To Stop or Not To Stop? - Investigating the Differential Effects of Two Self-Control Strategies on Self-Regulatory Resource Depletion

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ABSTRACT

Self-regulation is a vital function to humanity, and is an important factor in the dominant paradigm of consumer research, whereby consumer decisions are characterised by the battle between long- and short-term interests. The current research examined the relative effectiveness of two self-regulatory strategies: stopping an already-commenced consumption episode, or to not commence one at all. Traditional economic theories, including the principle of diminishing marginal utility, would predict that not starting is harder to accomplish; whereas a proposal by Thaler (1983) suggests that not starting is in fact the optimal strategy. Two studies were conducted whereby participants were asked to either perform a less-favoured task and resist from starting a more-favoured one (*Not Start*), or to cease performing a more-favoured task to complete the less-favoured task (*Stop*). Study 1 found that *Stop* was more difficult than *Not Start*, which tentatively supported Thaler's argument; however there was an explanation which could not be ruled out, namely the psychological distance of the anticipated second task. Study 2 addressed this issue by manipulating that factor by incorporating it into the experimental design. It was found that *Not Start* became as depleting as *Stop* when psychological distance of the second task was reduced. This research contributed to the literature by establishing a boundary condition upon the strength model of self-regulatory resource depletion, and adds to the discussion on the descriptive validity of the principle of diminishing marginal utility.

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List of Abbreviations

BMIS	Brief Mood Introspection Scale
DMU	Diminishing Marginal Utility
NA	Negative Affect (see "PANAS")
PA	Positive Affect (see "PANAS")
PANAS	Positive Affect/Negative Affect Schedule

1 INTRODUCTION

One of the most important features of humanity is the ability to control and manage their behaviour in order to selectively avoid the influence of immediate, external constraints (Bandura, 1977; Baumeister & Heatherton, 1996). Without this ability, humans would be slaves to their immediate urges, behaving without regarding

their own (or others') long-term wellbeing. This ability, known as self-control or self-regulation[1], allows humans to alter a variety of responses (Baumeister, 2002), including thoughts (e.g., by suppressing particular thoughts or forcing oneself to concentrate), emotions (getting into or out of a particular emotion or mood), regulating impulses (e.g., by resisting temptation), and persistence.

Self-control has long been found to have implications for a wide range of economic and social behavioural patterns, such as aggression (e.g., DeWall, Baumeister, Stillman, & Gailliot, 2007; Twenge, Baumeister, Tice, & Stucke, 2001), diet (e.g., Kahan, Polivy, & Herman, 2003; Polivy, Herman, Hackett, & Kuleshnyk, 1986), and addiction (e.g., Kirschenbaum, 1987; Muraven, Collins, & Nienhaus, 2002; Muraven, Collins, Shiffman, & Paty, 2005). Indeed, children's ability to engage in self-control has been demonstrated to be related to academic and social competence later in life, such as greater attentiveness, improved stress-coping abilities, social confidence (Funder & Block, 1989), as well as better scholastic performances (Mischel, Shoda, & Rodriguez, 1989; Shoda, Mischel, & Peake, 1990). These studies clearly demonstrated that self-control is a ubiquitous phenomenon, with important implications for many facets of

[1] The terms "self-control" and "self-regulation" are used interchangeably throughout this document (see Baumeister, 2002; Vohs & Schmeichel, 2003).

daily human functioning and development (Muraven, Tice, & Baumeister, 1998; Thaler & Shefrin, 1981).

It is perhaps paradoxical that even though self-control is important to human well-being, people continue to fail at it consistently (Baumeister & Heatherton, 1996). Many of us have attempted a wide range of self-control activities like diet programs, exercise regimes, or productive work routines; yet most of us have also heard tales of losing the battle to avoid the tasty chocolate treat, skipping gym, or passive TV-watching instead of completing work. It does not appear that this self-regulatory failure is due to lack of practice or experience: most people begin to learn self-control behaviour as soon as they start to learn the norms and rules of the world (Thaler & Shefrin, 1981). This learning is ongoing throughout life, both via first-hand experiences and by observing the experiences of others. In the majority of instances, people do achieve self-control quite successfully. This raises the question: given the importance of self-control, the vast number of examples of success, and the many experiences of successful self-regulation, why do self-regulation failures still occur?

