That is, for any two progress levels t_1 and $t_2 > t_1$, the hedonic utility of a focal option at progress level t_2 is less than or equal to the hedonic utility at t_1. This can be formally stated as follows.

$$\text{For } \forall t_1 \neq t_2 \in X = \{t: 0 \leq t \leq 1\}, if\ t_1 < t_2, then\ h_F(t_1) \geq h_F(t_2)$$

If we assume that $h_F(t)$ is continuous and differentiable at every progress level *t*, the following property also holds.

$$h_F'(t) \leq 0 \qquad (7)$$

Since $h_F'(t)$ equals the slope of the hedonic utility function at progress level *t*, the greater $|h_F'(t)|$ is, the steeper the negative slope is, which implies that either an individual becomes satiated with the focal task faster.

3.3.2.2 Hedonic Utility of an Interrupting Option (HU_t^I)

Another important assumption of the Similarity-Proximity model is that similarity between a focal and interrupting task affects the extent to which an individual generalizes his current level of enjoyment of a focal task to an interrupting task (e.g., Rolls et al. 1982). For instance, if an interrupting task is perceived as very similar to the focal task, the hedonic utility that an individual expects to obtain from the interrupting task at *t* would be very similar to his

expected hedonic utility from the focal task at *t* (HU_t^F). If an interrupting task is, however, not similar to the focal task at all, the hedonic utility that an individual expects to obtain from the interrupting task would be independent of the hedonic utility from the focal task; it would be just the initial level of hedonic utility from the interrupting task (HU_0^I). Therefore, the hedonic utility from an interrupting option (HU_t^I) can be expressed as a convex combination of HU_t^F and HU_0^I (see (8)) to reflect the notion that similar interruptions exhibit satiation with the focal activity, but dissimilar interruptions are not altered by repeated consumption of the focal task.

$$HU_t^I = s_{F,I} \cdot HU_t^F + (1 - s_{F,I}) \cdot HU_0^I \quad (8)$$

, where $s_{F,I}$is the perceived similarity between a focal and interrupting task such that 0 denotes the least similar and 1 denotes identical ($0 \leq s_{F,I} < 1, \text{ for } \forall F \neq I$).

By this convex combination, the more similar an interrupting task is to the focal task, the more weight will be put on HU_t^F in preference to HU_0^I, and vice versa.

3.3.2.3 Instrumental Goal Utility of a Focal Option (GU_t^F)

Drawing on the previous literature on the relationship between goal proximity and the value of a goal (Heath et al. 1999), I assume that the instrumental goal utility from achieving a focal goal ($G_F(t)$) is a monotonically increasing convex function of *t*. Thus, the instrumental goal utility part can be expressed as follows.

$$G_F(t) = g(t) \cdot \mathcal{R} \quad (9)$$

$$s.t.\ 0 \leq g(t) \leq 1, g'(t) \geq 0, g''(t) \geq 0, g(0) = 0, g(1) = 1$$

, where $\mathcal{R}$ is individual's valuation of the reward.

Given the range of $g(t)$, some may interpret $g(t)$ as the subjective probability of achieving a focal goal or similarly goal expectancy. I admit that $g(t)$ could be either of them,

both, or something else. I avoid naming $g(t)$ as the subjective probability or goal expectancy of goal attainment because no researcher has shown that it is actually the subjective probability changing with goal progress that increases motivation for the goal. The three important points of (9), however, are, 1) each individual would have different valuation for the goal itself (i.e., scaling factor $\mathcal{R}$), 2) the instrumental goal utility at progress level *t* will converge toward their actual value as *t* approaches 1, the progress level associated with goal attainment, and 3) the marginal impact on the value of goal gets bigger as *t* approaches 1. It should be noted that there are some goals that one never "attains" – such as striving to a better person – where there is no concept of achieving (i.e., *t* =1) and thus no goal gradient character to goal utility.

3.4 Comparative Statics

In the previous sections, I introduced the basic model and explained the basic properties of the three terms in the model. In this section, I examine how the probability of choosing the focal option would change with a small change in each parameter of the Similarity-Proximity model. For this analysis, I start with (6). For notational simplicity, let the utility difference $(HU_t^F - HU_t^I) + (GU_t^F)$ be $D(t)$. Then (6) becomes $\Phi(D(t))$.

$$\Phi\left((HU_t^F - HU_t^I) + (GU_t^F)\right)$$

$$= \Phi(D(t))$$

In order to examine how the probability of choosing the focal option changes with progress *t*, I take a partial derivative of (6) with respect to progress level *t*, which yields the following.

$$\frac{\partial\, \Phi(D(t))}{\partial\, t} = \phi\big(D(t)\big) \cdot D'(t) \qquad (10)$$

, where ϕ is the probability distribution function of the standard normal distribution.

The above Equation (10) means the rate at which the cumulative distribution function of the standard normal distribution (Φ) changes at *D(t)* - the utility difference between the focal and interrupting option. In other words, it shows how the probability of choosing the focal option (i.e.,$U_t^F > U_t^I$) changes with progress *t*. Thus, if the above partial derivative is greater than or equal to zero, it means that the probability of choosing the focal option increases with progress (i.e., as *t* increases). In contrast, if the above is less than zero, it means that the probability of choosing the focal option decreases with progress. Therefore, it is essential to examine when this partial derivative is greater or less than zero.

When I substitute the actual functional form of ϕ for (10), that yields,

$$\begin{aligned} &\phi(D(t)) \cdot D'(t) \\ &= \frac{1}{\sqrt{2\pi}} e^{-\frac{(D(t))^2}{2}} \cdot D'(t) \end{aligned} \tag{11}$$

From (11), it is evident that $\phi(D(t))$ is always greater than zero regardless of the value of $D(t)$. Thus, the sign of (11) the partial derivative of the effect of goal progress on choice to persist with the focal option,is determined by the sign of $D'(t)$, the rate of change in the utility difference between the focal and interrupting option.

Now, when I substitute (8) and (9) for $D(t)$, that yields,

$$\begin{aligned} D(t) &= \left((HU_t^F - HU_t^I) + (GU_t^F)\right) \\ &= \left(\left(HU_t^F - s_{F,I} \cdot HU_t^F - \left(1 - s_{F,I}\right) \cdot HU_0^I\right) + (GU_t^F)\right) \\ &= \left(h_F(t) - s_{F,I} \cdot h_F(t) - \left(1 - s_{F,I}\right) \cdot HU_0^I + g(t) \cdot \mathcal{R}\right) \end{aligned} \tag{12}$$

Thus, the first-order derivative of $D(t)$ with respect to *t* (the change in likelihood of choosing the focal option with increasing t) is:

$$D'(t) = \left(1 - s_{F,I}\right) \cdot h_F{}'(t) + g'(t) \cdot \mathcal{R} \tag{13}$$

By definition, the first term in (13) (i.e., $\left(1 - s_{F,I}\right) \cdot h'_F(t)$) is less than or equal to zero because $\left(1 - s_{F,I}\right)$ is always greater than zero, and $h'_F(t)$ is less than or equal to zero. In contrast, the second term in (13) (i.e., $g'(t) \cdot \mathcal{R}$) is greater than or equal to zero because $g'(t)$ is always greater than or equal to zero, and $\mathcal{R}$ is greater than zero[5]. Consequently, there are two countervailing forces in determining the sign of $D'(t)$.

In the following section, I first discuss implications of (13) without using specific functional forms. I do this first to show that the implications of the Similarity-Proximity model are not technical artifacts of specific functional forms. Then, I show, using specific functional forms, how $D'(t)$ changes with a change in each parameter.

3.4.1 Implications without Functional Forms

$s_{F,I}$'s contribution to the stay or switch decision. $s_{F,I}$ is the perceived similarity between a focal and interrupting option. As the interrupting option gets more similar to the focal option, $(1 - s_{F,I})$ approaches to zero. As a result, the first term in (13) (i.e., $\left(1 - s_{F,I}\right) \cdot h'_F(t)$) gets smaller, meaning that the impact of the negative term on $D'(t)$ gets smaller. Therefore, holding everything constant, the more similar the interrupting option is to the focal option, the more likely $D'(t)$ is to be positive, which implies that the probability of choosing the focal option increases with progress. With the same logic, the less similar the interrupting option is to the focal option, the more likely $D'(t)$ is to be negative, which implies that the probability of choosing the focal option decreases with progress. It might be helpful to think about this similarity point using the aforementioned pizza vs. burrito example. After eating many pizzas, people would be more likely to stay with pizza if they are offered a very similar option: another

[5] I assume that people pursue a goal because it has a positive reward or value.

brand of pizza. In contrast, people would be more likely to switch if they are offered a dissimilar option: a burrito.

Proposition 1. The less similar an interrupting option is to a focal option, the more progress decreases the likelihood of staying with a focal option.

$h_F'(t)$'s contribution to the stay or switch decision. $h_F'(t)$ is the rate at which the hedonic utility from a focal task declines with progress. Thus, the bigger the $|h_F'(t)|$ is, the bigger the drop in the enjoyment level is (i.e., rapid satiation). In this case, the negative satiation term in Equation 13 $\left(1 - s_{F,I}\right) \cdot h_F'(t)$), dominates the positive goal gradient term, $g'(t) \cdot \mathcal{R}$. The first term in (13) (i.e., $\left(1 - s_{F,I}\right) \cdot h_F'(t)$) becomes rapidly more negative with t, meaning that the impact of the negative term on $D'(t)$ gets bigger. Therefore, holding everything constant, the bigger the $|h_F'(t)|$ is, the more likely $D'(t)$ is to be negative, which implies that the probability of choosing the focal option decreases with progress. With the same logic, the smaller the $|h_F'(t)|$ is, the more likely $D'(t)$ is to be positive, which implies that the probability of choosing the focal option increases with progress. This latter case is when the focal option rarely satiates either because the pleasure from the focal option is very stable or decreases very smoothly. Representative examples of this case are car wash or coffee reward programs. Thus, this result is consistent with the previous findings where those enrolled in a car wash or coffee reward program show the 'goal-gradient' pattern (Kivetz et al. 2006; Nunes and Dreze 2006).

Proposition 2. The more slowly (vs. rapidly) a focal option satiates, the more (vs. less) likely people would be to stay with a focal option with progress.

The smaller $|h_F{}'(t)|$ can be interpreted differently; it may suggest the bigger time interval between occasions consuming the focal options. That is, even for a focal option of which pleasure generally drops steeply, if there is a long time interval between options so that people recover from satiation, they would be more likely to stay with the focal option.

Proposition 3. The bigger (vs. smaller) the time interval between focal options is, the more (vs. less) likely people would be to stay with a focal option with progress.

$g'(t)$'s contribution to the stay or switch decision. With the convexity assumption shown in (9) (i.e., $g''(t) > 0$), $g'(t)$ increases with progress *t*. Then, the second term in (13) (i.e., $g'(t) \cdot \mathcal{R}$) gets bigger in positive direction, meaning that the impact of this term on $D'(t)$ gets bigger with progress. Therefore, holding everything constant, if $g(t)$ is a convex function, $D'(t)$ is more likely to be positive with progress, which implies that the probability of choosing the focal option increases with progress.

