# Oscillation in the Dynamic Consumer Self-Control Process

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# Abstract

Consumers often vow to act in accordance with their long-term interests (e.g., quit smoking to ensure future health). Unfortunately, they may later discover that breaking their promise (e.g., smoking a few cigarettes) is more immediately pleasurable and/or convenient than keeping it. How do consumers decide what to do in these *self-control dilemmas*? Our research explores this question. Because consumers are motivated both to break and keep their promise, we propose that their thoughts in the pre-decision period follow an oscillating path. That is, consumers may go *back and forth* between considering reasons in favor of promise breaking and considering reasons in favor of promise keeping. The effort required to go back and forth constantly may then wear consumers out, making their final decision more dependent on various aspects of the reason generation path (e.g., the first reason, the last reason, or the most convincing reason) than it otherwise would be. Two experiments test these propositions. In the future, we will also bring methodological novelty to the research, developing a model that can make precise predictions about how different elements in the oscillation path contribute to the dilemma outcome. Unlike past work, our research illustrates how consumers' thoughts may change within the *same dilemma* (within-dilemma focus). Our framework thus has implications for how the self-control decision can be changed once the dilemma has already begun.



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Consumers typically start each day off with the best of intentions, promising themselves that they will make productive decisions that satisfy their obligations to themselves and to others. In other words, they set "standards" for themselves (Bandura, Barbaranelli, Caprara, and Pastorelli 1996; Baumeister and Heatherton 1996, 2; Carver and Scheier 2001). Dieters tell themselves that they will go to the gym, students declare that they will stop procrastinating, and shoppers say they will save rather than spend their next paycheck.

In daily life, however, consumers inevitably realize that breaking their promise to themselves (e.g., eating fattening rather than healthy foods) can be relatively more pleasurable and/or convenient in the short run than keeping it. Consumers thus find themselves in a *self-control dilemma*, in which they must weigh the immediate pleasures and/or conveniences of breaking their promise against the long-term benefits of keeping it. This distinction between long-term and short-term is prevalent in definitions of self-control (Giner-Sorolla 2001; Hoch and Loewenstein 1991; Tice, Bratslavsky, and Baumeister 2001; Trope and Fishbach 2000).

A posting on an Atkins Diet blog captures the dilemma. Speaking of the possibility of cheating on her diet, a woman writes,

> *"I keep going back and forth with myself about whether I will or will not go ahead and do it. Is it worth it???? Part of me says YES!!!!!!!!!! And part of me knows I would enjoy the meats and a salad just as well and could easily forego the rest.…Oh the trials of this all….. WHY is it that I can logically tell myself it will just take me a few days to get back into [it] which really isn't bad….. but at the same time feel like I am being horrible?????? Lordy, the guilt and condemnation we lay on ourselves….What's a woman to do?????" (Atkins Diet Bulletin Board 2008)*

Because consumers are initially torn between keeping and breaking their promise, they may go back and forth with themselves in an "inner debate" like the one above (Baumeister and Heatherton 1996, 8). On the one hand, they come up with reasons why it is acceptable for them to break their promise. In this way, they may temporarily change the anticipated emotions (Baumeister, Vohs, DeWall, and Zhang 2007) associated with promise breaking and promise keeping. For example, a dieter might tell herself that dessert is delicious (increasing anticipated pleasure from breaking her promise of dieting) and is not so fattening (reducing anticipated regret from breaking her promise). She could also tell herself that avoiding dessert will not boost

her self-esteem (decreasing anticipated pride from keeping her promise of dieting) and will leave her feeling hungry (increasing anticipated dissatisfaction from keeping her promise). These changes in anticipated emotion might lead consumers to lean toward breaking their promise.

Left at this point, consumers would probably break their promise. But consumers cannot bring themselves to believe something merely because they want it to be true (Baumeister and Newman 1994; Ditto and Lopez 1992). They need to feel that their beliefs have "rational" underpinnings (Ditto and Lopez 1992, 569). Thus if they do not find their reasons sufficiently convincing, they might counterargue their own rationalizations, thereby changing their anticipated emotions again and moving themselves toward keeping their promise. This rationalization and counterargumentation can continue for several rounds and may become overwhelming and fatiguing, as the woman in the Atkins post so vividly expressed.

But although this pre-decision back-and-forth process is familiar to anyone who has ever struggled to diet, study, work, or save, the consumer behavior literature has remained largely silent on the existence of such a back-and-forth process and on the ways in which it might impact subsequent choices in self-control dilemmas. Baumeister and Heatherton (1996) acknowledged that an "inner debate" occurs but did not specify the structure or the effects of this debate.

We pick up where this work left off. We focus on how thoughts and emotions fluctuate in the pre-decision period of a dilemma (within-dilemma focus) rather than on how they may differ from one dilemma to another (between-dilemma focus). As noted earlier, consumers may oscillate between favoring keeping their promise and favoring breaking it. Consistent with past self-control research (e.g., Hamilton, Vohs, Sellier, and Meyvis 2008), we contend that this oscillation drains a "limited resource" that helps consumers exert self-control. Thus consumers who have oscillated should be more tired and more likely to choose the least effortful course of action than those who have not.

Which action is least effortful? Researchers in the limited resource tradition (Baumeister, Vohs, and Tice 2007) would say that promise breaking is. In their view, consumers are worse at self-control when tired than when not tired, regardless of how the tiredness arose. We, on the other hand, believe the path to tiredness matters. When the tiredness inducing task is separate from the focal self-control task, as in most limited resource work (Baumeister et al. 1998), more tiredness may indeed yield worse self-control. But when tiredness stems from dilemma related oscillation, consumers go back and forth between favoring promise breaking and favoring

promise keeping. Any element of this back-and-forth (e.g., the final reason, the first reason, the most convincing reason) may in turn tip the scales in favor of one side and may thereby turn this side into the least effortful action.

We make three contributions to the understanding of self-control. First, we focus on within-dilemma fluctuations that might improve or worsen self-control. This contribution matters because consumers might come into contact with a marketing communication when they are already in the midst of a dilemma (e.g., in a store debating the possibility of spending rather than saving a paycheck). An understanding of within-dilemma properties can help marketers develop better interventions for promoting self-control once a dilemma has already begun.

Second, we propose a back-and-forth structure for the pre-decision period of a self-control dilemma. Specifying the structure of the pre-decision period is important because the decision consumers ultimately make and the course of action deemed to be least effortful are likely to be heavily dependent on this structure. In this paper, we use experiments to examine the effects of the dilemma structure. In the future, we will also bring methodological novelty to the research, developing a model that can precisely predict how different elements of the oscillation path contribute to the dilemma outcome.

Third, we demonstrate that the way consumers become tired matters. Not all tiredness inducing tasks make consumers worse at self-control. Rather, such tasks simply make consumers more likely to choose the path of least resistance, whatever that path happens to be. The content of the pre-decision back-and-forth process may in turn change which path is the one of least resistance. This insight matters because it suggests that we can make fatigued consumers exhibit high self-control if we stop them at the *right point* in the oscillation process.

This paper proceeds as follows. First we review the self-control literature, focusing first on why some consumers are better than others at promise keeping (between-person differences) and then on why the same consumer can fluctuate in her success at promise keeping (within-person differences). As we examine this prior research, we present our own theory and hypotheses. Next we present two studies meant to illustrate different aspects of our theory. We conclude with a discussion of future directions, including the start of a mathematical framework that captures the relationship between the oscillation path and the dilemma outcome.

## THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Self-control research has a rich history in psychology and consumer behavior. Scholars are interested in the topic because of its relevance for important human endeavors, including dieting (Stroebe, Mensink, Aarts, Schut, and Kruglanski 2007), studying (Vohs, Baumeister, Schmeichel, Twenge, Nelson, and Tice 2008) , smoking cessation (Mann and Ward 2007), and aggression prevention (DeWall, Baumeister, Stillman, and Gailliot 2007), to name a few.

The extant literature varies in is its focus on between-person as compared to within-person fluctuations in self-control. The between-person research examines why some consumers are better than others at keeping their promises across multiple dilemmas (Bagozzi, Baumgartner, and Pieters 1998; Hynie, MacDonald, and Marques 2006; Ramanathan and Williams 2007; Richard de-Vries, and van der Pligt 1998). By contrast, the within-person research explores why a given consumer is more likely to keep promises in some dilemmas than in others (Fujita, Trope, Liberman, and Levin-Sagi 2006; Li 2008; Shiv and Fedorikhin 1999) as well as why a given consumer's retrospective assessments of dilemmas may vary (Kivetz and Keinan 2006). In this section, we review this work[1] and use it to develop our own theoretical framework.

**Between-Person Differences in Self-Control**

Some consumers are better at self-control than others. A longitudinal study by Mischel, Shoda, and Rodriguez (1989) convincingly demonstrated this fact. In the study, an experimenter left preschool aged participants alone in separate rooms. Before leaving, she told each of them that they would receive a large amount of a desirable object (e.g., cookies or marshmallows) if they waited patiently until she came back. If they grew tired of waiting, they could ring a bell, and they would receive a smaller amount of a desirable object immediately. Researchers kept track of how long it took participants to ring the bell. If participants did not ring the bell within 15 minutes, the experimenter returned to the room and delivered the promised larger prize.

When the participants reached middle school, researchers asked the parents about their children's current performance in school and current interactions with peers. The longer it took participants to ring the bell in preschool, the more they excelled in the middle school classroom and the better they got along with their classmates (Mischel et al. 1989). To exhibit patience in

[1] This literature review is more extensive than it would be in a journal article. I have included more than would normally be expected because I wish to demonstrate my ability to conduct a comprehensive examination of the existing work in fields related to my research.

preschool, participants had to recognize that they would get a better outcome if they waited than if they did not, and they had to summon the willpower to wait. This same skill presumably also enabled participants to do well in their schoolwork and to have positive relationships with peers.