2 LITERATURE REVIEW

2.1 Past research on self-control behaviour

The importance of self-control - and paradoxically, the ubiquitousness of self-control failures - has stimulated extensive attention across a number of research disciplines, including psychology (e.g., Ainslie, 1975; Baumeister & Heatherton, 1996; Mischel & Ebbesen, 1970), behavioural economics (e.g., Strotz, 1955; Thaler & Shefrin, 1981), and political science (e.g., Elster, 1977; Schelling, 1978). Self-control problems are thought to originate from humans having "time-inconsistent preferences" (Ainslie, 1975; Frederick, Loewenstein, & O'Donoghue, 2002; Strotz, 1955) with a "present bias" favouring immediate utility over delayed utility (O'Donoghue & Rabin, 1999)[2]. The implication of this present-biased time-inconsistent preference is that when considering a trade-off between two future events separated in time, a person's preference may ordinarily reflect their long-term best interests; but as the events get closer in time, the

[2] The phenomenon of favouring immediate gratification has also been termed "time preference" (Frederick et al., 2002). For consistency, only the term "present bias" will be used to describe this phenomenon.

person would tend to temporarily assign more relative weight to the more-imminent event, which may be smaller or poorer than the alternative (Ainslie, 1975; O'Donoghue & Rabin, 1999). Self-control problems arise when this change in preference results in a decision that may compromise the person's long-run wellbeing, even if the decision brings about some immediate gratification (O'Donoghue & Rabin, 2000). For example, given a choice between earning $100 on October 1 or earning $200 on October 15, if asked in June most people would prefer the $200 alternative; however when asked on September 31, most people would prefer the $100 in one day rather than the $200 in 16 days, resulting in a suboptimal outcome (adopted from O'Donoghue & Rabin, 1999). This change in preference across time can occur without the individual gaining any additional information about the choices (Strotz, 1955).

Self-control is particularly important for contemporary consumer behaviour research. In the past, the dominant marketing research paradigm had been the rational choice model, where consumers were assumed to be dispassionate information processors, rationally weighing benefits and costs and effortlessly implementing their decisions (Bettman, 1979). This view of consumer behaviour, however, had long been identified as inadequate, because a more complete understanding of consumer behaviour requires consideration of both long-term rational concerns and short-term

emotional factors (Hoch & Loewenstein, 1991). Furthermore, until relatively recently, economists have assumed that people's preferences are consistent over time, thus neglecting the possibility of self-control problems and the implications of time-inconsistent preferences (O'Donoghue & Rabin, 2000).

About two decades ago, a body of literature emerged examining how consumer decision-making is influenced by transient changes in preferences across time. Hoch and Loewenstein (1991) framed consumer decision-making as a struggle between long-term cognitive and short-term affective factors. They suggested that when affective factors are given more weight, consumers are likely to become impatient and make immediate purchases that they may regret later (i.e., "impulsive shopping", Rook (1987) and Rook and Fisher (1995)). Consumers are, however, not entirely helpless against temporary changes in their preferences; they can use self-control to ensure that their actions are consistent with their long-term interests (Hoch & Loewenstein, 1991; Metcalfe & Mischel, 1999). More specifically, the greater the resources available to enact self-regulation, the more likely consumers are to resist the influences of transient emotional factors.

Further evidence supporting the hypothesis has been revealed in various aspects of consumer behaviour. For instance, engagement in active emotional regulation

increases the likelihood of risky choices (Bruyneel, Dewitte, Franses, & Dekimpe, 2009). Restrained eaters who were made to complete a cognitively draining task were subsequently found to be more susceptible to increased food intake than fellow restrained eaters who did no such draining tasks (Kahan et al., 2003). Also, consumers who have engaged in some prior self-regulatory behaviour were found to have stronger urges and spend more money in subsequent (unanticipated) buying situations than participants who have not self-regulated (Vohs & Faber, 2007). Clearly, studies in self-control have contributed to understanding of consumers' behaviour.