$\mathcal{R}$'s contribution to the stay or switch decision. $\mathcal{R}$ is the individual's valuation of the goal itself. If $\mathcal{R}$ gets bigger, the second term in (13) (i.e., $g'(t) \cdot \mathcal{R}$) also gets bigger in positive direction. Thus, holding everything constant, $D'(t)$ is more likely to be positive with bigger $\mathcal{R}$, which means that the probability of choosing the focal option increases with progress. The following example can illustrate this point. If the reward is a free flight ticket after purchasing 10 pizzas, people would be more likely to stay with a focal option as they get closer to it (even in case that they have already became sick of pizzas). In contrast, if the reward is just a small sticker showing that they actually had 10 pizzas, they would be more likely to switch to a burrito.

Proposition 4. The bigger (vs. smaller) the reward is, the more (vs. less) likely people would be to stay with a focal option with progress

To summarize, analyses show that the probability of choosing the foal option is negatively related with the perceived similarity of an interrupting to a focal option ($s_{F,I}$) and the speed of satiation ($h_F{}'(t)$). It is also shown that the probability of choosing the focal option is positively related with the time interval between focal options (reciprocal of $h_F{}'(t)$) and individual's valuation of the reward ($\mathcal{R}$). In the following section, I show the results of comparative statics more specifically with concrete functional forms. This helps us better understand the meaning of the Similarity-Proximity model. It should be, however, noted that implications do not change with functional forms.

3.4.2 Implications with Functional Forms

In this section, I choose functional forms of $h_F(t)$ and $g(t)$ for comparative statics analyses. First, I use a simple linear function of *t* for $h_F(t)$. Specifically, I set $h_F(t)$ as $C_F - at$, such that C_F is a constant and a is greater than or equal to zero. Here, C_F denotes an individual's initial level of enjoyment of a focal task (i.e., when $t = 0$), and a denotes the speed of satiation. This functional form satisfies the condition shown in (7) (i.e., $h_F{}'(t) \leq 0$). This can be formally stated as follows.

$$h_F(t) = C_F - at \qquad (14)$$

$$s.t.\ a \geq 0$$

Second, I use a quadratic function of *t* for $g(t)$; I set $g(t)$ as t^2. This function satisfies all of the five conditions shown in (9) (i.e., $0 \leq g(t) \leq 1, g'(t) \geq 0, g''(t) \geq 0, g(0) = 0, g(1) = 1$). This can be formally stated as follows.

$$g(t) = t^2 \tag{15}$$

When I substitute (14) and (15) for (13), that yields,

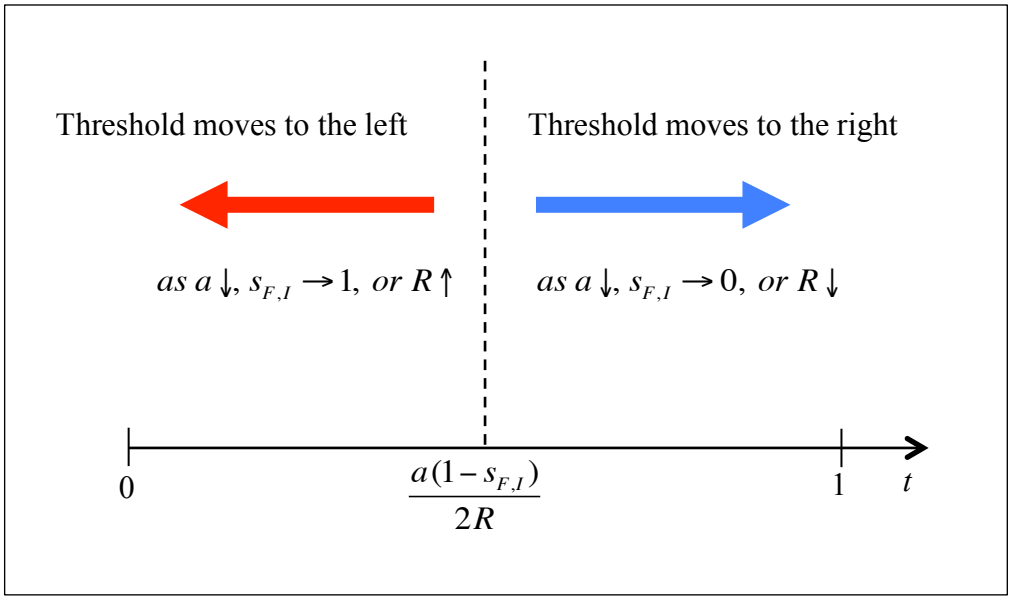
$$\begin{aligned} D'(t) &= \left(1 - s_{F,I}\right) \cdot h_F{}'(t) + g'(t) \cdot \mathcal{R} \\ &= -a\left(1 - s_{F,I}\right) + 2t \cdot \mathcal{R} \end{aligned} \tag{16}$$

A quick recap of the idea: our interests lie in how the probability of choosing a focal option changes with progress (see (10)). From previous discussion, we know that the probability of choosing a focal option increases with progress when (11) is greater than or equal to zero, while it decreases with progress otherwise. Further, we know that the sign of (11) is determined by the sign of (16). Thus, it is essential to examine when (16) is greater than or equal to zero. Setting $D'(t) \geq 0$, and rearranging it yields the following.

$$\begin{aligned} D'(t) &= -a\left(1 - s_{F,I}\right) + 2t \cdot \mathcal{R} \geq 0 \\ \Rightarrow t &\geq \frac{a\left(1 - s_{F,I}\right)}{2\mathcal{R}} \end{aligned} \tag{17}$$

The above inequality shows that the probability of choosing a focal option increases with progress when progress *t* is greater than or equal to a certain threshold (i.e., $\frac{a(1-s_{F,I})}{2\mathcal{R}}$), whereas it decreases with progress when progress *t* is less than the threshold. More importantly, this threshold is influenced by the speed of satiation (a), the dissimilarity of focal and interrupting tasks $(1 - s_{F,I})$, and the reward value $(\mathcal{R})$. Specifically, the threshold shifts to the left (i.e., gets smaller) if a gets smaller, $s_{F,I}$ gets closer to 1, or $\mathcal{R}$ gets bigger (see Figure 3.2).

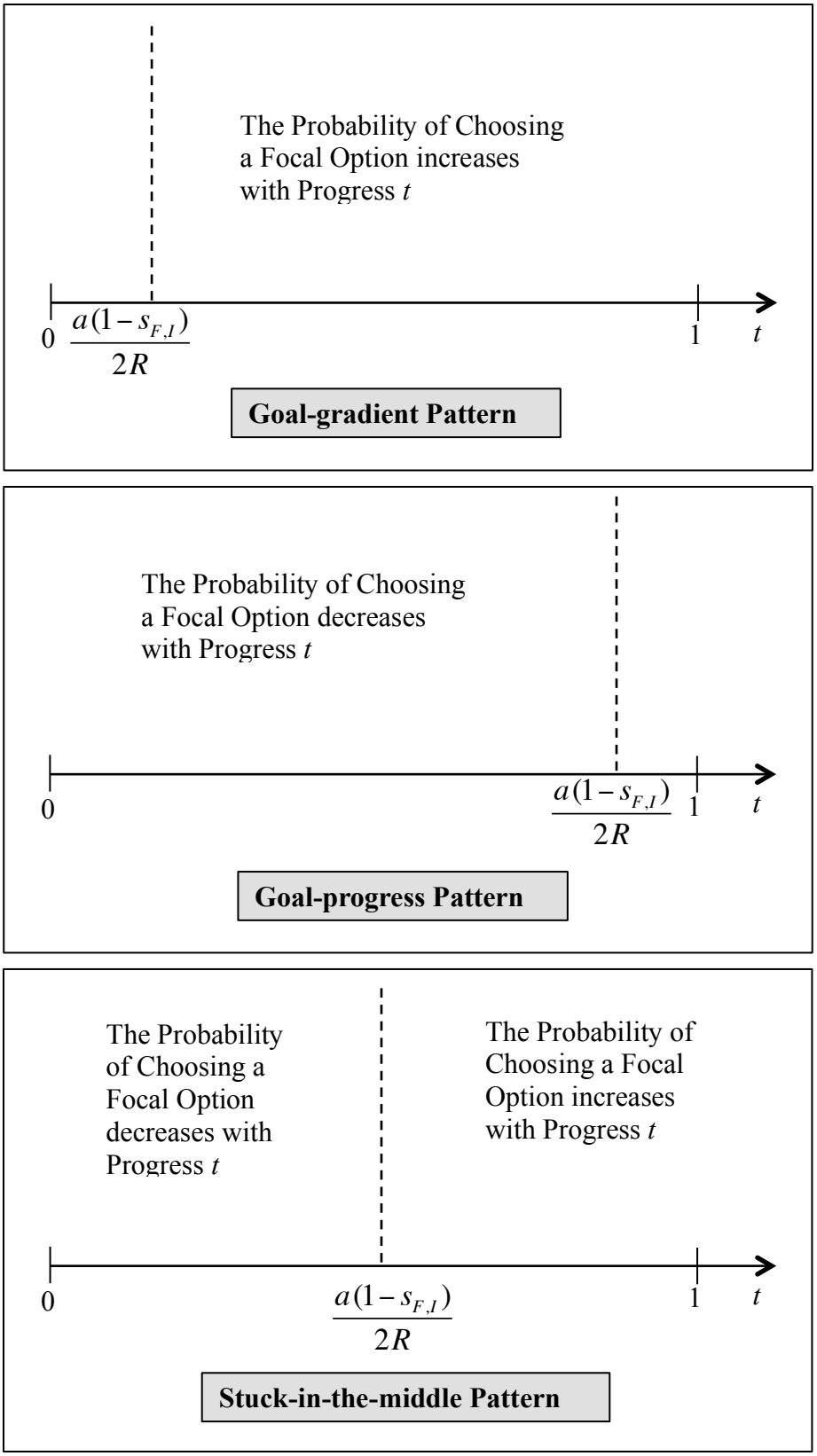
Figure 3.2 How the Threshold Moves with Changes in Parameters



Then, what happens is, the left hand side area of the threshold becomes smaller, and the area at the right hand side becomes larger. By (17), the probability of choosing a focal option increases with progress in the larger, right hand side of the threshold while it decreases with progress in the smaller, left hand side of the threshold. Put differently, if a focal option satiates slowly (due to either its characteristics or longer interval), or if an interrupting option is more similar to the focal option, or if the reward value is perceived big, even small progress can pass the threshold. Subsequently, people would be more likely to choose a focal option with progress, which is consistent with the 'goal-gradient' pattern. In contrast, the threshold shifts to the right if a focal option satiates rapidly, or if an interrupting option is very dissimilar to the focal option, or if the reward value is perceived small. Then, it requires much more progress for *t to* pass the threshold. Thus, people would be more likely to choose an interrupting option with progress in the larger, left hand side area of the threshold, which is consistent with Fishbach and colleagues' 'goal-progress' pattern. Of course, in the case that the threshold is located in the middle, we can observe a pattern consistent with the 'stuck-in-the-middle' (see Figure 3.3).