Mischel et al.'s (1989) work showed that between-person differences in self-control arise early and persist. Although our focus is on within-person and not on between-person fluctuations, the impact of oscillation on the dilemma outcome could vary as a function of individual difference variables. Thus we need to be aware of which individual difference variables might matter for self-control so that we can measure them in our studies. We unfortunately did not measure many of them in the studies reported here, but we will measure them in the future.

The first step in self-control is for consumers to set "standards" for how they ideally want to behave (Baumeister and Heatherton 1996, 2). As it turns out, individual difference variables and specifically consumers' beliefs about how self-control works are critical to this stage (Mukhopadhyay and Johar 2005). In one study, participants made the most promises about how they would act in the future when they believed (a) the capacity for self-control is "unlimited" as opposed to "limited" in the short run and (b) the capacity for self-control is "malleable" as opposed to "fixed" in the long run (Mukhopadhyay and Johar 2005, 780). This finding matters for our purposes because it suggests that the sheer propensity to make promises differs from one consumer to another. A dilemma can only arise if consumers have made a promise and if they are tempted to break their promise. Thus in our studies, we need to ensure that consumers have actually made a promise to behave in a certain way before we present them with the dilemma.

Once consumers have made promises, other individual difference variables impact their likelihood of keeping the promises. For example, consumers who think more carefully about the effects that their actions may have are more likely to abide by their long-term aspirations than consumers who think less carefully about these effects (Nenkov, Inman, and Hulland 2007). Likewise, consumers who score lower on impulsivity scales experience different blends of emotions when they look back on their intake of fattening foods than those who score higher on these scales, and as a result, the two groups differ in their propensity to take utilitarian products and hedonic products shortly after having eaten a high calorie food (Ramanathan and Williams 2007). Thus the emotions stemming from recalling a self-control dilemma vary as a function of

impulsivity and impact behavior in a later dilemma. Given these findings, we may want to measure our participants' impulsivity and propensity to anticipate the effects of actions.

Because we are interested in prospective, within-dilemma fluctuations in likelihood of exhibiting self-control, what concerns us most are the emotions consumers *expect* to experience if they break or keep their promise. In the typical design for anticipated emotions studies, participants first rate how much negative affect they think they will experience if they take the action that is convenient or pleasurable in the short term but that is inconsistent with their best interests in the long term (e.g., eating fattening food, failing to attend a necessary medical appointment, or starting to smoke). Several weeks, months, or years later, researchers measure how frequently participants actually took the immediately pleasurable or convenient action since the last questionnaire, using self-report measures (Bagozzi et al. 1998; Hynie et al. 2006), medical records (Lechner, de Vries, and Offermans 1997), or breath tests that detect quantity of smoking (Conner, Sandberg, McMillan, and Higgins 2006). Consumers with higher levels of anticipated negative emotion from breaking their promises to themselves tend to break their promises less frequently than those with lower levels of anticipated negative emotion (Bagozzi et al. 1998; Conner et al. 2006; Hynie et al. 2006; Lechner et al. 1997).Therefore we may want to measure how much negative emotion consumers *typically* expect to feel in response to promise breaking in a particular domain. We can then see if this measure is predictive of the emotional fluctuations consumers experience during pre-decision oscillation.

Earlier, we alluded to the notion that consumers' self-control "resources" are limited in the short-run. Thus if consumers operate to capacity on one task, they will be unable to exhibit self-control on another task (Baumeister, Vohs, and Tice 2007). Most work in this tradition has examined how a given consumer may be better or worse at self-control depending on whether she is operating at her full capacity or not (within-person differences). The full capacity level, however, varies from one consumer to the next (Muraven and Baumeister 2000), suggesting that some consumers may become exhausted more quickly and easily than others (between-person differences). We may want to account for these between-person differences in our studies.

Despite its strengths, between-person research cannot explain why the *same consumer* may sometimes keep promises and other times break them. For insights of this sort, we turn to the within-person determinants of self-control.

## Within-Person Differences in Self-Control

A given consumer's capacity to exhibit self-control may vary from one dilemma to the next. The literature on within-person differences in self-control falls into two categories. One stream of research explores how the dilemma's positioning relative to other dilemmas (e.g., whether it is viewed as being the first of several dilemmas or not as well as whether it comes just after another dilemma or not) influences the consumer's self-control in the dilemma. A second body of work examines how changing the consumer's level of attention and focus of attention (e.g., focus on concrete versus abstract aspects of situations, high versus low focus on obtaining immediate pleasures) prior to the start of the dilemma impacts performance in the dilemma. We review each of these literatures.

### *Changing the Dilemma's Positioning Relative to Other Dilemmas*

While we focus on within-dilemma dynamics in this paper, there is no doubt that dilemmas' positions relative to each other are also important. When consumers are currently facing a dilemma, making them aware that other dilemmas of this sort will arise in the future changes their behavior in the current dilemma (Khan and Dhar 2007). Consumers then reason that they will keep their promises down the line and that they can therefore break their promises now (Khan and Dhar 2007). Consistent with this theory, participants were less likely to choose an educational movie (less pleasurable in the short term but more beneficial in the long term) as compared to a fun movie (more pleasurable in the short term but less beneficial in the long term) when they thought they were going to choose among movies again later on than when they did not think they were going to do so (Khan and Dhar 2007). Thus future dilemmas can be used as *rationalizations* for promise breaking, and as such, they may fuel the rationalization side of our proposed back-and-forth process.

Mere knowledge of subsequent dilemmas is not the only way in which a focal dilemma's positioning vis-à-vis other dilemmas impacts consumers' behavior. When consumers feel they have spent a great deal of time and energy completing one task, they feel they deserve to reward themselves, and so they are more likely to choose the more immediately pleasurable or convenient alternative in a later task than they otherwise would be (Kivetz and Zheng 2007).

Beyond this effect of "entitlement" (Kivetz and Zheng 2007, 572), the energy consumers expend in one dilemma is important because the energy needed for self-control is purportedly

"limited," as noted earlier (Baumeister et al. 2007b, 351). People grow tired when they make attempts to avoid what they are naturally inclined to do (Baumeister et al. 2007b). Thus expending effort to avoid temptation in one self-control dilemma makes consumers less likely to successfully avoid temptation in a later dilemma (Baumeister, Bratslavsky, Muraven, and Tice 1998; Baumeister and Heatherton 1996; Muraven, Tice, and Baumeister 1998).

In the standard limited resource paradigm, participants either are or are not instructed to restrain their natural tendencies toward a course of action (e.g., participants either are or are not told to avoid eating warm, freshly baked chocolate chip cookies, or participants either are or are not told to avoid laughing or smiling in response to a funny video clip) (Baumeister et al. 2007b). Their ability to keep their "impulses" in check in a completely unrelated area is then assessed (e.g., ability to resist the desire to stop drinking a disgusting beverage, ability to resist the desire to quit working on a difficult puzzle, ability to resist the desire to make purchases) (Muraven et al. 1998, 774). Across multiple studies (see Baumeister et al. 2007b for a summary), participants who had to go against what they were initially inclined to do in the first task were less able to do the same in the second task, as compared to participants who could let their initial tendencies flow freely in the first task. This finding was taken as evidence that exerting self-control is draining and so leaves less energy left over for later self-control. Consumers are more inclined to take the path of least resistance when they are tired than when they are not.

Changing the direction of one's thoughts (Muraven et al. 1998) or emotions (Baumeister et al. 1998) has been found to produce tiredness of the sort described in limited resource research. In one study, participants completed two tasks. First, they were either told to push all thoughts of white bears out of their minds for a given time period or were told to think about whatever they wished during that time. Second, they had to rearrange scrambled groups of letters to form words. The researchers purposely designed this word formation exercise so that it could not be fully solved. Participants who had been told to keep their thoughts in check stopped working on this exercise sooner than participants who had not been told to alter their thoughts, suggesting that turning one's thoughts away from a topic is tiring (Muraven et al. 1998).

In a similar study, the first task required that participants watch a movie clip. A third of the participants were told to avoid showing the emotions they experienced in response to the movie, a third were told to go out of their way to show these emotions, and a third were told nothing. In the second task, they again rearranged groups of letters to form words, but this time,

the entire exercise was doable. Participants who had been told to keep their emotions in check were less successful at forming words than participants who had not been told to do so, indicating that altering one's the expression of one's feelings is tiring (Baumeister et al. 1998).

Given the findings from these two studies, we propose that the back-and-forth process in the pre-decision period of self-control is tiring. Going from rationalization to counterargumentation and back again requires constant shifts in direction of thought, with rationalization entailing coming up with a reason why promise breaking is acceptable and with counterargumentation entailing coming up with a reason why promise breaking is unacceptable. Oscillation also demands repeated changes in direction of anticipated emotion, insofar as rationalization and counterargumentation have opposite effects on the emotions consumers expect to experience if they break their promise. Hence going back and forth should be more tiring than coming up with all reasons in favor of promise breaking first and all reasons in favor of promise keeping second.

**H1: Oscillation between the two sides of a self-control dilemma makes consumers more tired than non-oscillation does.**

Evidence consistent with this proposition comes from a working paper by Hamilton et al. (2008). These authors showed that going from one mode of thought to another and back again (e.g., concrete or abstract mode of thought) is fatiguing, in that "switching mindsets" in one task makes participants spend less time working on a puzzle later (Hamilton et al. 2008, 3).

Our H1 is similar to Hamilton et al.'s (2008) work but differs in two important respects. First, our participants oscillate between two sides of a *self-control dilemma*, whereas Hamilton et al.'s (2008) participants oscillated between different ways of approaching a problem that was unrelated to self-control. One might argue that our oscillation is just a special case of Hamilton et al.'s (2008), but we nevertheless thought it was worthwhile to replicate their result in a self-control dilemma. Second, we differ from Hamilton et al. (2008) in our within-dilemma focus. Whereas Hamilton et al. (2008) wish to know how oscillation in one situation impacts self-control in an unrelated dilemma, we explore how oscillation in one dilemma impacts the outcome of that same dilemma.

The limited resource camp contends that the path of least resistance is always promise breaking. Thus if oscillation between the two sides of a dilemma is fatiguing, consumers should

be more likely to break their promises if they have oscillated than if they have not. We, on the other hand, argue that the content of the oscillation can alter which path is the one of least resistance. In the next section, we review evidence consistent with this proposition.