2.1.1 Thaler's Mirage and two self-regulatory strategies: Stop *vs.* Not Start.

One of the most basic self-control dilemmas faced by consumers is the question of whether to engage in a consumption episode. There may be times when a consumer may choose to decline a consumption episode – even at the cost of forgoing the enjoyment associated with the episode – in order to avoid the adverse consequences of over-consuming. This scenario is illustrated by Thaler (1983) in his discussions of a "Mirage" in public policy decisions:

"*A group of economists was sitting around having cocktails, awaiting the arrival of dinner. A large bowl of cashews was placed on the cocktail table, and within 90 seconds one half of the cashews were gone. A simple linear extrapolation would have predicted the total demise of*

the cashews and our appetites in another 90 seconds. Leaping into action, I grabbed the bowl and (while stealing a few more nuts on the way) hid it in the kitchen. Everyone seemed relieved, yet puzzled. How could removing the bowl, and thus removing a choice, have made us better off?"

Thaler (1983) illustrated the Mirage with the following decision-tree:

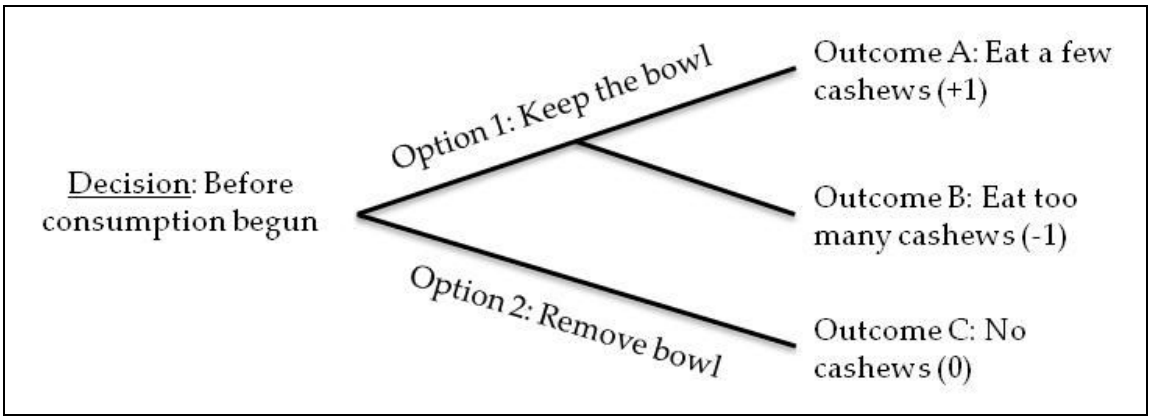


Figure 2-1: A decision-tree illustrating the options available to the hungry economists in Thaler's (1983) illustration of the "Mirage".

Here, the dinner guests have two incompatible motivations: their immediate interests (to eat cashews) and their overall preference (to maintain appetite). Presumably, the dinner guests would like to enjoy some cashews (+1), but would not like to consume so much that they completely lose their appetite (-1). Thaler (1983) argued that, ordinarily, a rational consumer would choose Option 1, which represents the *Stop* strategy. This is because the rational consumer believes that there is some non-zero probability of reaching the best outcome of eating just a few cashews (Outcome A, the relative value of the outcome is denoted by +1). This outcome is presumably more

enjoyable than choosing *Not Start*, or eating no cashews at all (Outcome C, 0), which would have been the necessary consequence of choosing Option 2 (remove bowl). In addition, it is a fundamental economic tenet that having more choices could only make one better off; conversely the reduction of choices (i.e., imposition of constraints) would make one worse off (Thaler, 1980). Option 2 (remove bowl) can lead to only one outcome (C: no cashews;) whereas Option 1 (keep the bowl), ostensibly, allows consumers to use discretion to eat just a small number of cashew, enough to satisfy their immediate cravings yet retain their appetite. The superior outcome offered by Option 1, and the ostensible availability of discretion, seem to make *Stop* (Option 1) the superior strategy compared to *Not Start* (Option 2).