The Similarity-Proximity model is a very simple utility-based model. One of the beauties of this model is, as shown in comparative statics analyses, its capability to deduce all the diverse findings of previous literatures on goal pursuit. Although different schools have proposed different mechanisms for why they found their findings, I argue that the Similarity-Proximity model can even more parsimoniously explain why different schools found their findings. In the following section, I push my model further. By incorporating weight functions, I extend the basic model to explain an even broader range of previous findings in the goal pursuit literature.

Figure 3.3 Illustration of Moving Threshold and Its Consequences



3.5 Model Extension

One of the assumptions on which the basic Similarity-Proximity model is based is the equal weight assumption: people put an equal weight on both the hedonic utility and goal utility part. It is, however, not always the case. Thus, in this section, I extend the basic model by relaxing this assumption. A body of research on self-regulation and goal pursuit has demonstrated that the effect of goal progress on persistence would differ depending on to which information people focus. By focusing one over the other information, people put more weight on the information on which they focus. For instance, Bonezzi et al. (2011) showed that people exhibit a goal-gradient pattern when instructed to focus on 'to-go' information while they exhibit a goal-progress pattern when instructed to focus on 'to-date' information. My interpretation of these results is that people put more weight on the goal utility part by focusing on 'to-go' information while they put more weight on the hedonic utility part by focusing on 'to-date' information. Similarly, Koo and Fishbach (2008) also found that, at the same level of progress, when people are certain of their commitment (i.e., what they are pursuing is important goal for them), focusing on 'to-go' (vs. 'to-date') information increases goal adherence. Thus, I add a simple weighting function to the basic model to incorporate these findings. Specifically, I modify (12) by adding weighting functions ω and $(1-\omega)$ to the hedonic utility difference part and the goal utility part, respectively. That yields,

$$
\begin{aligned}
D(t) &= \omega(HU_t^F - HU_t^I) + (1-\omega)\cdot(GU_t^F) \\
&= \omega\left(HU_t^F - s_{F,I}\cdot HU_t^F - \left(1-s_{F,I}\right)\cdot HU_0^I\right) + (1-\omega)\cdot(GU_t^F) \\
&= \omega(1-s_{F,I})\cdot HU_t^F - \omega(1-s_{F,I})\cdot HU_0^I + (1-\omega)\cdot g(t)\cdot\mathcal{R} \\
&= \omega\left(1-s_{F,I}\right)\cdot h_F(t) - \omega\left(1-s_{F,I}\right)\cdot HU_0^I + (1-\omega)\cdot g(t)\cdot\mathcal{R} \qquad (18)
\end{aligned}
$$

, where ω is weighting function ranging from 0 to 1 (i.e., $0 \leq \omega \leq 1$).

Then, the first-order derivative of $D(t)$ with respect to *t* is

$$D'(t) = \omega\left(1 - s_{F,I}\right) \cdot h_F{}'(t) + (1 - \omega) \cdot g'(t) \cdot \mathcal{R} \tag{19}$$

When I substitute the same functional forms that I used for (16) for (19), that yields

$$D'(t) = -a\omega\left(1 - s_{F,I}\right) + (1 - \omega) \cdot 2t \cdot \mathcal{R} \tag{20}$$

Setting (20) is greater than or equal to zero, and rearranging it yields the following.

$$D'(t) = -a\omega\left(1 - s_{F,I}\right) + (1 - \omega) \cdot 2t \cdot \mathcal{R} \geq 0$$

$$\Rightarrow t \geq \frac{a\omega\left(1 - s_{F,I}\right)}{2\mathcal{R}(1 - \omega)} \tag{21}$$

The above inequality shows even more interesting results in addition to the original results. First, if an individual put an equal weight on both utilities (i.e., ω = .5), we will get exactly the same results that we got in previous comparative statics analyses. If an individual put more weight on the hedonic utility part (i.e., $\omega > .5, and\ (1 - \omega).5$), the right hand side term of the above inequality becomes bigger, which implies that the threshold moves to the right. Then, it requires much more progress for *t to* pass the threshold. Thus, people would be more likely to choose an interrupting option with progress in the larger, left hand side area of the threshold, which is Fishbach and colleagues' 'goal-progress' pattern. This result is consistent with the previous finding that motivation decreases with progress when people focus on completed action (i.e., to-date information). With the same logic, if an individual put more weight on the goal utility part (i.e., $\omega < .5\ and\ (1 - \omega).5$), the threshold becomes smaller so that it moves to the left. Thus, people would be more likely to choose a focal option with progress in the larger, right hand side area of the threshold, which is the 'goal-gradient' pattern. Again, this result is consistent with the previous finding that motivation increases with progress when people focus on remaining action (i.e., to-go information).

The basic model can be extended in various ways, too. For instance, by adding one more goal utility term to the basic Similarity-Proximity model, we can capture how people allocate their limited resources to two non-conflicting goals (in this case, the original hedonic utility of an interrupting option would change to the hedonic utility of the other goal). Additionally, by deleting the hedonic utility term of an interrupting option from the basic model, we can explain the dynamics of goal pursuit in a single goal context. For the moment, I put these extensions on hold. Instead, in the following section, I experimentally test some of the propositions driven by the Similarity-Proximity model.

3.6 Study 1: The Role of Goal Progress Depends on the Similarity of the Interruption

The objective of Study 1 is to test the Proposition 1: the more similar an interrupting option is to a focal option, the more likely people would be to stay with a focal option with increasing progress. This proposition can be examined by manipulating the similarity of the interruption. If an interrupting option is very similar to a focal option, people would exhibit higher motivation for their focal goal with progress, while this tendency would be weakened or reversed if an interrupting option is dissimilar to a focal option. This is because, with a similar interruption, the satiation with the focal goal with progress is matched by imagined satiation with the interruption. But progress moves one closer to the rapidly ascending end section of the goal gradient function, $g'(t) \cdot \mathcal{R}$.

Thus, in Study 1, I expect to find a two-way interaction of the similarity of interruption and goal proximity. For a focal goal, I used Pandora radio, a very popular personalized Internet radio service among young people; participants were given a goal to rate 10 songs from their favorite stations. I manipulated the goal proximity by interrupting participants after 3rd or 7th

songs. I also manipulated the similarity of interruption by employing two tasks that are equally enjoyable but dissimilar to each other. A pretest (n = 36) showed that 'listening to music with Pandora radio' (M = 5.75, on the 7-pt scale) and 'playing the Wii Sports Resort' (M = 5.58) are equally enjoyable on average ($t(35) = .447$, $p = .657$)

3.6.1 Method

Participants and Design. One hundred twenty six undergraduates from an introductory marketing class participated in partial fulfillment of a course requirement. Upon signing up for participation, participants got an email asking them to come to the lab with the titles of their two favorite songs. Song titles were used to create two Pandora radio stations for the participant. Each participant completed the experiment individually. Goal proximity and the similarity of an interrupting task are two independent variables of interest. Thus, the experimental design was 2(goal proximity: goal far vs. goal near) × 2(the similarity of interruption: similar vs. dissimilar) between-subject design. In the goal far condition, participants were interrupted with another task after they had listened to three songs, and in the goal near condition, they were interrupted after seven songs. When interrupted, participants were told that the research team wanted their feedback on the interrupting task as well. Thus, participants had to choose when to do the other task. The key dependent variable was the choice of whether to do the other interrupting task now or later.

Apparatus. Participants came to a small room where a 32" LCD display panel was mounted on the wall. The display was used to present both an online survey and a desktop application of Pandora radio with it. At the right hand side of the screen, a desktop application of Pandora radio was presented, and at the left hand side of the screen, an online survey was

presented. Participants can see both an online survey and Pandora radio simultaneously. The study used a premium membership for Pandora Radio so that participants were not interrupted by commercial ads while listening.

Procedure. Following a brief instruction and online informed consent, participants were asked to type in their two favorite songs with artists' names in the online survey. Then, using the desktop application next to the online survey, they created their personalized Pandora radio stations using their two songs. The experimenter named the stations as the Pandora station 1 and Pandora station 2. After creating the stations, participants briefly experienced both stations by listening to and evaluating three songs from each of the two Pandora stations. The purpose of this practice session was to familiarize participants with the rating task as well as with the Pandora radio stations.

Participants were instructed that, when the song begins, they should type in the song and the artist name on the survey page, and they would have to listen to each song at least for 30 seconds. After 30 seconds, the online survey page automatically proceeded to the next page where participants rated the song on the three 7-pt scales (dislike-like, bad-good, and boring-interesting). Following the rating task, participants on the next page read "You can either keep listening to the current song or proceed to the next page. Please click the next button when you want to proceed to the next song."

Therefore, participants were able to listen to the current song as long as they wanted. If participants chose to proceed to the next song, they clicked the next button on the survey and on the Pandora application. Then, participants listened to the next song and followed the same procedure. For both practice and experimental sessions, time spent on each song was recorded as a potential covariate. However, results showed that this time had no effects on any of the

dependent variables.

Following practice session, participants were told their goal in the experiment. Their goal was to complete two tasks; Task 1 is to evaluate 10 songs from the Pandora station 1, and Task 2 is to guess whether another person (my research assistant) would give a 'thumbs up' or 'thumbs down' to each song. The experimenter double-checked with participants if they correctly understood their goal by asking them to verbalize their goal. For a few subjects who were confused with the Task 2, the experimenter provided further explanation to ensure that all participants correctly understood their goal.

Once a participant began the Task 1 using the Pandora station 1, the experimenter sat behind, appearing to check email. After some time, he interrupted and requested participants to pause the song. The interruption occurred either after participants had rated 3 or 7 songs, depending on the goal proximity condition. The experimenter excused himself for interrupting and told participants that the research team actually wanted their feedback on something else. In the similar interruption condition, he asked the participant to listen to the Pandora station 2. In the dissimilar interruption condition, he asked the participant to play a Nintendo Wii game (Table Tennis).

The key dependent variable was the participant's choice of whether to accept the interruption now or defer it to later in the experimental session. The experimenter asked participants, "thus, we need you to listen to the Pandora station 2 (or to play this Wii game) at some point of the experiment in addition to completing your original two tasks. But you can choose when to listen to the Pandora station 2 (or to play this Wii game). You can do it 'now' or 'during the second task.' When would you like to do it?" This choice of "now" versus "later" was the main dependent variable to measure focal goal persistence.

Once participants chose when to do the interrupting task, the experimenter asked them to click to the next page and note their answers in the online survey. Then, participants answered a series of questions on similarity perception between the Task 1 and the interrupting task, and other potential covariates. Once they had completed the survey, participants were thanked and released.