*Changing Level and Focus of Attention*

Attention is a central determinant of within-person changes in self-control (Baumeister, Heatherton, and Tice 1994). In general, the less attention consumers can devote to a dilemma, the worse they are at keeping their promises (Baumeister et al. 1994). For example, Shiv and Fedorikhin (1999) manipulated participants' level of attention before asking them to choose between a healthy and an unhealthy food. Those in the low attention condition were more likely to opt for the unhealthy alternative than those in the high attention condition but only if they also scored high on trait measures of impulsivity; those low in impulsivity largely chose the healthy alternative regardless of the attention manipulation. Therefore distraction via a "cognitive load" manipulation hampers self-control among impulsive consumers (Shiv and Fedorikhin 1999). Limited resource researchers might argue that fatigue reduces consumers' ability to pay attention and thereby increases their likelihood of breaking their promises.

The notion that consumers keep their promises more frequently when they are high rather than low on attention has recently been called into question though. Mann and Ward (2007) have argued that only the most "salient" objects in the surroundings influence the decisions of those low on attention. If these objects happen to be the immediate benefits of promise breaking (e.g., the tempting odor of freshly baked cookies), then consumers may certainly be more likely to break their promise when under high load than when under low load (Mann and Ward 2007) as Shiv and Fedorikhin (1999) found. However, if these objects instead prompt a focus on the importance of promise keeping, then consumers may be more likely to keep their promise when under high load than when under low load (Mann and Ward 2007).

Mann and Ward (2000) tested this hypothesis by putting either food (meant to prime the positive aspects of promise breaking) or objects associated with dieting (meant to prime the positive aspects of promise keeping) in the view of participants, all of whom said they were dieting. They then kept track of how much consumers ate later in the session. When dieting related objects were present, the amount eaten was smaller among those under high load than

among those under low load, suggesting that low attention facilitates self-control under certain circumstances.

We argue that the back-and-forth period of the self-control dilemma may itself draw consumers' attention to the benefits of promise breaking or promise keeping. When consumers rationalize breaking their promises, they concentrate on the good outcomes of promise breaking. When they counterargue their rationalizations, they focus on the good outcomes of promise keeping. Thus we predict that consumers will act in accordance with the reason they generated just before their back-and-forth process stopped, with those who ended on rationalization opting for promise breaking and those who ended on counterargumentation opting for promise keeping. The final reason is the path of least resistance: acting in accordance with this reason requires nothing more than continuing on the same track, whereas acting in accordance with a reason in favor of the other side requires shifting direction of thought once again. This logic leads us to H2.

**H2: If consumers are stopped during their back-and-forth process, they will take the course of action consistent with the final reason they generated.**

Even if the oscillation is artificially stopped, consumers might still continue to oscillate on their own and may therefore make a decision inconsistent with the final reason they generated in the formal back-and-forth process. What determines whether consumers will continue to go back and forth on their own? As per H1, oscillation is fatiguing, and those who oscillate for more as opposed to fewer rounds have less energy remaining to reverse their direction of thought again. Therefore, we argue that consumers are especially likely to continue on the path indicated by the final reason when they have oscillated for more as opposed to fewer rounds (see Figure 1).

**H3: Consumers are especially likely to act in accordance with the final reason when they have oscillated for more as opposed to fewer rounds. In other words, rounds of oscillation *moderate* the relationship between the final reason and behavior.**

As noted earlier, many aspects of the back-and-forth process could conceivably determine which path is the one of least resistance. We concentrate on the final reason, but other elements (e.g., the first reason, the most convincing reason, the two adjacent reasons with the

highest or lowest contrast in their convincingness levels, etc.) may be equally important. Indeed, the back-and-forth process is a *sequence* of reasons. It would be careless to ignore all the reasons prior to the final one, particularly given the field's knowledge of sequences of choices and events (Khan and Dhar 2006; Loewenstein and Prelec 1993). We ultimately hope to integrate multiple elements of the back-and-forth into a model of the oscillation path, and we further discuss this possibility in the Future Directions section. For now though, we present two studies to test H1, H2, and H3.

## STUDY 1

Study 1 tests the proposition that going back and forth within the context of a self-control dilemma is fatiguing. As in the standard limited resource paradigm (Baumeister et al. 1998; Muraven et al. 1998), participants completed two tasks. First, they oscillated or did not oscillate in the pre-decision period of a self-control dilemma. Second, we asked participants to complete an activity and gave them multiple opportunities to stop working on it. We kept track of how many rounds it took them to stop and used this measure as a proxy for energy, as Wallace and Baumeister (2002) did. Besides testing H1, study 1 provides preliminary evidence suggesting that fatigue does not necessarily result in promise breaking.

### Design Overview

Participants were randomly assigned to one of the six cells in a 2 (Task 1: Oscillation vs. No Oscillation) x 3 (Task 2: Oscillation vs. No Oscillation vs. Anagrams) between-subjects design.

In the first task, participants read about a self-control dilemma: a choice between studying and partying. They then listed reasons in favor of each action. Participants in the no oscillation condition listed five reasons in favor of one side first and five reasons in favor of the other side second. Participants in the oscillation condition went back and forth between listing a reason in favor of one side and listing a reason in favor of the other side until they had listed five reasons in favor of each side. They generated their own reasons in this study; in study 2, we provide the reasons for them and vary the order of presentation so that it is oscillating or non-oscillating.

In the second task, participants either solved anagrams or performed reason generation for a new hypothetical self-control dilemma. Those assigned to provide reasons did so either in oscillating or non oscillating fashion. After every two anagrams or reasons, participants were given a chance to stop what they were doing. We measured how many rounds it took for participants to stop working, consistent with the usual limited resource paradigm (Wallace and Baumeister 2002).

We included both an anagrams condition and reason generation conditions in the second task because we thought our oscillation manipulation in the first task might have different effects depending on whether the second task required oscillation or not. If oscillation is more tiring than non-oscillation, as H1 proposes, then consumers who have oscillated in task 1 should stop working on task 2 in fewer rounds, and this should be especially true when task 2 includes oscillating reason generation (more demanding in terms of energy requirements) rather than non-oscillating reason generation (less demanding in terms of energy requirements) or anagrams.

**Sample**

Participants were 169 individuals drawn from the subject pool of a behavioral lab at a northeastern university. Most of them studied or worked at the institution; others simply lived in nearby neighborhoods. They signed up to take part in an hour long lab session, which included this study as well as several others. The gender breakdown of our sample was 37.9% males and 59.2% females, with 3% failing to indicate their gender. Sample members were between the ages of 18 and 67 ($M$ = 23.73 years, $SD$ = 7.91 years). Since the self-control dilemmas in the study are common among students, we note that 85.2% of our sample members were currently students.

**Procedure**

When participants entered the lab, they were seated at individual computer workstations. They were told that the study required them to imagine themselves in "situations that students commonly face." After reading and signing the consent form, they turned to their screens.

Participants saw two icons on their screen, the first labeled Student Task 1 and the second labeled Student Task 2. They double clicked on the Student Task 1 icon to begin the study. In this first part, participants indicated whether or not they were currently full-time students. Next the following paragraph appeared.

*It's Saturday night. You have a 5 page paper due on Monday for your history course. You've already written up an outline but still haven't started writing the paper. You are sitting in front of your computer thinking about how to begin the paper. Just as you start typing the first words of the opening sentence, your cell phone rings. It's your best friend, calling to tell you about a party. Your friend says, "Hey! I just found out about an awesome party going on tonight! Let's check it out." You're at a loss. On the one hand, you'd love to go, but on the other hand, you want to start writing your paper tonight. You say, "Let me think about it. I'll call you back." Then you hang up and think...*

The content of the next screens differed depending on condition. All participants generated five reasons in favor of going out and five reasons in favor of staying in. However, participants in the oscillation condition of task 1 went back and forth between the sides, such that reasons 1, 3, 5, 7, and 9 corresponded to one side and reasons 2, 4, 6, 8, and 10 corresponded to the other side. By contrast, participants in the non-oscillation condition of task 1 generated all five reasons for one side first and all five reasons for the other side second. For both oscillation and non-oscillation, the side participants began with was determined at random, as Table 1 shows. We operationalized oscillation by making every other reason correspond to the same side, as this approach is consistent with Hamilton et al.'s (2008) procedure. We could just as easily have had participants oscillate after every two reasons or every three reasons though.

Using the measures described below, we kept track of the self-reported convincingness of each reason and the amount of time it took participants to come up with each reason. After the reason generation part of task 1, participants completed the self-reported tiredness measures described below. They then closed the window and double clicked the Student Task 2 icon.

The first task 2 screen told participants that they would again be asked to place themselves in situations that students commonly face. Then those in the oscillation and non-oscillation conditions of task 2 saw the following screen.

*It's the end of the week, and you've just received your monthly paycheck from your on-campus, part time job. Now you get to decide how to use your money. Ideally, you'd like to put the money in your bank account and leave it there. After all,*

*you're taking a graduate school entrance exam in a year, and you're saving for a test prep course. You really need to ace this exam to get into the graduate school of your dreams. But you've also had your eye on a cool new futon for your dorm for the last couple of weeks. Although you already have seating in your dorm, this futon caught your attention the moment you saw it. It's exactly what you want! "What should I do?" you ask yourself. Then you think...*

Next they provided reasons in favor of saving and reasons in favor of spending, with the order in which they provided these reasons varying depending on whether they were in the oscillation or the non-oscillation condition (see Table 1). After every two reasons, we offered them a chance to stop. They then indicated whether they wanted to stop or not. If they wanted to stop, reason generation ended, and they skipped to the final questions of the study. If they never asked to stop, they provided five reasons in favor of each side, just as they did in task 1, and were then taken to the final questions of the study. We kept track of the number of rounds it took participants to stop and measured the amount of time it took them to stop. We also assessed the self-reported convincingness of each reason and the amount of time it took participants to come up with each reason, using the same measures as in task 1.