Thaler (1983), however, argued that the discretion offered to consumers in Option 1 is sometimes not feasible at all. Even though Option 1 ostensibly offers a pathway to the best outcome (A), that pathway is merely a *mirage*. The dinner guests would probably fail to stop eating at the appropriate moment and end up overeating, thus arriving at the least desirable outcome (Outcome B). Thaler argued that declining consumption and removing the bowl (Option 2) is, in fact, the most rational option, because the only outcome available from this option – no more cashews (Outcome C) – is better than the only realistic, non-mirage outcome that results from Option 1.

Thaler's (1983) story illustrated the two strategies that form the subject of the current investigation: *Stop* and *Not Start*. Both strategies can be examples of "precommitment", which are measures taken by consumers to limit their future behaviour in order to ensure that they will act in a way that is consistent with their long-term preferences (Strotz, 1955). *Not Start* is definitely a form of precommitment, while *Stop* may include plans to assist in the act of stopping after an appropriate level of consumption. Both strategies require self-control, because in both cases the consumer has to override a dominant response (Baumeister, Bratslavsky, Muraven, & Tice, 1998): in *Stop*, the consumer has to overcome the urge to continue consumption and cease it at the appropriate time; in *Not Start*, the consumer has to overcome the urge to start consuming at all. The relative efficacy of the two strategies is yet to be examined in detail in existing literature concerning self-control.

Most of the self-regulation literature has examined the implications of activities that involve the *Not Start* strategy, but relatively few have dealt with *Stop*. A growing body of literature on the "strength model" of self-regulatory resources (e.g., Baumeister et al., 1998; Muraven et al., 1998) (to be discussed further in section 2.2 below) also focussed primarily on self-regulatory strategies that require impulse control (i.e., resist from doing something) (Carver & Scheier, 1996). The *Not Start* strategy is common in

daily life, where people often establish rules to prevent engaging in a tempting activity lest they cannot stop. Thaler and Shefrin (1981) outlined a number of examples: "Christmas Club" accounts (which pay no interests and prescribe punitive fees for withdrawals before the Christmas season, thus appearing to be a very poor savings option compared to a regular saving account;) ingestion of the drug Antabuse which makes one physically sick if they consume alcohol; or "fat farms" where participants pay to receive a guarantee that they would be under-fed by the operators. In all of these examples, people paid a premium to ensure that they stay with their pre-planned course of action. Those who adopted the *Not Start* strategy would have considered it sufficiently meritorious even though the strategy would limit their utility.

In contrast, *Stop* strategies have generally been discussed on a hypothetical or speculative level. For instance, Baumeister and Heatherton (1996) argued that the longer an activity goes on, the harder it is to self-regulate against that activity, and thus it is simpler to avoid a temptation than to overcome it. Ainslie (1975) briefly discussed a type of self-control called "rationing reward" (p. 487), where a consumer must choose between consuming a reward quickly and intensely, and consuming one slowly and gradually. Ainslie suggested that consumers would "probably" gain more utility from the latter strategy, although he did not elaborate on his reasons. It seems that this

"rationing reward" strategy would have been useful in Thaler's (1983) dinner party example, in that had the dinner guests consumed the cashews slowly they might have gained some enjoyment without overeating; however once again there is no experimental evidence to show the efficacy of this strategy, or to demonstrate its relative effectiveness against *Not Start*.

There had been some studies attempting to contrast *Not Start* against other self-regulatory strategies; but none had specifically examined the efficacy of *Stop* in comparison to *Not Start*. For example, Kirschenbaum (1987) identified two major types of self-controlling responses: resisting temptation (i.e., foregoing short-term positive consequences to avoid negative consequences in the long-run, e.g., dieter resisting dessert to avoid weight gain) and tolerating "noxious stimulation" (i.e., incurring short-term negative consequences to attain long term positive consequences, e.g., student memorising boring formulae to achieve high grade). Resisting temptation is similar to the *Not Start* strategy examined in this study; however the possibility of self-regulating by ceasing an existing consumption episode was not considered in Kirschenbaum's study. Other authors (e.g., O'Donoghue & Rabin, 1999, 2000) have considered the effect of a similar pair of self-regulatory strategies – delaying pleasure versus bringing forward pain – which again did not address the question posed by Thaler (1983).