My prediction in Study 1 is that, in the similar interruption condition, the hedonic utility that participants expect to obtain from the Pandora station 1 and 2 would not differ much. Thus, they would choose to stay with the current Pandora station 1 when interrupted after 7th song than after 3rd song because the instrumental goal utility would be bigger at 7th song than at 3rd song. This is consistent with the prediction by (17). That is, the numerator of the threshold (i.e., $(1 - s_{F,I})$) becomes smaller so that the threshold moves to the left; goal persistence would increase with progress in the larger, right hand side area of the threshold. In contrast, in the dissimilar interruption condition, the expected hedonic utility of the Pandora station 1 gets lower with progress while the hedonic utility of an interrupting option (i.e., Wii game) would not be influenced by progress and remains constant and eventually surpasses the utility of listening to Pandora 1. Moreover, the instrumental goal utility, $g'(t) \cdot \mathcal{R}$, would increase with progress. Thus, these countervailing forces contribute to the extent to which a participant would stay with a focal option with progress. Thus, the effect of goal progress would be weaker or reversed in this case. This is also consistent with the prediction by (17); the numerator of the threshold (i.e., $(1 - s_{F,I})$) becomes bigger so that the threshold moves to the right; goal persistence would decrease with progress in the larger, left hand side area of the threshold.

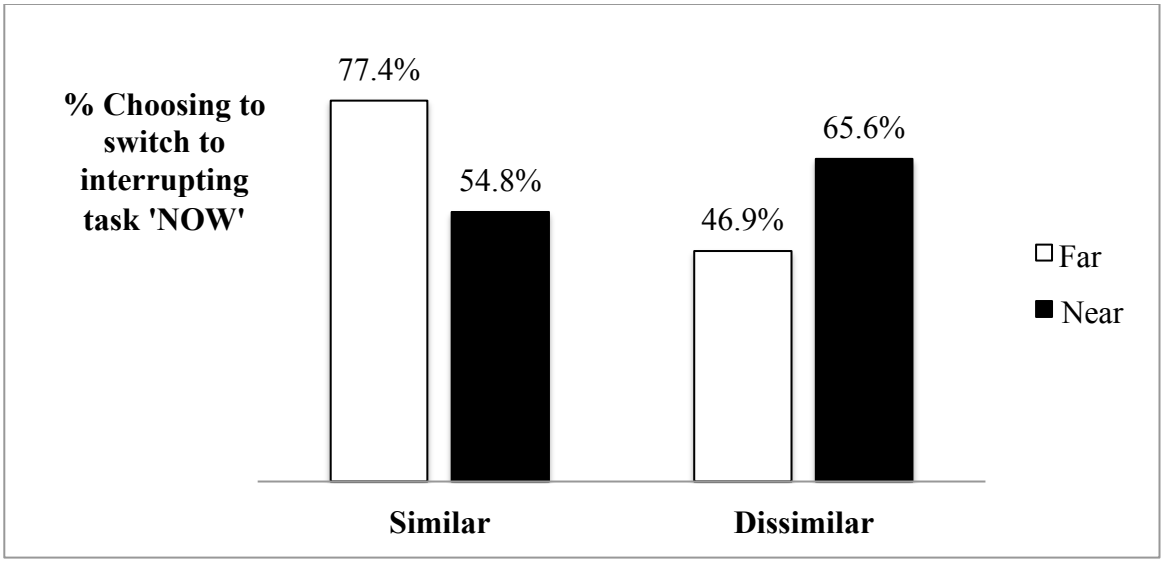
3.6.2 Results

Manipulation check. Participants in the similar interruption condition perceived the interrupting task more similar to the Task 1 (M = 5.23) than those in the dissimilar condition (M = 2.27, $F(1,124) = 140.63$, $p = .000$, η^2=.531). This indicates that my manipulation of similarity was successful.

Willingness to be interrupted now. The Similarity-Proximity model predicts that, when interrupted with a *similar* task (i.e., Pandora station 2), people would be *less* willing to be interrupted now when they are closer to a goal. However, if interrupted with a *dissimilar* task, the pattern would be weakened or reversed.

Consistent with these predictions, a logistic regression results yielded a significant two-way interaction ($\chi^2(1) = 6.17$, $p = .013$, see Figure 3.2). Planned comparisons showed that, with a similar interruption, more people chose to do the interrupting task now when they were far from the goal (M = 77.4%) rather than near (M = 54.8%, $p = .053$), reflecting higher progress. However, with dissimilar interruption, more people chose to do the interrupting task now when they were near (M = 65.6%) than far from the goal (M = 49.6%, $p = .087$), although the difference was only marginally significant. Results are consistent with the Proposition 1; the more similar an interrupting option is to a focal option, the more likely people would be to stay with a focal option with progress.

Figure 3.4 Results of Study 1



3.6.3 Discussion

In Study 1, I found that similarity between an interruption and one's focal task moderates the effect of goal proximity on goal persistence. When interrupted with a similar Pandora station 2, more participants chose to switch to the similar interrupting task now when they were far from rather than closer to the current goal. In contrast, when interrupted with a dissimilar Wii game, more participants chose to switch to that dissimilar interrupting task when they were closer rather than far from the current goal.

One might ask whether or not the perceived similarity changes with progress on the focal activity. That is, after experiencing similar things repeatedly, people might perceive similar things less similar; repeated exposure to similar things could make people more sensitive to distinct features. Thus, participants in the goal near condition (i.e., interrupted after 7th song) might perceive Pandora station 2 as less similar to Pandora station 1 than those in the goal far condition (i.e., interrupted after 3rd song) did. Subsequently, the interrupting task would have

been more attractive to participants in the goal near condition than in the goal far condition. If it were the case, it should work against the goal-gradient pattern that I found in the similar interruption condition, which implies that the reported results might be even stronger. Moreover, examination of the data revealed that the difference in perceived similarity in the similar interruption condition was not statistically significant ($M_{\text{less progress}} = 5.32$, $M_{\text{more progress}} = 5.13$, $F(1,60) < 1$, NS).

Although the pattern of results in the similar interruption condition was (only directionally) reversed in the dissimilar condition, it should be noted that the Similarity-Proximity model originally predicts no specific directions in the dissimilar interruption case because both the hedonic and the goal utility of a focal task come into play with progress in opposite direction. That is, with progress, the hedonic utility of a focal task decreases while the instrumental goal utility increases. Considering only hedonic utility, the interrupting task becomes more attractive with progress on the focal activity. However, goal utility from focal task increases with progress. If goal utility is large (i.e., $\mathcal{R}$ is big), the difference in hedonic utility will be dominated by goal utility so that there will be goal-gradient pattern. If goal utility is small (i.e., $\mathcal{R}$ is small), we can observe a pattern similar to what I reported in Study 1. If we look at the experimental setting in Study 1, the goal was to complete two tasks, which might not be very appealing end-goal to students although that's the only way for them to get a credit.

In the next Study, I examine this issue further with a dissimilar interruption case. Specifically, drawing on the extended model (see (18)), I change the relative weight of the hedonic and instrumental goal utility to examine the impact of these countervailing forces on goal persistence.

3.7 Study 2 Overview: Countervailing Forces of Hedonic Utility and Instrumental Goal Utility

The basic Similarity-Proximity model consists of two parts; the hedonic utility difference between focal and interrupting task (i.e., $HU_t^F - HU_t^I$) and the instrumental goal utility (i.e., GU_t^F) (see (6)). Study 2 is designed to examine this dynamics of the two components in the case of a dissimilar interruption. My aim here is to examine this issue in an experimental design from prior published work on this topic. I aim to show that varying the relative magnitude of the one component can change the original pattern of results. From this perspective, Fishbach and Dhar's (2005) study 2 serves this purpose very well because they manipulated perceived goal progress and measured people's interests in dissimilar tasks without making the explicit goal salient.

Fishbach and Dhar first asked participants to specify how much time they had spent on their coursework in the past day. Their survey form was, however, already partially filled by a fictitious participant so that participants clearly saw one of the crossed-out numbers (i.e., 30 minutes vs. 5 hours). The experimenter told them to ignore the number and explained that he was re-using the form to save papers. Then, participants rated on a seven-point scale to what extent they felt that they made progress toward completing their academic tasks. Finally, participants indicated their interests in pursuing each of three nonacademic activities (i.e., go out with friends, watching TV, and have fun). Their results show that people are more interested in incongruent activities (i.e., nonacademic activities) if they saw low comparison standard and thus perceived (relatively) more progress in focal activities.

However, in Fishbach and Dhar, there was no explicit goal, and thus participants had no idea how far they are away from their desired end state. I would interpret their results as follows. In their goal manipulation, participants who saw upward comparison standard (i.e., 5 hours)

perceived that they did not study much so that they might feel less sick of studying their coursework. In contrast, those who saw downward comparison standard (i.e., 30 minutes) perceived that they studied a lot so that they might feel sick of it. Consequently, those who felt sick of studying coursework expressed higher interest in pursuing nonacademic activities. This is consistent with the prediction of the Similarity-Proximity model when considering only the hedonic utility part (i.e., without goal part, $g'(t) \cdot \mathcal{R}$)).

I, argue, however that if participants had ever considered their specific end goal, results might have been different because the goal part would exert its effect in the opposite direction – causing more persistence with more progress. Thus, if the end goal is made salient, I expect the difference in participants' interests in pursuing nonacademic activities between the two progress conditions to be smaller or disappear or be reversed because the goal part would weaken or offset the impact of hedonic utility difference part.

To examine these differential effects of the two components of the Similarity-Proximity model, I ran three versions of Study 2 with slight variations. In all studies, I used a 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) between-subject design. It is noteworthy that the two cells with no explicit goal condition exactly mimics Fishbach and Dhar's (2005) study 2. Thus, I expect to replicate their findings in these no explicit goal conditions; more (vs. less) progress leads to higher (vs. lower) interests in nonacademic activities. In the explicit goal conditions, I expect no or smaller difference in interests in nonacademic activities because of the impact of the instrumental goal utility. In what follows, I report three studies and discuss the findings.

3.8 Study 2A

3.8.1 Method

Participants and Procedure. A total of ninety-five undergraduate students who enrolled in BCOR marketing course participated in the experiment for course credit. Drawing on Fishbach and Dhar (2005), I first asked participants to specify the time they had spent per week outside of classroom on their BCOR marketing course. Similar to Fishbach and Dhar (2005), on the survey form, a clearly visible fictitious number (1 hour or 6 hours) was crossed out. Then, participants in the explicit goal condition specified what grade they realistically wanted to get in their BCOR marketing course, while there was no question about the grade in the no explicit goal condition. Then, for both conditions, participants indicated on a 7-point scale (1=not at all interested, 7=very interested) their interests in pursuing the following nonacademic activities; go out with friends, watch TV, and have fun. Finally, potential covariates (participants' age, gender, major, and first language) were collected. These variables had no effects and were dropped from further analyses. One participant's data was excluded because he failed to provide his study time. Thus, the result is based on ninety-four subjects.

3.8.2 Results

Study time. Eighteen of our 95 participants specified their study time with time ranges (e.g., 2~3 hours) rather than point decimal values. For these participants, the midpoint of the specified range was taken and converted to minutes.