Participants in the anagrams condition of task 2, on the other hand, had to solve anagrams. Anagrams are sets of jumbled letters. Participants must rearrange these letters to form a word. Ten anagrams appeared on the screen one by one, each followed by a screen asking participants to rate the difficulty of the previous anagram. After every two anagrams and corresponding difficulty ratings, participants were offered a chance to stop solving anagrams. Participants clicked a button to indicate whether they wanted to stop or not. Willingness to continue working on anagrams is a common measure of energy in the limited resource literature (Brown 2008; Wallace and Baumeister 2002). Thus we kept track of the number of rounds and the amount of time it took participants to stop. Finally, we measured time spent on each anagram.

After completing task 2, participants answered demographic questions. They then completed studies for other researchers, were paid $10 for their time, and were debriefed.

**Measures**

*Convincingness of Task 1 Reasons*. After each reason in task 1, participants rated how convincing they found the reason they had just provided. They gave their ranking on a seven point Likert scale (1 = Not at all convincing, 7 = Extremely convincing). Because participants gave five reasons in favor of going out and five reasons in favor of staying in, they ultimately provided ten convincingness ratings. We factor analyzed these convincingness scores separately for participants assigned to the oscillation condition of task 1 and for participants assigned to the non-oscillation condition.

Among participants in the oscillation condition, reasons 1, 3, 5, 7, and 9 loaded onto one factor, whereas reasons 2, 4, 6, 8, and 10 loaded onto a second factor. Recall that participants were randomly assigned to have reasons 1, 3, 5, 7, and 9 correspond either to going out or staying in. If reasons 1, 3, 5, 7, and 9 corresponded to going out (staying in), reasons 2, 4, 6, 8, and 10 corresponded to staying in (going out). A scale comprised of convincingness ratings 1, 3, 5, 7, and 9 exhibited acceptable reliability for participants in the oscillation condition ($\alpha$=.87), as did a scale comprised of convincingness ratings 2, 4, 6, 8, and 10 ($\alpha$= .94). For each participant in the oscillation condition, we computed the mean of ratings 1, 3, 5, 7, and 9 and thereby created a side 1 average convincingness rating. Likewise, we computed the mean of ratings 2, 4, 6, 8, and 10 for all participants in the oscillation condition and thereby created a side 2 average convincingness rating.

Among participants in the non-oscillation condition, on the other hand, reasons 1 through 5 loaded onto one factor, and reasons 6 through 10 loaded onto another factor. Again, recall that participants were randomly assigned to have reasons 1 through 5 correspond either to going out or staying in. If reasons 1 through 5 corresponded to going out (staying in), reasons 6 through 10 corresponded to staying in (going out). A scale comprised of convincingness ratings 1 through 5 exhibited acceptable reliability for participants ($\alpha$= .84), as did a scale comprised of convincingness ratings 6 through 10 ($\alpha$= .91). In the non-oscillation condition, the side 1 average convincingness rating was the mean of ratings 1 through 5, whereas the side 2 average convincingness rating was the mean of ratings 6 through 10.

*Time for Task 1 Reasons*. We measured the amount of time participants spent coming up with each reason[2]. For participants in the oscillation (non-oscillation) condition, we summed the time spent on reasons 1, 3, 5, 7, and 9 (1 through 5) to obtain side 1 total time, and we summed the time spent on reasons 2, 4, 6, 8, and 10 (6 through 10) to obtain side 2 total time.

*Self-Reported Tiredness*. At the end of task 1, participants rated the extent to which five words (tired, fatigued, confused, exhausted, and frustrated) described how they were feeling at the moment. These words were intended to capture how tired participants felt after having come up with reasons. A factor analysis within each of the task 1 conditions (oscillation and non-oscillation) revealed that the items all loaded onto one factor. A scale comprised of all five items showed good reliability within each condition (oscillation: $\alpha = .86$, non-oscillation: $\alpha = .84$). Thus we computed each participant's mean score across the five items to yield one tiredness score.

*Rounds to Quit in Task 2*. As mentioned earlier, we gave participants a chance to quit after every two items (anagrams or reason generation requests) in task 2. We kept track of how many rounds it took participants to quit, where the maximum number of possible rounds to quit was five.

*Time to Quit in Task 2*. We measured the time from the moment participants started reason generation in task 2 to the moment they indicated they no longer wished to continue. For participants who never indicated a desire to stop, we measured the time spent on all reason generation screens. All times were measured in milliseconds.

**Results**

We started by examining whether our oscillation manipulation in task 1 impacted the number of rounds it took participants to stop in the task 2 conditions. We ran a binomial regression with rounds to stop as the dependent variable (maximum number of rounds set to 5) and with the task 1 condition, the task 2 condition, and the task 1 x task 2 interaction as predictors (see Table 2). The Wald chi-square tests revealed a marginally significant main effect

[2] Our measure of time spent was crude. It encompassed three separate tasks: reading the instructions, thinking of the reason, and typing the reason. Our interest was primarily in the time spent thinking of the reason, but our measure of time did not allow us to disentangle thinking time from reading and typing times. Nevertheless, we decided to rely on our measures as rough approximations of the amount of time participants spent reflecting on each reason.

of the task 1 condition ($\chi^2$ (1) = 2.81, p<.10) and a main effect of the task 2 condition ($\chi^2$ (2) = 21.20, p<.001), but these effects were qualified by a task 1 condition x task 2 condition interaction ($\chi^2$ (2) = 9.87, p<.01).

To explore the interaction, we conducted a separate binomial regression within each level of task 2 condition, with rounds to stop as the dependent variable and the task 1 oscillation manipulation as the independent variable (see Table 2). The oscillation manipulation did not affect rounds to stop in the reason generation conditions (Task 2 Oscillation: B = .32, n.s., Task 2 Non-Oscillation: (B = .26, n.s.) but did affect rounds to stop in the anagram condition (B = -.77, $\chi^2$ (1) = 9.59, p<.01). Given that the equation for the binomial regression was $\log(p_i/(1-p_i)) = \beta_0 + \beta_1 Task1Cond_i$ ( $p_i$ equals probability of person i continuing on each round, $\hat{\beta}_0 = .61$, $\hat{\beta}_1 = -.77$ ) we computed the estimated $p_i$ in each condition. The estimated probability of continuing on a round was smaller for oscillation participants ( $\hat{p}_i = .46$ ) than for non-oscillation ones ( $\hat{p}_i = .65$ ), suggesting that oscillation in a self-control dilemma did tire participants. Thus H1 was supported in a manner consistent with Hamilton et al.'s (2008) results.

This finding was further confirmed by comparing participants in the oscillation condition of task 1 with participants in the non-oscillation condition of task 1 on self-reported tiredness. An independent samples t test revealed that participants in the oscillation condition reported feeling (marginally) more tired than those in the non-oscillation condition (t(162)= 1.83, p=.07).

Why did the oscillation manipulation have no effect on participants in the reason generation conditions of task 2? We speculate that perhaps participants were bored with reason generation by the time they reached task 2, and so most of those assigned to generate reasons in task 2 decided to quit early regardless of how fatigued they were. Consistent with this interpretation, participants did give up in fewer rounds in both reason generation conditions of task 2 (Task 2 Oscillation Mean Rounds to Quit = 1.95, Task 2 Non-Oscillation Mean Rounds to Quit = 1.88) than in the anagram condition of task 2 (Task 2 Anagrams Mean Rounds to Quit = 2.73).

Study 1 also provided preliminary evidence that oscillation might not necessarily result in promise breaking. We compared participants in the oscillation condition of task 1 with participants in the non-oscillation condition of task 1 on the convincingness of task 1 reasons and on time taken to generate task 1 reasons. Whereas participants in the non-oscillation condition

found one side significantly more convincing than the other, as revealed by a paired samples t test comparing the side 1 convincingness score and the side 2 convincingness score ($t(81) = -3.60$, $p < .01$) ., participants in the oscillation condition were about equally favorable to both sides ($t(86) = -.94$, n.s.). Similarly, participants in the non-oscillation condition spent significantly more time on the less convincing side than on the more convincing side ($t(81) = 7.07$, $p < .001$), but participants in the oscillation condition spent about equal amounts of time on both sides ($t(86) = 1.77$, $p = .08$). These findings, illustrated in Figures 2 and 3, suggest that oscillation participants were less certain of the superiority of one side over the other (though we admit that convincingness scores and time spent are imperfect proxies for certainty). Thus while oscillation may increase tiredness, it also decreases the perceived superiority of one side over the other. As a result, it is not clear that the path of least resistance will necessarily be promise breaking after within-dilemma oscillation.

**Discussion**

Our study illustrated that going back and forth between reasons in favor of promise breaking and reasons in favor of promise keeping has two effects. First, it makes consumers tired in the same way that other self-control tasks did in past experiments (Baumeister et al. 1998; Baumeister et al. 2007b). Second, it makes consumers less certain that one action is superior to the other.

Hence the two findings have differing implications for how consumers will behave after a back and forth process. The first finding suggests that consumers who go back and forth for more rounds should find it more difficult to opt for promise keeping than consumers who go back and forth for few rounds. The second finding indicates that the advantage of one option (e.g., promise breaking) over the other (e.g., promise keeping) may decline as the number of rounds of back and forth and as the time spent on back and forth increases. Which of the two sides will dominate at the end of the back-and-forth may be a function of the variables outlined in H2 and H3.

This study had several limitations. First, it asked consumers to provide their own reasons in favor of and against promise breaking. One could argue that it was the particular reasons participants generated and not the back and forth between promise breaking and promise keeping that yielded our results. To address this flaw, we would have to give the reasons to participants and then vary

the order in which the reasons appear. Second, we did not examine how oscillation impacts actual behavior in a self-control dilemma. Third, interrupting the back-and-forth with questions about convincingness might have led the oscillation process to differ from the way it typically occurs in everyday life. To remedy this problem, we would have to make participants oscillate without providing convincingness ratings. We ran study 2 to address these limitations.