Despite Thaler's (1983) belief and the many precommitment devices using the *Not Start* strategy, *Stop* is not always unattainable and is sometimes a viable strategy. It is possible for consumers to set limits on their consumption, begin to consume, and stop consuming at the pre-determined limit. It has also been observed that even the most ardent addict can occasionally control their consumption levels (Vohs & Faber, 2007). Indeed, if humans were completely unable to stop consuming, the question of whether *Stop* is more difficult than *Not Start* would be a moot point because no one would ever consider *Stop* a possibility. One of the primary objectives of this research is to directly test the relative efficacies of the *Stop* and *Not Start* strategies. As will be discussed below, it is not immediately clear that *Stop* is necessarily more difficult to achieve than *Not Start*, particularly if a number of economics principles are considered.

2.1.2 Thaler's Mirage and the principle of Diminishing Marginal Utility.

Thaler (1983) argued that sometimes it is better for consumers to forego consumption rather than keeping the option to consume open, in order to avoid potentially negative outcomes (e.g., from overconsumption). If Thaler is correct, then one should expect *Not Start* to be easier to achieve than *Stop*, because if *Stop* were easier to accomplish, there should be no need for consumers to guard against continuing consumption. However this belief is contrary to a number of established economic

principles. For instance, as stated earlier, the *Stop* strategy allows consumers to use discretion on whether to continue consuming, whereas *Not Start* precludes this discretion. Thaler (1980) suggested that having more choices available to consumers is always beneficial to consumers, according to fundamental economic tenets. Additionally, Thaler's (1983) prediction is one of a number of relatively recent results that are inconsistent with the principle of *Diminishing Marginal Utility* ("DMU"). DMU states that as individuals engage in an episode of consumption, each additional unit of consumption would provide less utility than the previously unit of consumption. DMU has long been a central component of economic theories such as expected utility theory, decisions under uncertainty, and analysis of demand (e.g., Jevons, 1879; Marshall, 1920; Schlee, 1992). Despite its widespread application, DMU's predictive validity in real-world scenarios had come under scrutiny (e.g. Rabin, 2000a; Rabin, 2000b; Rabin & Thaler, 2001). These authors' main criticism was that DMU predicts an implausibly high level of risk aversion. It is the concavity of the utility function which predicts that a person who refuses a 50-50 bet of losing $10 or gaining $11, they would also refuse a 50-50 bet involving a $100 loss, even with the potential gain of several million dollars (Rabin & Thaler, 2001). Thaler's (1983) Mirage can be seen as another contention which questioned this principle, despite not directly stated so by the author.

DMU has not yet been directly invoked to explain self-regulation, let alone to explain the relative merits of the two self-regulatory strategies under investigation here. However if DMU were to be used to predict the current research question, it would have predicted that *Stop* is preferable to *Not Start*. The prediction follows DMU's essential point that, as a consumption episode goes on, each unit of consumption provides less utility for the consumer than the previous unit of consumption. If an object's utility is positively correlated to the degree of difficulty required to self-regulatory against the object (Hoch & Loewenstein, 1991, Figure 3), the gradual decrease in utility in the course of consumption means it should be increasingly easy for a consumer to stop consuming. It also follows that if every unit of consumption has less utility than the previous one, then the consumer would derive the maximum utility from the very first unit of consumption. DMU would have predicted that if the consumer chooses to decline all consumption (i.e., *Not Start),* they would be self-regulating from a position where the object of regulation has the greatest utility, thus making *Not Start* very difficult to achieve. The view that *Not Start* is easier to achieve than *Stop* (Ainslie, 1975; Strotz, 1955; Thaler, 1983) is therefore inconsistent with the prediction that would have been advanced by DMU.

In short, Thaler's Mirage (1983) illustrates an instance where the optimal outcome (i.e., to not start consuming) seems to be at odds with what would have been predicted by DMU (i.e., to consume and then stop). DMU is a robust theory that is pivotal to a number of economic theories; however Thaler's Mirage describes a very common real-world phenomenon whereby consumers would attempt to limit their consumption (Thaler & Shefrin, 1981). Also as stated earlier, despite what is asserted in Thaler's Mirage, *Stop* is sometimes possible to achieve; and there are circumstances under which *Stop* does provide better outcome than *Not Start*. The relative efficacy of the two self-regulatory strategies, and the boundary conditions under which each strategy is superior, form the crux of this investigation.