I first analyzed study time as a dependent variable, expecting to see no treatment effects on self-reported study time, since participants were randomly assigned to cells of a 2(Perceived

goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) ANOVA, and participants should in expectation have equal average study time. Instead, I found an unexpected main effect of perceived goal progress. People in the more progress condition (i.e., 1 hour crossed out) reported significantly less study time (M = 184 minutes) than those in the less progress condition (i.e., 6 hour crossed out, M = 244 minutes, $F(1,90) = 7.71$, $p < .01$). It seems that the crossed out numbers influenced participants' reference points.

This main effect, however, was qualified by significant two-way interaction ($F(1, 90)=10.358$, $p < .01$). Analysis of simple main effects revealed that perceived goal progress only had an effect on self-reported hours of studying when no explicit goal was salient ($M_{\text{more progress}}$ = 138 minutes, $M_{\text{less progress}}$ = 268 minutes, $F(1, 90) = 17.97$, $p < .001$). When an explicit goal was salient, perceived goal progress had no significant effect ($M_{\text{more progress}}$ = 228 minutes, $M_{\text{less prgress}}$ = 219 minutes, $F(1, 90) < 1$, NS). I take these unexpected results to imply that that the goal progress manipulation by comparison was weaker in the no explicit goal condition, because the crossed out numbers are being compared to different standards of own prior studying. This will be material in interpreting the primary dependent variable of Interest in pursuing nonacademic activities.

Table 3.1 Results of Study 2A

DV	No explicit goal		Explicit goal	
	Less progress (6 hours crossed out)	More progress (1 hour crossed out)	Less progress (6 hours crossed out)	More progress (1 hour crossed out)
Study time (in minutes)	268 (vs. 300)	138 (vs. 60)	219 (vs. 300)	228 (vs. 60)
Interest in pursuing nonacademic activities	5.81	6.04	5.63	5.61

Interests in nonacademic activities. I expected to follow Fishbach and Dhar in creating a composite measure for the main dependent variable (i.e., average interests in three nonacademic activities). I found that the reliability of this three-item scale was substandard, as measured by Cronbach's alpha (alpha = .44). Typically alpha = .70 is treated as a minimum threshold for internal consistency of multi-item scales. It is noteworthy that in Fishbach and Dhar's (2005) Study 2, reliability as measured by Cronbach's alpha = .53, also below conventional standards. Fishbach and Dhar (2005) nonetheless found a significant difference in their dependent variable by progress conditions. Therefore, I averaged three items to create the same measure and examine my hypothesis. In the no explicit goal condition, I expected to replicate Fishbach and Dhar's finding of increased interest in the interrupting nonacademic activities with higher perceived goal progress. I expected this effect to soften significantly when there was an explicit goal, producing a significant interaction of progress with the presence or absence of an explicit goal.

A 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of explicit goal: No explicit goal vs. Explicit goal) ANOVA yielded no significant two-way interaction ($F < 1$, *NS*). Thus, the hypothesis was not supported. The main effect of the existence of explicit goal was, however, marginally significant ($M_{\text{no goal}} = 5.93$, $M_{\text{goal}} = 5.62$; $F(1,92) = 2.98$, $p = .088$). This suggests that a salient explicit goal makes people less interested in goal-incongruent activities, which is not inconsistent with my prediction, but also not particularly surprising.

A closer examination of cell means revealed that the pattern was directionally consistent with my predictions. Specifically, similar to Fishbach and Dhar (2005), with no explicit goal, people expressed directionally higher interests in pursuing nonacademic activities when they were in the more progress ($M = 6.04$) than in the less progress condition ($M = 5.81$, $F(1,90) =$

1.25, $p = .297$). In contrast, with an explicit goal, people expressed similar level of interests in nonacademic activities in both progress conditions ($M_{\text{more progress}} = 5.61$, $M_{\text{less progress}} = 5.63$; $F < 1$, *NS*). One more thing to note is that, in the more progress condition, people were marginally less interested in nonacademic activities when an explicit goal became salient ($M = 5.61$) than not ($M = 6.04$, $F(1,90) = 2.96$, $p = .089$), consistent with what my model would predict when goal gradient effects on goal utility are added to the hedonic utility of studying versus pursuing the interrupting nonacademic activities.

3.8.3 Discussion

The results of Study 2A did not support the hypothesis nor replicate previous findings. One interpretation is that the high level of random error in the dependent variable – reflected in the low Cronbach's alpha -- reduced the power of the statistical test. If this is true, it should be noted that Fishbach and Dhar had almost as weak alpha values. A second possibility is that the Fishbach and Dhar results reflected a Type 1 error.

A third possibility for my failure to replicate Fishbach and Dhar in the no explicit goal condition is the weak goal manipulation. The tendency to distort one's prior amount of studying in response to high or low comparison standards weakens the effect of manipulating the comparison standard of the response crossed out from a prior respondent. This causes the reported study time in the no explicit goal condition to be closer to respondent's manipulated reference points for both progress conditions. That is, participants reported significantly lower amount of study time when they saw 1 hour crossed out (M = 138 minutes) than when 6 hours crossed out (M = 268 minutes, $F(1, 90) = 17.97$, $p < .001$, see Table 3.1).

These unexpected results might lead to a weak goal progress manipulation, and subsequently replication failure. I examined this possibility with a 'continuous goal progress' variable that I created by subtracting the comparison standards (i.e., 1 hour vs. 6 hours) from participants' reported study time. When I regressed the interests in nonacademic activities on this continuous goal progress, existence of explicit goal, and its interaction, none of the beta coefficients reached statistical significance. In conclusion, weak goal manipulation in the no specific condition, although it looks like a culprit, is not the main driver of the replication failure.

Another interpretation for the results of Study 2A is that the power of the goal progress was reduced due to chronic individual differences in study time that add error variance to the dependent variable of interest in distracting activities. Those who generally spend less time on their coursework are those inherently more interested in nonacademic activities (see Table 3.1). To examine this, in the next study, I collect individual differences in the interests in pursuing other activities at the beginning to control for error variance.

3.9 Study 2B

The results of Study 2A suggest that goal progress manipulation might not be strong enough. So, in Study 2B, I altered the experimental procedure to strengthen the goal progress manipulation. Instead of asking about the study time on the coursework in the past week, I asked study time on a marketing course in the past day. I also changed the time reference for the more progress condition from 1 hour to 30 minutes and from 6 hours to 3 hours for the less progress condition, respectively, to make a more realistic comparison to study time for a single course rather than the collection of courses measured in Study 2A. I expect the participants in the more progress condition to perceive even more strongly that they make more progress if they see a

fictitious number expressed in minutes. Additionally, for the explicit goal condition, I asked about participants' realistic expectations for the midterm scores (100 percent basis). I intentionally collected the data a week before the second midterm of the marketing course so that their explicit goal becomes more vivid. I also collected covariates (i.e., individual differences in the interests in pursuing other activities) at the beginning of the survey and added three more nonacademic activities for the dependent variable (see Table 3.2).

Table 3.2 Comparison of Study 2A, 2B, and 2C with Fishbach and Dhar's (2005) Study 2

	Fishbach and Dhar (2005)	Study 2A	Study 2B	Study 2C
Covariates (How much time you spent on the following activities over the past two weeks?)	N/A	N/A	1. Web surfing 2. Attending social events 3. Volunteer work	1. Web surfing 2. Attending social events 3. Volunteer work
Goal progress manipulation (Crossed-out numbers)	30 minutes vs. 5 hours	1 hour vs. 6 hours	30 minutes vs. 3 hours	30 minutes vs. 5 hours
Period	In the past day	In the past week	In the past day	In the past day
Study time for	Coursework	A marketing course	A marketing course	Coursework
Explicit goal		Grade goal for the marketing course	Score goal in midterm next week	GPA goal for this semester
Manipulation check (Please indicate the extent to which you feel that you are making progress toward completing your academic task)	Yes	N/A	N/A	Yes
DV (Please indicate your interests in pursuing the following activities)	1. Go out with friends 2. Watch TV 3. Have fun	1. Go out with friends 2. Watch TV 3. Have fun	1. Go out with friends 2. Watch TV 3. Exercise 4. Watch Movie at home 5. Listen to Music 6. Have fun	1. Go out with friends 2. Watch TV 3. Exercise 4. Watch Movie at home 5. Listen to Music 6. Have fun

3.9.1 Method

Participants and Procedure. A total of seventy undergraduate students who enrolled in BCOR marketing course participated in the experiment for a course credit. They first indicated on a 7-point scale (1 = Very little, 7 = A lot) how much time they had spent on three different activities over the past two weeks; web surfing, attending social events, and volunteer work. Then, participants specified the time they had spent on the BCOR marketing course in the past day. Participants responded on the survey form where either 30 minutes or 3 hours was crossed out but still clearly visible. Following this question, participants in the explicit goal condition were asked to specify what grade (expressed as a percentage) they realistically wanted to get in their BCOR marketing course midterm the following week. There was, however, no question about the grade in the no explicit goal condition. Then, for both conditions, participants indicated on a 7-point scale (1 = not at all interested, 7 = very interested) their interests in pursuing the following nonacademic activities; go out with friends, watch TV, exercise, watch movie at home, listen to music, and have fun. Finally, information about participants' gender, and their first language was collected.

3.9.2 Results

Study time. Similar to Study 2A, the reported study time was converted into minutes and analyzed to understand how distortions in perceived own study time as a function of seeing another's study time as a comparison standard might have weakened the manipulation of goal progress. A 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) ANOVA with 'study time in minutes' as a dependent variable yielded no significant two-way interaction ($F(1,66) = .001$, $p = .980$, *NS*) but a significant main effect of perceived goal progress; those who saw 30 minutes crossed out reported

significantly less study time (M = 79 minutes) than those who saw 3 hours crossed out (M = 125 minutes, $F(1,66) = 4.77$, $p = .03$, $\eta^2 = .067$). This result seemed to be driven by the different reference points. However, on average, participants in the more progress condition reported about 50 minutes more study time than their fictitious respondent (79 minutes – 30 minutes) while those in the less progress condition reported about 55 minutes less study time than their fictitious respondent (180 minutes – 125 minutes). Therefore, despite the significant main effect of goal progress, I argue that the goal progress manipulation was successful.

Interests in nonacademic activities. Like in Study 2A, the reliability of the three original items (go out with friends, watch TV, and have fun) was assessed with Cronbach's alpha. The reliability ($\alpha = .26$) was even worse than Study 2A ($\alpha = .44$) or Fishbach and Dhar (2005) ($\alpha = .53$). The reliability did not increase much either when all of the six items were used ($\alpha = .42$). In both cases, the reliability was too poor to be used as a dependent variable.

Inter-item correlation showed that watch TV and watch movie at home have zero correlation with the other four items while the four items positively correlate one another (all p's < .054). Therefore, I excluded the two items and assessed the reliability with the four remaining items. The result showed that Cronbach's alpha increased to some degree but not to an acceptable level ($\alpha = .65$). Despite this, I averaged four items to create a composite measure to examine my hypothesis[6]. (see Table 3.3)

[6] Table 3.3 also shows the results when I used the same three items as Fishbach and Dhar (2005).