## STUDY 2

Study 2 tested the notion the final reason in the oscillation drives the outcome of the self-control dilemma (H2) and that this is especially the case when consumers have gone back and forth for more as opposed to fewer rounds (H3). We used a choice between healthy and unhealthy food as our dilemma, as this domain is common in self-control research (Stroebe et al. 2008; Mann and Ward 2007). In the study, participants oscillated either for many or few rounds, and they ended either on a reason in favor of eating an unhealthy food or a reason in favor of eating a healthy food. We assessed the joint impact of these manipulations on food choice.

We note that we did not obtain the significant statistical confirmation of H2 and H3 that we anticipated. However, we also did not obtain findings consistent with the limited resource view. Thus study 2 may not conclusively prove our hypotheses, but it is still important because its results question whether the limited resource tradition is sufficient to account for the impact of oscillation on dilemma outcomes.

### Design Overview

Study 1 was a 2 (rounds of oscillation before interruption: 3 versus 8) x 2 (final reason favors promise breaking versus final reason favors promise keeping) between-subjects design, with participants randomly assigned to one of the four cells.

Participants were told they would get to choose between chocolate (unhealthy option) and carrots (healthy option). They were also informed that they could choose neither option if they wished. Before choosing, participants saw reasons in favor of each side. They did not have to generate reasons, as in study 1. In all conditions, participants went back and forth between seeing a reason in favor of chocolate and seeing a reason in favor of carrots. Half of the participants saw three reasons in favor of each side (short oscillation), and the other half saw eight reasons in favor of each side (long oscillation). We also manipulated the side participants ended on, with

half of the participants ending on a reason in favor of chocolate and the other half ending on a reason in favor of carrots. After oscillating, participants were distracted so that they would not oscillate further. They then made their choice and reported their satisfaction, regret, and tiredness.

**Sample**

The sample contained 58 individuals (24 males, 29 females, 5 did not indicate gender) from the same pool as study 1. They were a relatively young group, ranging in age from 18 to 35 ($M$ = 22.30 years, $SD$ = 3.97 years).

**Procedure**

Participants were assigned to a computer workstation. Once there, they completed a questionnaire, within which we embedded questions about dieting status. After this survey, participants double clicked the Food Study icon. A screen indicated that participants would choose one of three options: eating a chocolate bar, eating carrots, or eating neither. The program prompted participants to raise their hands for assistance. At this point, experimenters brought two snacks to participants: an unwrapped chocolate (choosing this high fat alternative entails breaking one's promise of eating healthy foods) and a plate of carrots (choosing this low fat alternative entails keeping one's promise). The next screen read as follows.

> *Before you make your choice, we want you to think about each of the food options carefully. On the screens that follow, we will show you several key points about the food options. The points resemble comments you might say to yourself as you try to decide which snack to eat.*

Each point was a reason in favor of eating chocolate or in favor of eating carrots. Participants were randomly assigned to a short or a long oscillation condition, where those in the short (long) oscillation condition saw three (eight) reasons in favor of each side before we terminated their back-and-forth. Moreover, participants were randomly assigned to end their back-and-forth either on a reason in favor of eating chocolate or on a reason in favor of eating carrots. Each reason was presented on a separate screen. The reasons were organized into pairs, with the first reason in the pair favoring one option and the second reason favoring the other

option. The particular pairs participants in the short oscillation condition saw and the order in which short oscillation and long oscillation participants saw their assigned pairs was determined at random.

Participants had to click a Continue button to proceed from one reason to the next, and so they determined how much time they spent on each reason. We kept track of the time spent on each reason. Since we wanted to keep the oscillation process as similar as possible to the way it occurs in real life, we decided not to ask for convincingness ratings after each reason in this study.

At the end of the back-and-forth process, we used a cognitive load manipulation (Shiv and Fedorikhin 1999) to distract participants so that they would not continue oscillating on their own. Specifically, we asked them to keep a seven digit number in their minds, and we indicated to them that they would report the number later in the session (Shiv and Fedorikhin 1999). After participants saw the number but before they had to report it, they made their food choice. They returned unwanted snacks to an experimenter, wrote down the number they had been given, rated their tiredness using the five words from study 1, and ate their snack. Afterward, they rated their regret and satisfaction with their snack choice. Finally, they were debriefed and paid.

**Measures**

*Dieting Status*. Participants read several statements that might come to people's minds over the course of daily life. Embedded in these statements were six thoughts about dieting. Participants rated how many times they entertained these thoughts on a typical weekday, on a typical weekend day, and in a typical week. A factor analysis on the six weekday ratings revealed a single factor, as did a factor analysis on the six weekend day ratings and a factor analysis on the six week ratings. The reliabilities for the three scales were all acceptable (weekday: $\alpha$=.93, weekend day: $\alpha$=.94, week: $\alpha$=.92). Thus we created three separate scales to capture individual differences in dieting. Each scale was the mean of its constituent questions.

*Self-Reported Tiredness*. We measured self-reported tiredness as in study 1. The scale exhibited acceptable reliability in each of the four conditions (all $\alpha$'s > .70) so we averaged the five items together to yield a mean self-reported tiredness score for each participant.

*Dissatisfaction and Enjoyment*. Participants indicated their agreement with ten statements (1= Completely disagree, 7 = Completely agree) designed to capture satisfaction, pleasure, and regret concerning the choice (e.g., "I continue to feel hungry even after having eaten the snack."). We factor analyzed the items within each of the four conditions. The two factors that emerged across conditions were a dissatisfaction factor (two items) and an enjoyment factor (four items). A scale comprised of the two dissatisfaction items and a scale comprised of the four enjoyment items exhibited good reliability in all conditions (all α's > .70). Thus we created a dissatisfaction scale and an enjoyment scale, each of which was the mean of its constituent questions.

**Results**

We started by assessing whether our oscillation manipulation impacted self-reported tiredness. In particular, we ran an independent samples t test on the composite self-reported tiredness score. While participants in the high oscillation condition had a higher mean level of tiredness than those in the low oscillation condition ($M_{high}$=2.73, $M_{low}$=2.53), this difference was not significant. Nevertheless, we decided to check and see if our manipulations impacted choice.

We ran a multinomial logistic regression with choice (chocolate, carrots, or neither) as the dependent variable and with the oscillation condition (how many rounds the oscillation lasted), the final reason condition (the reason on which the oscillation ended), and the oscillation condition x final reason condition as predictors. There were no significant effects of any manipulation. Adding dieting status indices as predictors did not improve the model.

Next we ran the same multinomial logistic regression including either only the oscillation condition or only the final reason condition as predictors. The result of the final reason condition regression (see Table 3) revealed a marginally significant effect of the final reason, such that consumers who ended on carrots were more likely to choose carrots than they were to choose neither (B = 1.83, $\chi^2$ (1) = 4.09, p<.05). However, consumers who ended on chocolate were no more likely to choose chocolate than they were to choose neither (B = 1.09, $\chi^2$ (1) = 1.45, n.s.). Thus this analysis revealed partial but certainly not full support for H2.

We did not fare much better when we ran generalized linear models (identity link), one with dissatisfaction as the dependent variable and the other with enjoyment as the dependent variable. Both of these analyses yielded insignificant results, with the only predictor approaching even marginal significance being the oscillation condition in the model predicting enjoyment.

The interaction between oscillation condition and final reason condition was never significant, indicating that H3 was not supported.

At the same time, we did not find a main effect of the oscillation condition on choice. While the limited resource work would predict that more oscillation yields greater promise breaking, our data did not support this notion. Hence, it appears that a simple main effect of tiredness story is not sufficient to account for choice after oscillation in a self-control dilemma.

Although the model for testing H3 did not contain a statistically significant interaction, we decided to graph the frequency with which each of the foods was chosen in each of the four conditions. Figure 4 displays this data. The figure confirms the notion that the final reason plays a central role in determining the outcome of the dilemma. Simply comparing the two low oscillation conditions to each other, a larger proportion of participants chose carrots when the back-and-forth ended on carrots than when it ended on chocolate. The same result emerges when we simply compare the two high oscillation conditions to each other.

Comparing the two carrot conditions to each other and then the two chocolate conditions to each other, however, did not yield results that were quite as consistent with our expectations. Looking just at the two carrot conditions, a larger proportion of participants chose carrots in the short oscillation condition (.63) than in the long oscillation condition (.46). Looking just at the two chocolate conditions, a larger proportion of participants chose chocolate in the long oscillation condition (.46) than in the short oscillation condition (.37). The carrot condition result was inconsistent with H2, whereas the chocolate condition result was consistent with H2. Nevertheless, none of these differences is significant, because if they were, a main effect of oscillation condition would appear in the analyses.

**Discussion**

Study 2 yielded weak evidence in favor of H2 but no evidence in favor of H3. At the same time, it did not support the limited resource account either.

Why did the study not turn out as we had expected? More specifically, why was H3 not supported in this study even though our initial study provided preliminary evidence to suggest that H1 and H2 are correct? First, our cell sizes were extremely small in this study, limiting the power of our statistical tests and making it difficult for us to adequately assess our hypotheses. Obviously, we can address this problem in future studies by simply increasing our sample size.

Second, our distraction task (i.e., asking participants to keep a particular number in their minds) was meant to stop the back-and-forth process that we instigated, but it is certainly possible that it did not have this effect. Rather than taking participants down the path that they were on at the time that the reason presentation ended, it might have given participants an opportunity to (unconsciously) bring together all the reasons they were presented with throughout the session, using all of them jointly to yield a final decision (see, for example, Dijksterhuis and Nordgren 2006). A better test of our hypothesis might simply be to ask participants to make their choice immediately after the reason presentation; a distraction task might be unnecessary and might actually eliminate the joint impact of the final reason and the tiredness on the dilemma outcome.

Third, it is conceivable that many participants were not hungry when they came to the lab. If so, the choice between the snacks probably was not a self-control dilemma. In the future, we can remedy this problem by asking participants to refrain from eating before coming to the lab.

Fourth, perhaps the final reason and the sheer amount of oscillation on their own are not sufficient to explain the consumer's decision. Instead, we may need a more nuanced model, once that takes into account other variables in the back-and-forth. We further discuss this possibility in the Future Directions section.