2.2 Strength model of self-regulation and depletion

The theoretical focus of the present research is to investigate the relative difficulties of two self-regulatory strategies: to stop a consumption episode after it has begun, or to not start it in the first place. In order to test the question, it is necessary to determine the degree to which each strategy requires effort from the individual regulating his or her behaviour; that is, how much psychic cost is required to execute each strategy (Shefrin & Thaler, 1988). A recent body of research had established a

framework by which the psychological costs of self-regulation can be determined, which became known as the "strength model" of self-regulation (e.g., Baumeister et al., 1998; Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000). This framework regards self-regulation as an act of overriding, altering, or inhibiting the natural behaviour in which an individual is predisposed to engage (Heatherton & Baumeister, 1996). It is assumed that actions that require self-regulation draw upon a limited psychic resource that becomes temporarily depleted, such that subsequent acts of executive function become harder to achieve (Baumeister et al., 1998). This psychic resource is variously termed *ego strength, ego resource* or *self-regulatory resource* (e.g., DeWall et al., 2007), and the temporary depletion of this resource is termed *ego depletion* or *self-regulatory resource depletion* (for consistency, the rest of this document will refer to "self-regulatory resource depletion", or simply "depletion".) As will be detailed below, the degree to which an individual suffers from depletion can be experimentally inferred and quantified. This qualifies the "strength model" to be an appropriate framework to examine the psychic cost of self-regulation as required by Shefrin and Thaler (1988)

The idea of a limited pool of ego resource traces back to Freudian psychoanalytic theory (Freud, 1961). Freud believed that individuals' behavioural motivation is influenced by both their internal urgings (manifested in the *id*) and learned societal

inhibitions (manifested in the *super-ego),* and that one's *ego* must mediate between the two sources of motivation in order to deal with the external reality. Whilst Freud was not explicitly clear on the nature and composition of the resources that fuel this mediation, his work asserted that the ego's task of mediating between short-term impulses and long-term interests can impose psychological costs. Subsequent studies have established that attempts to control is indeed taxing on the self (Brehm & Self, 1989), and that when an individual is made accountable for their active volitions, their behavioural and cognitive processes change in some ways (e.g., Tetlock & Boettger, 1989). Baumeister et al. (1998) believed that, despite those previous research efforts, understanding of the self's functions remained relatively poor. This prompted a series of research which established a theoretical framework to understand the process of control, by focussing on how self-regulatory failure happens (Brehm & Self, 1989). The "strength model" was established from this research, attempting to explicate the circumstances under which individuals suffer from self-control difficulties, and offers a simple yet robust experimental paradigm to aid this investigation. The standard experimental paradigm will be detailed in section 3.1 below.

It is important to recognise that not all difficult or effortful acts lead to self-regulatory depletion. Behaviours that require minimal overriding or inhibition of urges

are not classified as self-regulatory, even if they do require effort (Muraven & Baumeister, 2000), such as solving moderately difficult mathematical problems (like manually calculating three-digit multiplications, e.g., 123 x 456). Despite requiring some effortful exertion, solving those mathematical problems generally does not require overriding dominant responses, therefore producing no self-regulatory resource depletion (Muraven et al., 1998, Study 3). It had also been demonstrated that the effects of self-regulatory resource depletion is only temporary (e.g., Baumeister et al., 1998; Muraven, Baumeister, & Tice, 1999; Muraven et al., 1998). That is, after an individual is depleted following a self-regulatory episode, they regain their full complement of self-regulatory resource after a period of rest. The process of depletion and resource regeneration had been compared to the use and replenishment of muscular strength: when a muscle is exercised, its strength is gradually depleted and its subsequent performance becomes impaired temporarily; however its strength is restored after a suitable period of rest (Muraven et al., 1998). The transient nature of self-regulatory depletion makes it necessary to measure any changes in resources resulting from self-regulation immediately following the exertion.