Table 3.3 Results of Study 2A, 2B, and 2C in comparison with Fishbach and Dhar's (2005) Study 2

Scale (1=not at all interested, 7=very interested)		With no explicit goal		With an explicit goal	
		Less Progress	More progress	Less progress	More progress
Fishbach & Dhar's (2005) Study 2 (n = 40)	FD's DV[7] (α=.53)	4.31[a]	5.05[b]	N/A	N/A
	Go out with friends	N/A	N/A	N/A	N/A
	Watch TV	N/A	N/A	N/A	N/A
	Have fun	N/A	N/A	N/A	N/A
Study 2A (n = 95)	FD's DV (α=.44)	5.82	6.04	5.64	5.61
	Go out with friends	6.04	6.35	5.74	6.21
	Watch TV	4.88	4.87	4.74	4.08
	Have fun	6.54	6.91	6.43	6.54
Study 2B (n = 71)	FD's DV (α=.26)	5.60	5.49	5.50	5.72
	New DV1[8] (α=.65)	5.59	5.93	5.83	6.04
	Go out with friends	6.00	5.88	6.00	6.29
	Watch TV	4.63	3.94	3.83	4.06
	Have fun	6.15	6.64	6.67	6.82
	Exercise	5.05	5.65	5.28	5.29
	Watch Movie at home	4.26	4.53	5.00	5.35
	Listen to Music	5.16	5.53	5.39	5.76
Study 2C (n = 149)	FD's DV (α=.50)	5.71	5.55	5.45	5.19
	New DV2[9] (α=.64)	5.51	5.29	5.19	5.14
	Go out with friends	6.46	6.29	6.00	5.92
	Watch TV	3.86	3.76	3.63	3.28
	Have fun	6.81	6.60	6.71	6.39
	Exercise	5.35	5.26	5.21	5.75
	Watch Movie at home	4.78	4.39	4.16	4.22
	Listen to Music	5.81	5.42	5.42	5.28

[7] Fishbach and Dhar's (2005) DV was averaged across the following three items; go out with friends, watch TV, and have fun.
[8] New DV1 was averaged across the following four items; go out with friends, have fun, exercise, and listen to music.
[9] New DV2 was averaged across the all six items.

A 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) ANOVA yielded no significant two-way interaction ($F < 1$, *NS*) or main effects (all *F's* < 1.43, all *p's* > .23). Planned contrasts were not even marginally significant (all *F's* < 1.27, all *p's* > .26). When I controlled for error variance using three covariates, the results were the same. Thus, replication failed again. Although the result in the no explicit goal condition was directionally consistent with previous findings ($M_{\text{more progress}} = 5.93$, $M_{\text{less progress}} = 5.59$), the difference was not significant ($F(1, 70) = 1.27$, $p = .26$). Moreover, although the result in the explicit goal condition showed that those in the more progress condition ($M = 6.04$) were not different from those in the less progress condition ($M = 5.83$, $F < 1$, $p = .48$) in their interests in nonacademic activities, people overall expressed directionally higher interests in nonacademic activities when they were asked about an explicit goal than when they were not.

3.9.3 Discussion

The results of Study 2B did not support the hypothesis nor replicate the previous findings. One interesting observation is that participants' interests in nonacademic activities are not statistically different across all four conditions although the reported study time was statistically different between more and less progress condition. A possible explanation for this null result is that the question used in Study 2B was too narrowly focused to capture participants' other thoughts and past behavior. In other words, different from Fishbach and Dhar (2005) who asked how much time people had spent on the COURSEWORK in the past DAY or Study 2A where I asked how much time they had spent on a MARKETING COURSE in the past WEEK, in Study 2B, the question was about a MARKETING COURSE in the past DAY. Therefore, given that normal undergraduate students take 5 to 6 courses per semester, it might be the case that the participants

had spent more time on the other courses rather than the marketing course in the past day, and thus expressed higher or lower interests in nonacademic activities from considering their whole behavior in the past day. So, in the next study, I go back to the Fishbach and Dhar's (2005) original manipulation and ask about the COURSWORK in the past WEEK.

The second issue is that, in both Study 2A and 2B, there was no question to check if goal progress manipulation is successful. Although the reported study time in both conditions differ from the fictitious number by about 50 minutes in the present study, it does not necessarily mean that goal progress manipulation was strong enough. Rather, it might be the case that in both conditions, participants did not perceived much difference so that perceived goal progress did not differ across all four conditions. If it is the case, the null results of Study 2B perfectly make sense. Therefore, following Fishbach and Dhar (2005), I explicitly ask about participants' perceived goal progress in the next study.

Finally, in both Study 2A and 2B, the 'watch TV' item did not correlate with the other two items (i.e., go out with friends, have fun). Although there is no way to examine if it is also the case in Fishbach and Dhar (2005), the low reliability of three items in all of the studies (including the original study) leads me to question about if it is valid to measure the nonacademic activities with the original three items.

3.10 Study 2C

Given the failure to replicate Fishbach and Dhar (2005) two times, in Study 2C, I tried to mimic the original study as closely as possible. With this goal in mind, I made several changes in the experiment. First, I used the same fictitious numbers (i.e., 30 minutes vs. 5 hours), the same period (i.e., in the past day), and the same study subjects (i.e., coursework). Second, in the explicit

goal condition, I asked participants' realistically desired GPA for the semester. Third, I asked a question about participants' perceived goal progress. The remaining part of the experiment was the same as Study 2B (see Table 3.2).

3.10.1 Method

Participants and Procedure. One hundred sixty students were recruited in front of the Business School library. They filled out the survey in exchange for a mini-sized chocolate. For this study, I only aimed for those not enrolled in the BCOR marketing course to minimize the potential overlap between this and previous studies. Respondents first answered if they were enrolled in the BCOR marketing course. Despite our attempt to recruit non-BCOR students, nine respondents indicated that they were enrolled in the BCOR marketing course. It did not, however, change the results if I included them in the data. Thus, I did not exclude them from analyses.

Participants then indicated on a 7-point scale (1 = Very little, 7 = A lot) how much time they had spent on three different activities over the past two weeks; web surfing, attending social events, and volunteer work. Then, participants specified the time they had spent on the coursework in the past day. Again, there was a fictitious number (either 30 minutes or 5 hours) crossed out on the survey form. Peculiar to Study 2C, there were six participants who answered 'N/A' for this question. I conjecture that these respondents assumed that the question was already answered so they just skipped it by writing 'N/A. Therefore, they were excluded from further analyses. Then, like in Fishbach and Dhar (2005), all participants indicated on a 7-point scale (1 = Very unlikely, 7 = Very likely) the extent to which they felt that they were making progress toward completing their academic tasks. Following this question, participants in the explicit goal condition were asked to specify their ideal GPA (on 4.0 basis) for the semester. Then, all participants indicated on a 7-point

scale (1 = not at all interested, 7 = very interested) their interests in pursuing the following six nonacademic activities; go out with friends, watch TV, exercise, watch movie at home, listen to music, and have fun. Finally, information about participants' gender, and their first language was collected.

3.10.2 Results

Study time. Like in Study 2A and 2B, the reported study time was converted into minutes and used. Descriptive statistics showed that five respondents reported that they studied 14 to 15 hours in the past day. I excluded them from further analyses because their z-scores of the study time were greater than 2.5.[10]

A 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) ANOVA with 'study time in minutes' as a dependent variable again yielded a two way interaction suggesting that perceived study time was distorted differentially as a function of experimental conditions ($F(1,145) = 3.74$, $p = .055$). Again, random assignment of subjects to conditions and veridical reporting would have produced no effects on this dependent variable. As in Study 1, analysis of the simple main effect of the goal progress manipulation in the no explicit goal condition used by Fishbach and Dhar showed that participants reported significantly more study time when they were exposed to the higher comparison standard (i.e., 5 hours; M = 302 minutes) than to the lower one (i.e., 30 minutes; M = 208 minutes, $F(1,145) = 4.98$, $p = .027$). In contrast, those in the explicit goal condition reported the same amount of study time in both progress conditions ($M_{\text{less progress}} = 212$ minutes, $M_{\text{more progress}} = 233$ minutes, $F(1, 145) < 1$, *NS*, see Table 3.4 and 3.5).

[10] The results are statistically the same when I included these extreme responses (see Table 3.5).

Table 3.4 Results of Study 2C (excluding outliers, n=149)

DV	No explicit goal		Explicit goal	
	Less progress (5 hours crossed out)	More progress (30 minutes crossed out)	Less progress (5 hours crossed out)	More progress (30 minutes crossed out)
Study time (in minutes)	302 (vs. 300)	208 (vs. 30)	212 (vs. 300)	233 (vs. 30)
Perceived progress	5.93	5.82	5.66	5.99
Interests in pursuing nonacademic activities	5.71	5.55	5.45	5.19

Table 3.5 Results of Study 2C (including outliers, n=154)

DV	No explicit goal		Explicit goal	
	Less progress (5 hours crossed out)	More progress (30 minutes crossed out)	Less progress (5 hours crossed out)	More progress (30 minutes crossed out)
Study time (in minutes)	317 (vs. 300)	224 (vs. 30)	212 (vs. 300)	284 (vs. 30)
Perceived progress	5.96	5.85	5.66	5.94
Interests in nonacademic activities	5.68	5.56	5.45	5.17

These findings closely follow the unexpected pattern in Study 2A. Taken together, I expected that goal progress manipulation by comparison standards would be weaker in the less progress with no explicit goal condition; I expected no effect of comparison on perceived progress because the reported study time (i.e., 302 minutes) in that condition was no different from the comparison standard (i.e., 5 hours = 300 minutes, $t(37)=.484$, *NS*) but expected, if any, the effect of absolute amount of study time on perceived progress, which could increase perception of goal progress.

Perceived goal progress. A 2(Perceived goal progress: Less progress vs. More progress) × 2(Existence of an explicit goal: No explicit goal vs. Explicit goal) ANOVA with 'perceived goal progress' as a dependent variable yielded no significant main effects nor higher interaction (all *F's*(1,145) < 1.63, $p > .205$). Results showed that comparing one's progress to a low standard did not increase perceived goal progress (M = 5.90) more than comparing one's progress to a high standard (M = 5.79, $F(1, 147) < 1$, *NS*). Therefore, goal progress manipulation by social comparison standards failed.

A further examination of the means indicated that, in the no explicit goal condition, perceived goal progress in the less progress condition (M = 5.93) was as high as those in the more progress condition (M = 5.82, $F(1,145) < 1$, *NS*). However, in the explicit goal condition, perceived goal progress was in the right direction although the difference was not significant ($M_{\text{less progress}}$ = 5.66, $M_{\text{more progress}}$ = 5.99, $F(1, 145) = 1.75$, $p = .18$). These results are consistent with my conjecture that the distorted high level of study time in the less progress with no explicit goal condition (M = 302 minutes) could increase perceived goal progress.