Despite the shortcomings of this second study, we believe the avenue explored in this paper represents a major step toward better understanding the consumer self-control process. We take a prospective, within-dilemma approach, considering the thoughts and emotions that rush through consumers' minds before they decide how to act in a self-control dilemma. Because we focus on within-dilemma dynamics, our approach is particularly well equipped for interventions to promote self-control once consumers are already in a dilemma (e.g., when shoppers are in a store facing the possibility of making an impulse purchase).

## FUTURE DIRECTIONS

In this paper, we took initial steps toward investigating the back-and-forth process in the pre-decision period of the self-control dilemma. We specifically focused on the role of fatigue and of the final reason in determining the outcome. However, we noted that other aspects of the oscillation (e.g., other reasons, the convincingness of the reasons, and the time spent on the

reasons) are likely to be important contributors to the outcome. We consider some of these other determinants here.

On the one hand, perhaps the initial reason, its convincingness, and the time spent thinking about it are the driving forces behind behavior. Evidence consistent with this proposition comes from the impression management literature, which suggests that the first piece of information people come across often sticks with them and is more influential than subsequently presented information when it comes to shaping views toward an object of judgment (Anderson 1965).

Past work has revealed that the most intense moment of an episode (the "peak") has a disproportionately large influence on the way consumers remember the episode (Redelmeier and Kahneman 1996). Based on this insight, we can surmise that perhaps it is the most convincing reason that determines which course of action the consumer will take. More recently, Bhargave's (2008) investigation has suggested that novel aspects of a series of occurrences may exert a powerful influence on consumers' recollections, and so perhaps rationalizations and counterargumentations that have not been used in earlier dilemmas play a more central role in driving the outcome of the dilemma than trite, overused ones.

Given that reasons are generated sequentially, we need to keep in mind that the impact of a focal reason on the outcome might vary depending on where the reason is positioned in the sequence as well as on the properties of the reasons that came just before and just after the focal reason. First, the effect of a reason may decline over the course of time. Thus if two reasons are equally convincing but one is generated before the other, the first should have a smaller impact on the outcome of the dilemma than the second, assuming primacy effects do not dominate.

Second, a reason might be more influential if the anticipated emotions it elicits stand in great (as opposed to small) contrast with the anticipated emotions associated with the reason that came just before it or just after it. In other words, a contrast effect might be evident in the domain of anticipated emotions linked to reasons.

For example, consider an undergraduate who faces the first dilemma in study 1: a choice between studying and partying. She starts going back and forth with herself about whether she should go out or not. At one point, she comes up with a highly convincing counterargument: if she goes out, she will get a terrible grade, and moreover, she will be thinking about this poor grade during her time at the party. This reason dramatically increases the anticipated regret and

decreases the anticipated pleasure from going out while increasing the anticipated pride and decreasing the anticipated dissatisfaction from staying in. When she even thinks about the possibility of going out, she experiences large pangs of negative anticipated emotions.

But then she suddenly thinks of an excellent rationalization: if she stays in, she will constantly think about the party, and this distraction will decrease her productivity. This rationalization has a double effect. First, it influences anticipated emotions in much the same way as it would if it had been generated right after a bout of neutral emotions. But these effects on emotions expected from the two potential courses of action may be further enhanced in this case. Because the student was previously so distraught by the mere possibility of breaking her promise, the highly compelling rationalization has a soothing power that it would otherwise lack. It brings the student out of her upsetting bout and makes her feel good about the immediately pleasurable option once again. The suddenness of the improvement in her expected mood may then make her more enthusiastic about the promise breaking option than she otherwise would be.

Based on these and other theory driven intuitions, we aim to construct a mathematical model linking multiple elements of the back-and-forth process to the dilemma outcome. Figure 5 presents a crude first step toward defining variables and equations for this model. For example, we include variables to capture the special influence of the first and last reason as well as variables to reflect contrast effects and peak effects. We can add variables as needed. A refined model of this sort can yield very precise predictions about how the path of oscillation relates to the decisions consumers make in self-control challenges. For this reason, we want to pursue the development of this model in future work.

## CONCLUSIONS

Public policy officials and marketers are constantly striving to improve consumer self-control. One critical problem is that consumers may already be in the midst of a self-control dilemma by the time they encounter interventions. Dieters may already be debating the possibility of eating fattening foods when they come across a public service announcement, shoppers might be on the verge of making an impulse buy when they see an advertisement warning them to save, and teenagers might be deciding whether to start smoking or not when their teacher starts delivering a lecture on the consequences of nicotine addiction. Thus an understanding of within-dilemma fluctuations in consumers' thoughts and emotions is critical if

we want to help consumers exert self-control once they have already entered a dilemma. In this paper, we have laid out a possible structure for within-dilemma oscillation and have proposed that the oscillation path is critical to the dilemma outcome. By developing a more precise mapping between the path and the final decision, we hope to help consumers follow through on their self-control promises.

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Figure 1

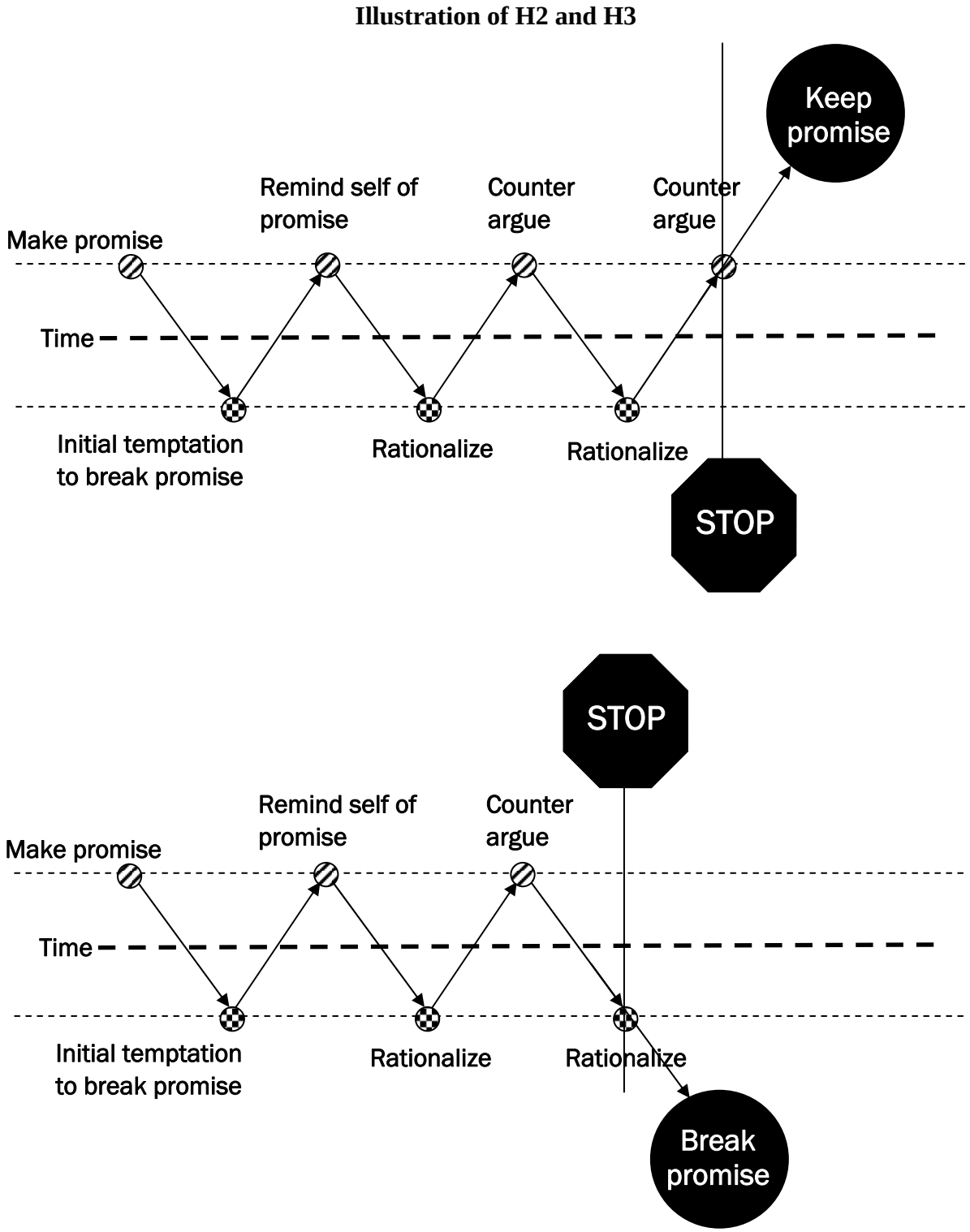


Illustration of H2 and H3
Keep promise
Remind self of promise
Counter argue
Counter argue
Make promise
Time
Initial temptation to break promise
Rationalize
Rationalize
STOP
STOP
Remind self of promise
Counter argue
Make promise
Time
Initial temptation to break promise
Rationalize
Rationalize
Break promise

Figure 2

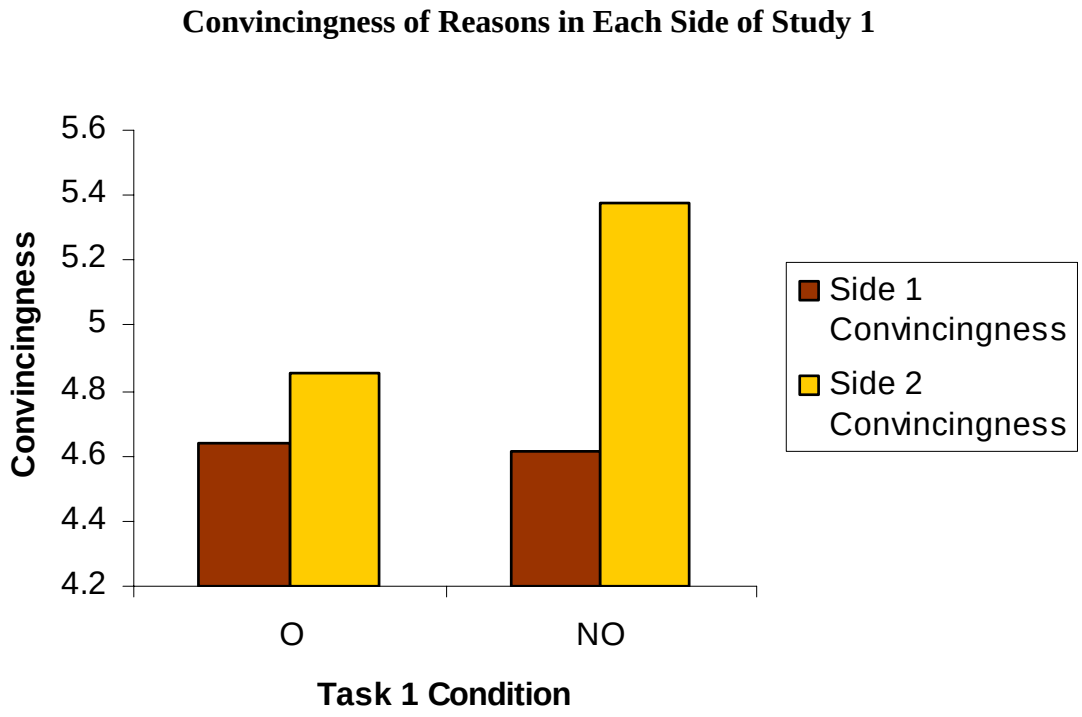

Convincingness of Reasons in Each Side of Study 1
Convincingness
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
O
NO
Task 1 Condition
Side 1 Convincingness
Side 2 Convincingness

Figure 3

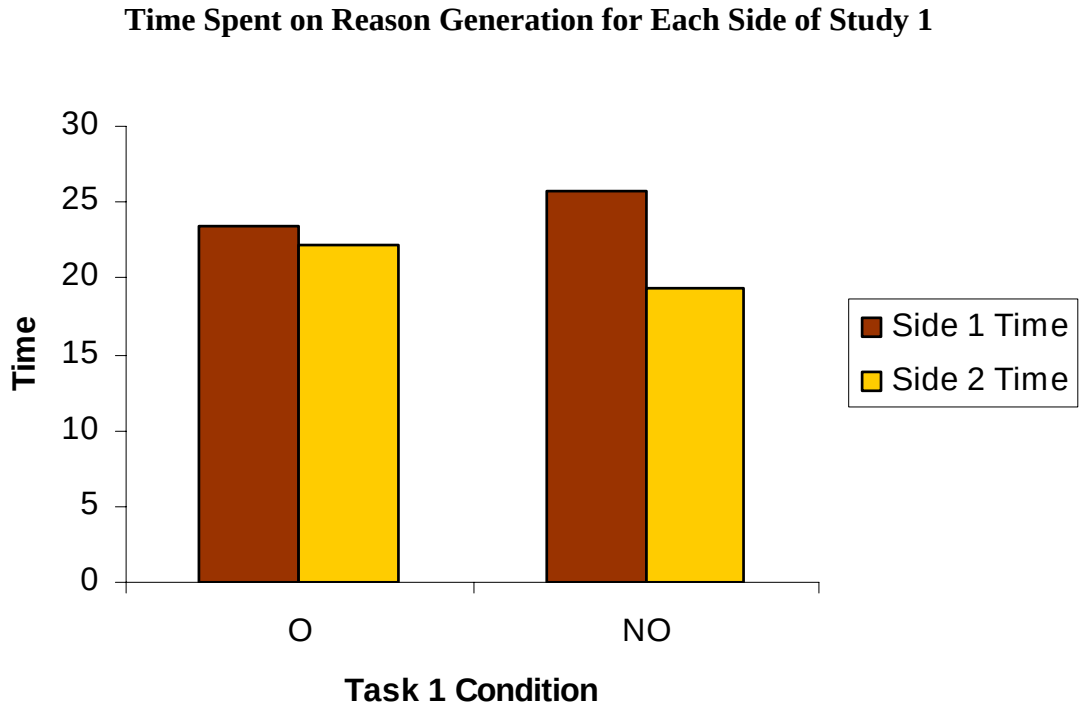

Time Spent on Reason Generation for Each Side of Study 1
30
25
20
15
10
5
0
Time
O
NO
Task 1 Condition
Side 1 Time
Side 2 Time

Figure 4

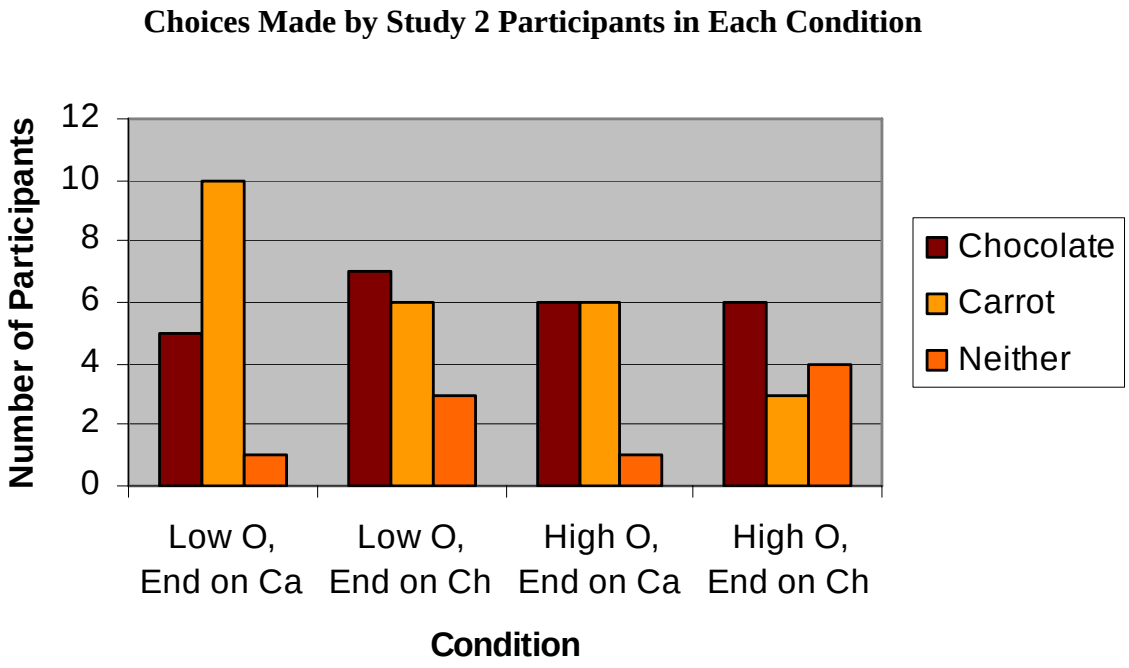
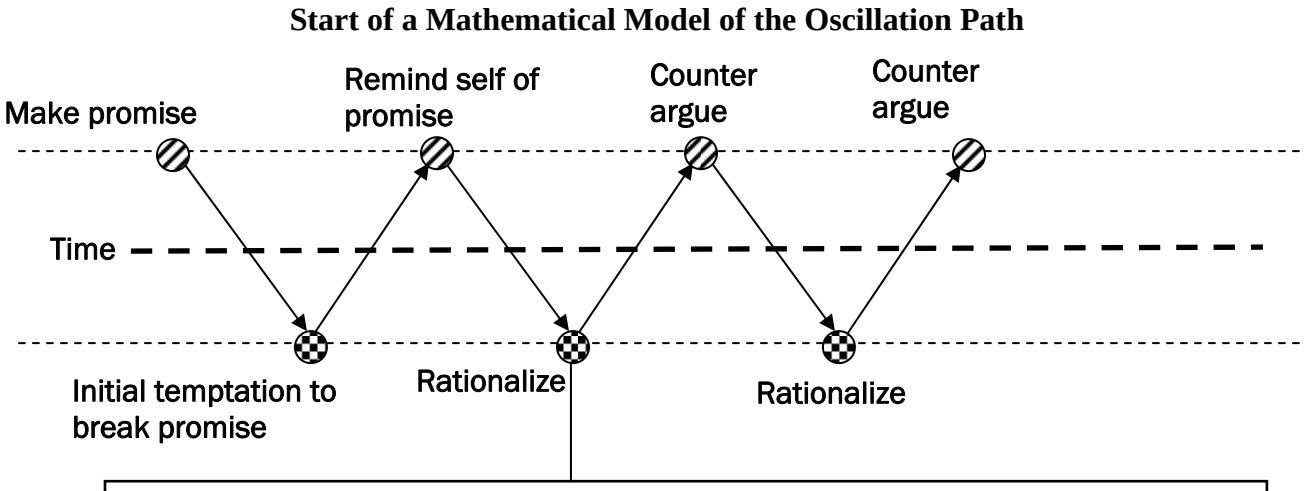

Choices Made by Study 2 Participants in Each Condition
Number of Participants
12
10
8
6
4
2
0
Low O, End on Ca
Low O, End on Ch
High O, End on Ca
High O, End on Ch
Condition
Chocolate
Carrot
Neither

Figure 5




Each reason j generated by consumer i has the following variables attached to it.

$nb_{ij}$ denotes the number of reasons generated by consumer i prior to her jth reason.

$na_{ij}$ denotes the number of reasons generated by consumer i after her jth reason and before making the decision.

$tb_{ij}$ denotes the amount of time spent by consumer i in the pre-decision period prior to the start of her jth reason.

$ta_{ij}$ denotes the amount of time spent by consumer i in the pre-decision period following the end of her jth reason.

$c_{ij}$ is the convincingness of consumer i's jth reason.

$c_{i,j-1}$ is the convincingness of consumer i's (j-1)st reason.

$p_{ij}$ is a dummy variable that takes value 1 if reason j is the first reason produced by consumer i and that takes value 0 otherwise.

$r_{ij}$ is a dummy variable that takes value 1 if reason j is the last reason produced by consumer I and that takes value 0 otherwise.