Interests in nonacademic activities. Like in Study 2A and 2B, the reliability of the three original items (go out with friends, watch TV, and have fun) was first assessed with Cronbach's alpha. The reliability ($\alpha = .50$) again failed to reach the minimum acceptable threshold. Although the reliability was too poor to be used as a dependent variable, it was the best of three studies and the closest to what Fishbach and Dhar (2005) found in their study ($\alpha = .53$). Thus, I used this composite measure to examine my hypotheses[11]. A 2(Perceived goal progress: Less progress vs. More progress) x 2(Existence of explicit goal: No explicit goal vs. Explicit goal) ANOVA yielded

[11] In Study 2C, the six items positively correlate each other in 13 of 15 pairs, and the reliability increased to .64 when all of the six items were used. Thus, in addition to the original three-item DV, I examined the hypotheses with this composite measure. Results were statistically the same except that the previously marginally significant difference in the more progress condition became nonsignificant ($M_{\text{no explicit goal}}$ = 5.29, $M_{\text{explicit goal}}$ = 5.14, $F(1, 145) < 1$, *NS* see Table 3.3).

no significant two-way interaction ($F < 1$, *NS*). There was, however, a significant main effect of the existence of explicit goal; participants with an explicit goal expressed less interests in nonacademic activities ($M = 5.32$) than those with no explicit goal ($M = 5.62$, $F(1,147) = 4.53$, $p = .035$). Planned contrasts showed that, in the no explicit goal condition, interests in nonacademic activities did not differ by goal progress ($M_{\text{less progress}} = 5.71$, $M_{\text{more progress}} = 5.55$, $F(1, 145) < 1$, *NS*). In the explicit goal condition, the difference was not significant either although the result was directionally consistent with the prediction of the Similarity-Proximity model ($M_{\text{less progress}} = 5.45$, $M_{\text{more progress}} = 5.19$, $F(1, 145) = 1.53$, $p = .22$). Furthermore, in the more progress condition, people were less interested in nonacademic activities when an explicit goal was salient than not ($M_{\text{no explicit goal}} = 5.55$, $M_{\text{explicit goal}} = 5.19$, $F(1, 145) = 3.06$, $p = .08$).[12] These results, like those in Study 2A, closely follow the predicted pattern of my predictions, though no effect approached significance.

3.10.3 Discussion

Across the three studies where I employed various goal progress manipulations and dependent measures, I failed to replicate Fishbach and Dhar's (2005) basic results that those who perceived more progress in their academic tasks – those exposed to a lower comparison standard of study time by another who ostensibly filled out the same form earlier --were more interested in incongruent activities. In all three studies, the reliability of the original three items leaves much to be desired. Although the reliability was also low even in the Fishbach and Dhar's (2005) study, I repeatedly got such a low reliability. Secondly, the goal progress manipulation failed due to unexpected differences in respondents' study time. This occurred not only in Study 2B where there

[12] All of the above results were the same when three covariates were included in the model. Thus, I do not report them here.

were less than 20 participants per cell but also in Study 2C where there were about 40 participants per cell.

As I failed to replicate the previous findings, the results in the explicit goal conditions (e.g., no difference by progress or directionally goal-gradient consistent pattern) cannot be argued that they are consistent with the Similarity-Proximity model. It should be, however, noted that, in two of the three studies (Study 2A and 2C), participants in the more progress condition expressed less interests in incongruent activities when they were instructed to think about their specific goal than when they were not (Study 2A: $M_{\text{no explicit goal}} = 6.04$, $M_{\text{explicit goal}} = 5.61$, $F(1,90) = 2.96$, $p = .08$; Study 2C: $M_{\text{no explicit goal}} = 5.55$, $M_{\text{explicit goal}} = 5.19$, $F(1, 145) = 3.06$, $p = .08$). I interpret this result as follows. No explicit goal condition means that an individual put no weight on the instrumental goal utility part (i.e., $1 - \omega = 0$, see (18)). Then, according to the Similarity-Proximity model, the choice probability is only determined by the hedonic utility difference part. But, in the explicit goal condition, an individual put weights on both the hedonic and goal utility part (i.e., $\omega \neq 1$). Thus, the choice probability is influenced by two parts, which result in lower interests in incongruent activities.

3.11 General Discussion

3.11.1 Summary of Findings

In Chapter 3, I proposed the Similarity-Proximity model of goal pursuit. It is a theoretical framework by which we can explain when and why an individual chooses to stay in or switch from his focal goal pursuit in the face of an interrupting option. On the basis of the assumption that one

always chooses an option from which he expects to obtain higher utility, the Similarity-Proximity model explains goal pursuit behavior by simple utility comparison.

In my formulation, one expects two different utilities from a goal-related option (i.e., the hedonic utility and the instrumental goal utility) while expects just a hedonic utility from an interrupting option. Thus, the model consists of three parts: the hedonic utility of a focal option, the hedonic utility of an interrupting option, and the instrumental goal utility of a focal option. Each component of the model is a function of goal proximity, and the similarity between interrupting and focal option plays a critical role in this dynamics by affecting the (expected) hedonic utility of an interrupting option.

Using the Similarity-Proximity model, I mathematically derived four propositions, each of which clearly shows how each of the four important factors in goal pursuit (i.e., similarity, the speed of satiation, time interval, and the magnitude of the reward value) affects our choice in the middle of goal pursuit. I also add weight functions to extend the basic model that can explain the effect of focus (or frame) on goal persistence (e.g., Koo and Fishbach 2008, 2012). Comparative statics results showed that this very simple, utility-based model is capable of deducing all the diverse patterns found in the previous goal pursuit literatures. Then, using experiments, I examined the propositions of the Similarity-Proximity model.

In Study 1, I tested the proposition 1; the more similar an interrupting option is to a focal option, the more progress increases the likelihood people would be to stay with a focal option in the face of an interruption. When being offered a similar task (i.e., Another Pandora station), more participants chose to keep listening to the current Pandora station if they had rated more songs. In contrast, when being offered a dissimilar task (i.e., Wii game), more participants chose to switch to the interrupting option if they had rated more songs.

In Studies 2a, 2b, and 2c, I narrowed my focus to the case of a dissimilar interruption. I tried to show how the two countervailing forces (i.e., the hedonic utility and the instrumental goal utility) affect the probability of choosing a focal option. I used one of Fishbach and Dhar's (2005) previous experiments where the instrumental goal utility part was not made salient to participants in the original study. By simply adding one more question to remind participants of their specific goal, I expected to find the original pattern of results to be reversed or weakened. In any of the three experiments that I ran with slight variations, I was not successful in replicating the original findings. Thus, the null results in the explicit goal condition, although they were consistent with the predictions of the Similarity-Proximity model, cannot be argued as supporting evidence for the model.

3.11.2 Theoretical Contributions

By providing a new theoretical framework, the Similarity-Proximity model contributes to the goal pursuit literatures where diverse findings have been accumulated for the past decade. Using a very simple utility-based approach, my model parsimoniously explains all different patterns of the results.

The model identifies and delineates four important factors in goal persistence. The four propositions based on each factor provide insights into why some people adhere more to their goal with more progress, but other people become more vulnerable to tempting interruptions with progress. In Chapter 3, with specific functional forms, I mathematically showed that all three different patterns of the previous findings (i.e., the goal-gradient, the goal-progress, and the stuck–in-the-middle pattern) can be deduced from the model.

A key theoretical contribution of the Similarity-Proximity model is, however, its ability to predict new findings as well as its ability to explain the existing findings. According to the Similarity-Proximity model, I conjecture that we can observe even an inverted-U relationship between goal progress and goal persistence in a very special case. When the hedonic utility drops steeply at the beginning and becomes smooth with progress, and when the instrumental goal utility increases steeply at the beginning perhaps due to an exaggerated mental representation of goal progress (Huang, Zhang, and Broniarczik 2012), one might observe just such an effect. I think that some past research projects were put in the file drawer due to their non-confirmatory results. My model, however, predicts that we can expect to see not just the U shaped pattern of Bonezzi et al but even the inverted-U pattern in the future.

3.11.3 Limitations and Future Directions

Several future directions should be addressed. First, I can meta-analyze individual studies from previous goal pursuit literature to validate the Similarity-Proximity model. That is, by having the independent coders to code the relevant experimental variables in terms of the four factors (i.e., similarity, the speed of satiation, time interval, and the magnitude of the reward value), I can validate the Similarity-Proximity model more thoroughly.

For instance, Etkin and Ratner's (2012) study 3 can be explained as follows. The authors showed that, when primed to think about similarities among the means of goal achievement in the set, participants performed better when their perceived progress was high (vs. low). Whereas, when primed to think about differences among the set, they performed better when their perceived progress was low (vs. high). Although the authors explained their results in terms of uncertainty related to goal pursuit (i.e., high variety reduces uncertainty when progress is low, while low

variety reduces uncertainty when progress is high), their results can be interpreted equally well with the Similarity-Proximity model. If people perceive the alternatives as similar, they are more likely to stay with the current option when their progress is high. But, if they perceive the alternatives as distinctive, with more perceived progress people are less likely to stick to their current goal. That exactly matches the results of Study 1 in this chapter.

Second, I can extend the basic model in several ways. My theorizing presumes that hedonic utility and goal utility are independent of each other. But it is possible that people project their decreased level of enjoyment of an option to their final reward if the reward is the same as the focal option (e.g., coffee reward program). In this case, we need a more complex model to capture this case. In general, that case will produce a wider range of progress over which increase in progress decrease the likelihood of persistence in the focal task.

Earlier I assumed that there was only goal utility $g'(t) \cdot \mathcal{R}$ attached to the focal option. But I can easily extend the model to the case in which two goals are being pursued together, or where the "interruption" from the focal task also can appeal due to hedonic utility and goal utility. Thus, the question is how and when to allocate the limited resources to each goal.

Finally, I can turn the basic model into a variety seeking model by deleting goal utility term from all options. More complex extensions could be also considered.

Chapter 4. Conclusions

In two essays of my dissertation, I examine two different types of goals that have not been taken into account in the past research. In Chapter 2, I show that in pursuing complex goals, people generate subgoals and shift their reference to the subgoals so that proximity to a subgoal changes perception of spare time and in turn influence intertemporal choices. In contrast, in Chapter 3, I study relatively simple goals involving repeating the same activity or very similar activities. I show that in pursuing relatively simple goals, people become satiated and project their expected hedonic utility to the other task as a function of similarity, and thus both proximity to a goal and similarity of interruption affect goal persistence. I believe that my two essays contribute to the literature on goal pursuit by demonstrating that causal psychological mechanisms by which goal progress affects goal persistence are entirely different depending on the nature of goal. In complex multi-stage goals, the key variable that dictates willingness to be interrupted is subgoal proximity. In simple, repetitive, goals, the key variables are satiation from repetition and similarity between the focal activity and some interruption.