Each reason j for consumer i receives a composite score that reflects its contribution to the final decision. The equation is linear for now but might very well take some other form in the future.

$$jscore = \beta_1 nb_{ij} + \beta_2 na_{ij} + \beta_3 tb_{ij} + \beta_4 ta_{ij} + \beta_5 c_{ij} + \beta_6 c_{i,j-1} + \beta_7 \left(c_{ij} \times c_{i,j-1}\right) + \beta_8 p_{ij} + \beta_9 r_{ij} + \beta_{10} \left(r_{ij} \times nb_{ij}\right) + \beta_{11} \left(r_{ij} \times tb_{ij}\right)$$

The scores for all reasons are summed to yield a prediction of the outcome.

$$compscore = \sum_{\substack{Allreasons j \\ \text{inf } avorofpromise \\ breaking}} jscore - \sum_{\substack{Allreasons j \\ \text{inf } avorofpromise \\ keeping}} jscore$$

, *where the consumer breaks her promise if* $compscore > 0$ *and keeps it if* $compscore < 0$

# Table 1

**Explanation of Study 1 Structure**

| Task 1 | | | | | |
|---|---|---|---|---|---|
| Oscillation<br>Participants assigned to the oscillation condition of task 1 were randomly assigned either to sequence 1 or sequence 2. | | | Non-Oscillation<br>Participants assigned to the non-oscillation condition of task 1 were randomly assigned either to sequence 1 or sequence 2. | | |
| | Sequence 1 | Sequence 2 | | Sequence 1 | Sequence 2 |
| Screen 1 | Prompt for a reason in favor of staying in | Prompt for a reason in favor of going out | Screen 1 | Prompt for a reason in favor of staying in | Prompt for a reason in favor of going out |
| Screen 2 | Rate convincingness of reason | Rate convincingness of reason | Screen 2 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 3 | Prompt for a reason in favor of going out | Prompt for a reason in favor of staying in | Screen 3 | Prompt for a reason in favor of staying in | Prompt for a reason in favor of going out |
| Screen 4 | Rate convincingness of reason | Rate convincingness of reason | Screen 4 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 5 | Prompt for a reason in favor of staying in | Prompt for a reason in favor of going out | | :<br>:<br>Continue until 5 reasons in favor of this side have been provided | :<br>:<br>Continue until 5 reasons in favor of this side have been provided |
| Screen 6 | Rate convincingness of reason | Rate convincingness of reason | Screen 11 | Prompt for a reason in favor of going out | Prompt for a reason in favor of staying in |
| Screen 7 | Prompt for a reason in favor of going out | Prompt for a reason in favor of staying in | Screen 12 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 8 | Rate convincingness of reason | Rate convincingness of reason | Screen 13 | Prompt for a reason in favor of going out | Prompt for a reason in favor of staying in |
| | :<br>:<br>Continue until 5 reasons in favor of each side have been provided | :<br>:<br>Continue until 5 reasons in favor of each side have been provided | Screen 14 | Rate convincingness of reason | Rate convincingness of reason |
| | | | | :<br>:<br>Continue until 5 reasons in favor of this side have been provided | :<br>:<br>Continue until 5 reasons in favor of this side have been provided |

Task 2

| Oscillation<br>Participants assigned to the oscillation condition of task 2 were randomly assigned either to sequence 1 or sequence 2. | | | Non-Oscillation<br>Participants assigned to the non-oscillation condition of task 2 were randomly assigned either to sequence 1 or sequence 2. | | |
|---|---|---|---|---|---|
| | Sequence 1 | Sequence 2 | | Sequence 1 | Sequence 2 |
| Screen 1 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending | Screen 1 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending |
| Screen 2 | Rate convincingness of reason | Rate convincingness of reason | Screen 2 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 3 | Prompt for a reason in favor of spending | Prompt for a reason in favor of saving | Screen 3 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending |
| Screen 4 | Rate convincingness of reason | Rate convincingness of reason | Screen 4 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 5 | Offer chance to stop. If participants choose stop, end reason generation here. If participants choose continue, continue reason generation. | | Screen 5 | Offer chance to stop. If participants choose stop, end reason generation here. If participants choose continue, continue reason generation. | |
| Screen 6 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending | Screen 6 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending |
| Screen 7 | Rate convincingness of reason | Rate convincingness of reason | Screen 7 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 8 | Prompt for a reason in favor of spending | Prompt for a reason in favor of saving | Screen 8 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending |
| Screen 9 | Rate convincingness of reason | Rate convincingness of reason | Screen 9 | Rate convincingness of reason | Rate convincingness of reason |
| Screen 10 | Offer chance to stop. If participants choose stop, end reason generation here. If participants choose continue, continue reason generation. | | Screen 10 | Offer chance to stop. If participants choose stop, end reason generation here. If participants choose continue, continue reason generation. | |
| | :<br>:<br>Continue until participant stops or until 5 reasons in favor of each side | | Screen 11 | Prompt for a reason in favor of saving | Prompt for a reason in favor of spending |
| | | | Screen 12 | Rate | Rate |

| | | | | |
|---|---|---|---|---|
| | have been provided. | | convincingness of reason | convincingness of reason |
| | | Screen 13 | Prompt for a reason in favor of spending | Prompt for a reason in favor of saving |
| | | Screen 14 | Rate convincingness of reason | Rate convincingness of reason |
| | | Screen 15 | Offer chance to stop. If participants choose stop, end reason generation here. If participants choose continue, continue reason generation. | |
| | | Screen 16 | Prompt for a reason in favor of spending | Prompt for a reason in favor of saving |
| | | Screen 17 | Rate convincingness of reason | Rate convincingness of reason |
| | | | :<br>:<br>Continue until participant stops or until 5 reasons in favor of each side have been provided. | |

# Table 2

**Binomial Regression with Rounds to Stop as the Dependent Variable and with Task 1 Condition, Task 2 Condition, and Task 1 Condition x Task 2 Condition as Predictors (Study 1)**

Omnibus Test

| Likelihood Ratio | Degrees of Freedom | Significance |
|---|---|---|
| 32.15 | 5 | .000 |

Tests of Model Effects

| | Type III | | |
|---|---|---|---|
| | Wald Chi-Square | Degrees of Freedom | Significance |
| Intercept | 11.38 | 1 | .001 |
| Task 1 Condition | 2.81 | 1 | .094 |
| Task 2 Condition | 21.20 | 2 | .000 |
| Task 1 Condition x Task 2 Condition | 9.87 | 2 | .007 |

Parameter Estimates

| | B | Standard Error | Wald Chi Square | Degrees of Freedom | Significance |
|---|---|---|---|---|---|
| Intercept | .61 | .19 | 10.62 | 1 | .001 |
| Task 1 Condition = 1 | -.77 | .25 | 9.59 | 1 | .002 |
| Task 2 Condition = 1 | -1.22 | .25 | 22.96 | 1 | .000 |
| Task 2 Condition = 2 | -.98 | .26 | 14.46 | 1 | .000 |
| [Task 1 Condition = 1] x [Task 2 Condition = 1] | 1.09 | .35 | 9.83 | 1 | .002 |
| [Task 1 Condition = 1] x [Task 2 Condition = 2] | .50 | .36 | 1.92 | 1 | .17 |

**Binomial Regression with Rounds to Stop as the Dependent Variable and with Task 1 Condition as the Independent Variable, Within Each Level of Task 2 Condition (Study 1)**

Omnibus Test

| | Likelihood Ratio | Degrees of Freedom | Significance |
|---|---|---|---|
| Task 2 Oscillation | 1.72 | 1 | .189 |
| Task 2 Non- | 1.10 | 1 | .294 |

| | | | |
|---|---|---|---|
| Oscillation | | | |
| Task 2 Anagrams | 9.80 | 1 | .002 |

Tests of Model Effects

| | | Type III | | |
|---|---|---|---|---|
| | | Wald Chi-Square | Degrees of Freedom | Significance |
| Task 2 Oscillation | Intercept | 13.64 | 1 | .000 |
| | Task 1 Condition | 1.72 | 1 | .190 |
| Task 2 Non-Oscillation | Intercept | 15.43 | 1 | .000 |
| | Task 1 Condition | 1.10 | 1 | .294 |
| Task 2 Anagrams | Intercept | 3.27 | 1 | .071 |
| | Task 1 Condition | 9.59 | 1 | .002 |

Parameter Estimates

| | | B | Standard Error | Wald Chi Square | Degrees of Freedom | Significance |
|---|---|---|---|---|---|---|
| Task 2 Oscillation | Intercept | -.60 | .17 | 12.52 | 1 | .000 |
| | Task 1 Condition = 1 | .32 | .24 | 1.72 | 1 | .190 |
| Task 2 Non-Oscillation | Intercept | -.37 | .18 | 4.38 | 1 | .036 |
| | Task 1 Condition = 1 | -.27 | .26 | 1.10 | 1 | .294q |
| Task 2 Anagrams | Intercept | .61 | .19 | 10.62 | 1 | .001 |
| | Task 1 Condition = 1 | -.77 | .25 | 9.59 | 1 | .002 |

# Table 3

**Multinomial Logistic Regression with Choice as the Dependent Variable and Final Reason Condition as a Predictor (Study 2)**

Likelihood Ratio Tests

| | -2 Log Likelihood | Chi-Square | Degrees of Freedom | Significance |
|---|---|---|---|---|
| Intercept | 13.34 | .000 | 0 | NA |
| Final Reason Condition | 18.44 | 5.10 | 2 | .078 |

Parameter Estimates

| Choice (Reference Category is Neither Choice) | | B | Standard Error | Wald Chi-Square | Degrees of Freedom | Significance |
|---|---|---|---|---|---|---|
| Chocolate | Intercept | .62 | .47 | 1.74 | 1 | .187 |
| | Final Reason Condition = 1 | 1.09 | .90 | 1.45 | 1 | .228 |
| Carrots | Intercept | .25 | .51 | .25 | 1 | .618 |
| | Final Reason Condition = 1 | 1.83 | .90 | 4.09 | 1 | .043 |