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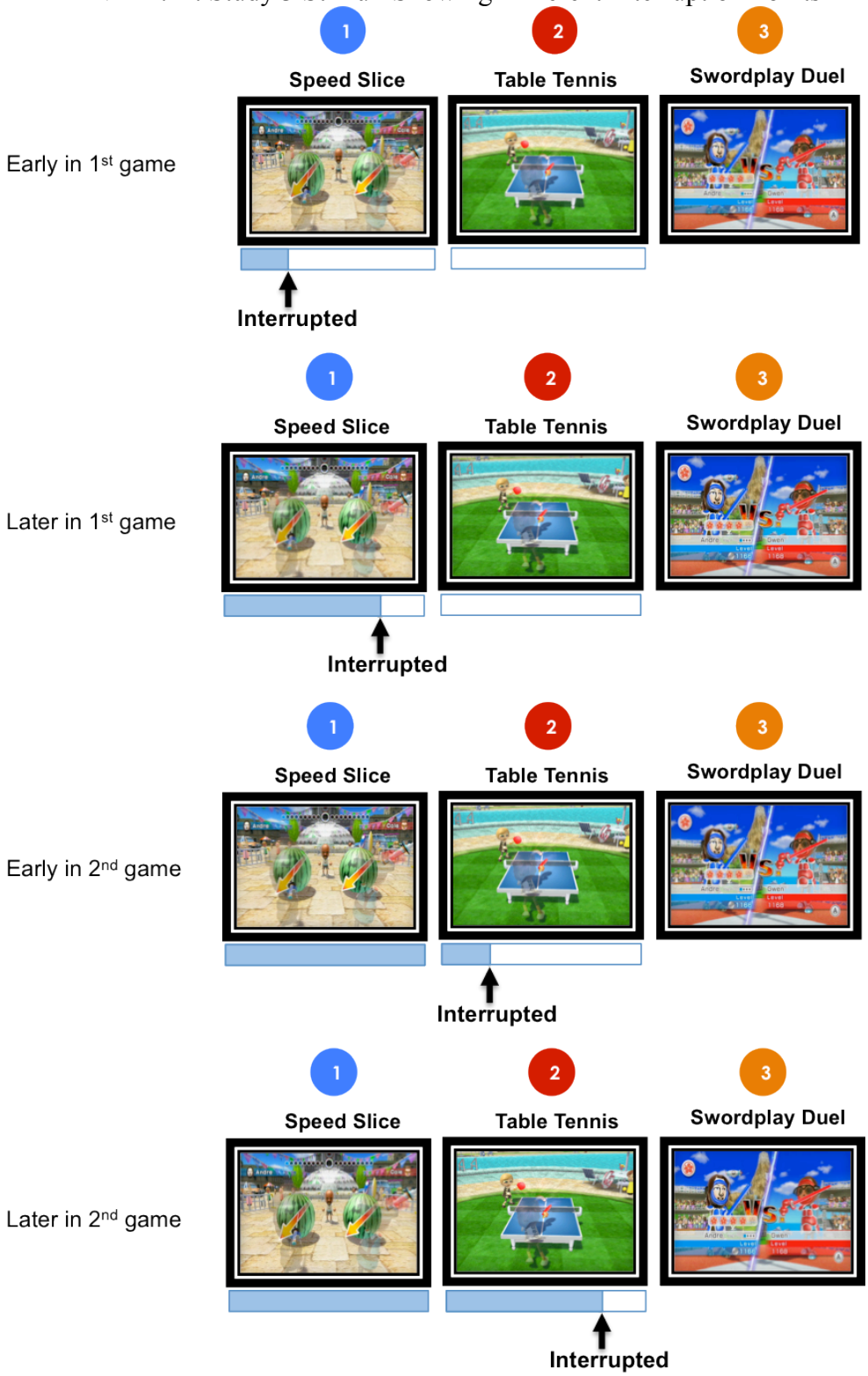
APPENDIX. A. Study 3 Stimuli Showing Different Interruption Points*



*Except for the progress bar, this display was identical to what was on the wall in study 2 in Chapter 2.

APPENDIX. B. Figure 1 of Louro et al. (2007)

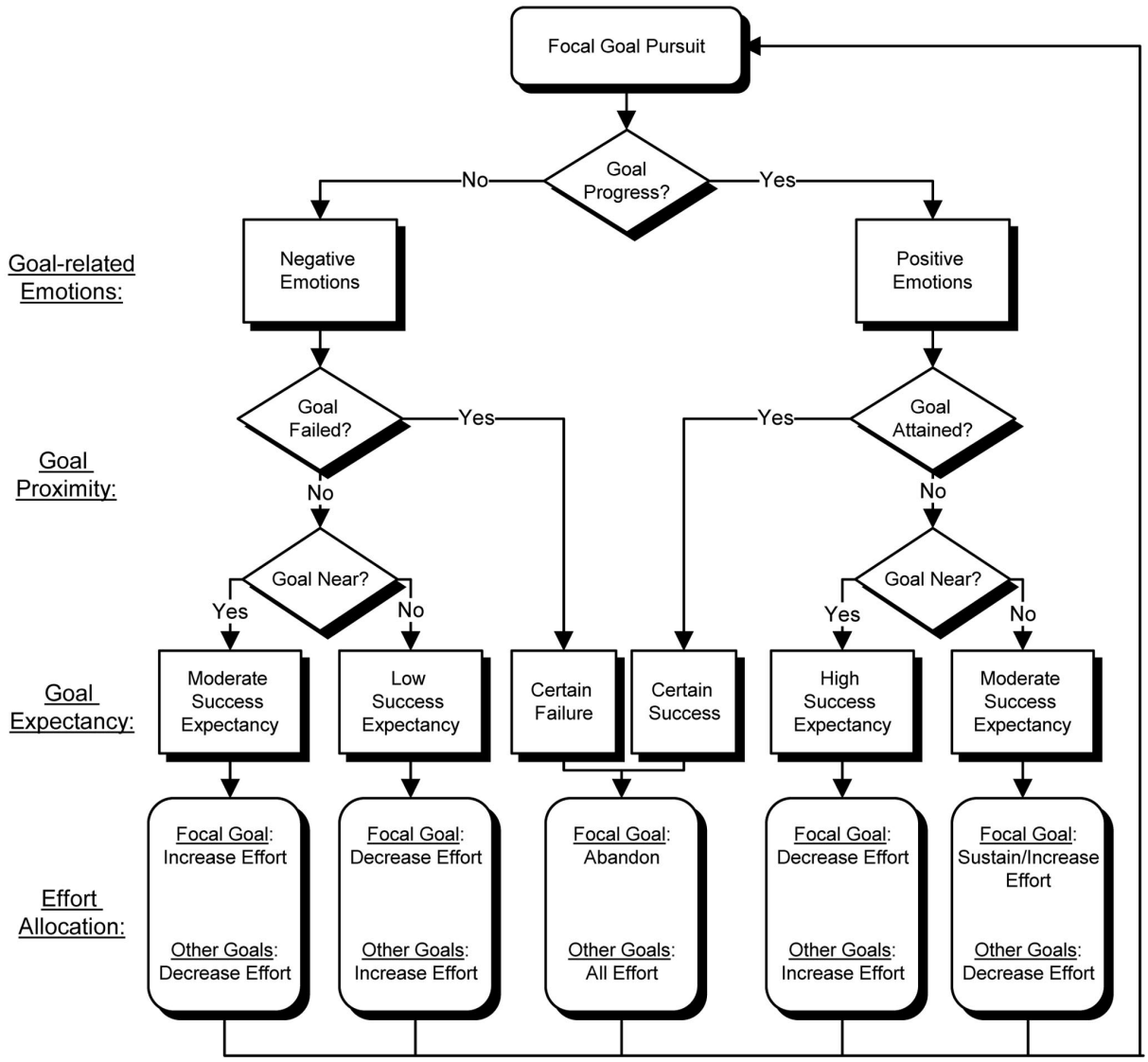
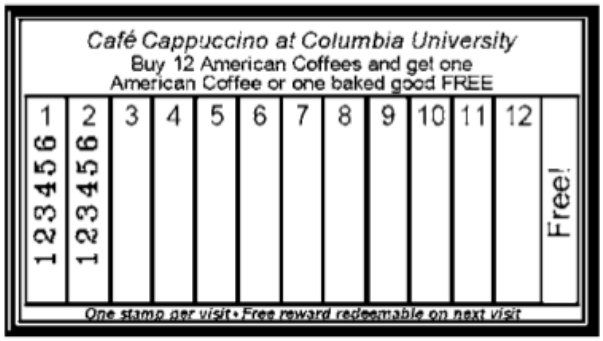


Figure 1. The multiple-goal pursuit model.

APPENDIX. C. Comparison of Study Materials



Kivetz et al. (2006)

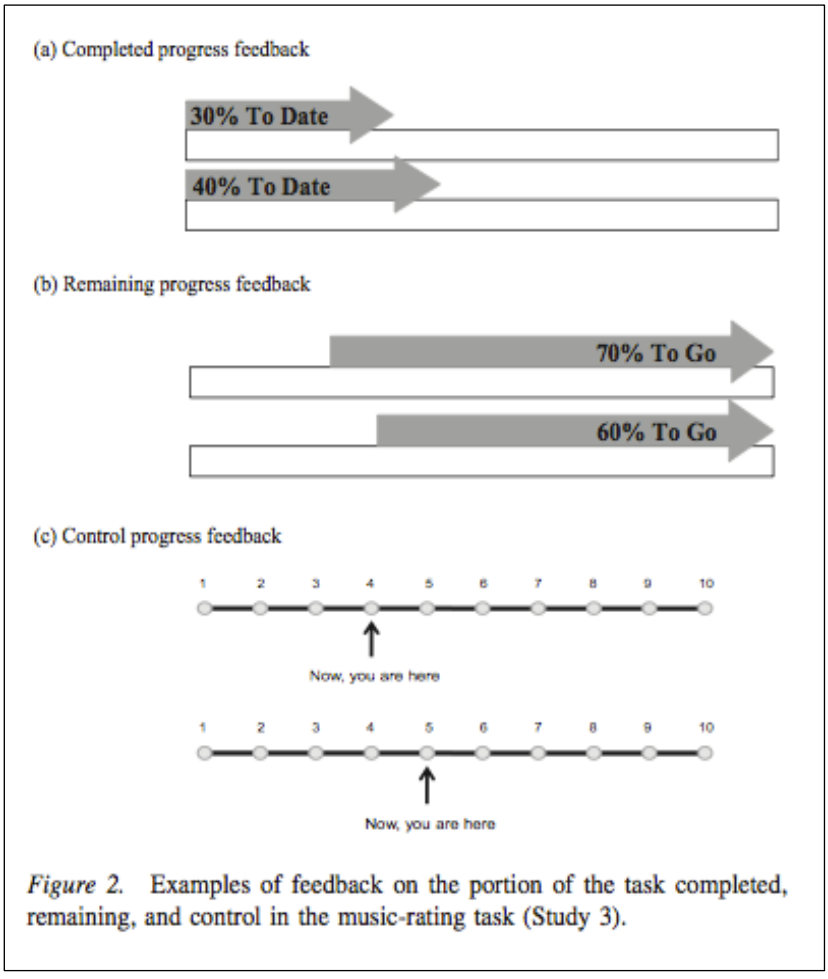


Figure 2. Examples of feedback on the portion of the task completed, remaining, and control in the music-rating task (Study 3).

Koo and Fishbach (2010)