2.3 Objectives and hypotheses of Study 1

The strength model of self-regulatory resource depletion was established to improve understanding of human self-control functions, by attempting to explain how self-control failures happen. The model assumes that any prior self-regulatory act leads to temporary reduction in one's ability to self-regulate; however it has yet to question the boundary conditions under which such depletion may be augmented or diminished. Recent studies have begun to explicate circumstances under which prior depletion may differentially affect subsequent depletion. For instance, it had been found that if two successive self-regulatory acts were of a similar nature (e.g., if they both involved thought-suppression), prior self-regulation actually enhances subsequent self-regulation, rather than impair it (Dewitte, Bruyneel, & Geyskens, 2009). The current research aims to add to this literature by explicating a situation whereby depletion effects could be reduced by using different self-regulatory strategies.

Additionally, studies in the strength model literature had mostly used manipulations that involve the *Not Start* strategy, such as refraining from eating a tasty snack, persevering at an unsolvable task, and deliberate manipulation of emotion. These manipulations can be translated into not starting, not stopping, and inhibiting respectively. Consequently, the question of self-regulating by *Stop* has not been

discussed in depth in the depletion literature. Baumeister and Heatherton (1996) suggested that the longer an activity goes on, the harder it is to self-regulate against it, which seemed to imply that *Stop* is more difficult than *Not Start*; however their contention is yet to be empirically tested. Critics (e.g., Carver & Scheier, 1996) have argued that if self-regulation were to be defined as an overriding of dominant urges, then research on self-regulation should also discuss strategies that involves "doing something", like leaving an unfulfilling career, or ceasing to live a lazy lifestyle and starting a fitness regime. The self-regulatory implication of this "expediting costs" strategy had also been examined by O'Donoghue and Rabin (1999, 2000). This "expediting costs" strategy, however, is not the same as *Stop* discussed in Thaler's Mirage (1983): cost-expedition involved asking the regulator to immediately incur a cost so to attain some future good. Like *Not Start*, the "expediting costs" strategy requires the regulator to not engage in immediate gratification. Thaler's Mirage, instead, questions whether asking the regulator to cease an already-commenced gratifying episode is more taxing than to delay/decline that gratification. Neither group of authors using the "expediting costs" strategy have specifically provided predictions for Thaler's Mirage, that is, whether *Stop* is more difficult self-regulatory strategy than *Not Start*.

Additionally, Thaler's prediction regarding the Mirage (1983) is in contrast with what the DMU, a robust economic principle, would have predicted. Thaler suggested that *Stop* would be more difficult to achieve than *Not Start*; whereas DMU would predict in the opposite direction. Thaler's contention that *Not Start* is the better strategy also opposed against a fundamental economic tenet: that having more choices is beneficial, and removal of choices is detrimental. This research aims to add to existing research on establishing the boundary conditions of DMU (e.g. Rabin, 2000a), by questioning whether DMU can offer adequate description and prediction for the kind of situations described by Thaler's Mirage.

The first hypothesis of the study follows the prediction made by Thaler's Mirage (1983): it is more depleting to stop an already-commenced episode of consumption, than to not start one in the first place.

H1: A "stop" self-regulatory strategy depletes self-regulatory resources more than a "not-start" strategy.

3 STUDY 1

This study used an experimental method consisting of two levels of a single independent variable (Regulatory Strategy: *Stop* vs. *Not Start),* into which participants

were randomly allocated. The dependent measure is the amount of self-regulatory resource depletion experienced by participants in each group. The standard experimental procedure employed in previous strength model research, which is explained below, was adopted in this study.

3.1 Experimental paradigm of the self-regulatory strength model

Strength model studies (e.g., Baumeister et al., 1998; Muraven et al., 1999; Muraven et al., 1998) typically employed a two-phase experimental paradigm (see Figure 3-1 below). In a typical study using this procedure, participants are randomly allocated to two conditions, *Depletion* and *Control*. In phase 1, the *Depletion* group receives a task that requires self-regulatory exertion, whereas the *Control* group completes a task that does not require regulation. In phase 2, both groups complete a self-regulatory measure, which is another task that requires self-regulatory exertion. The performance of each group in phase 2 is the dependent variable.

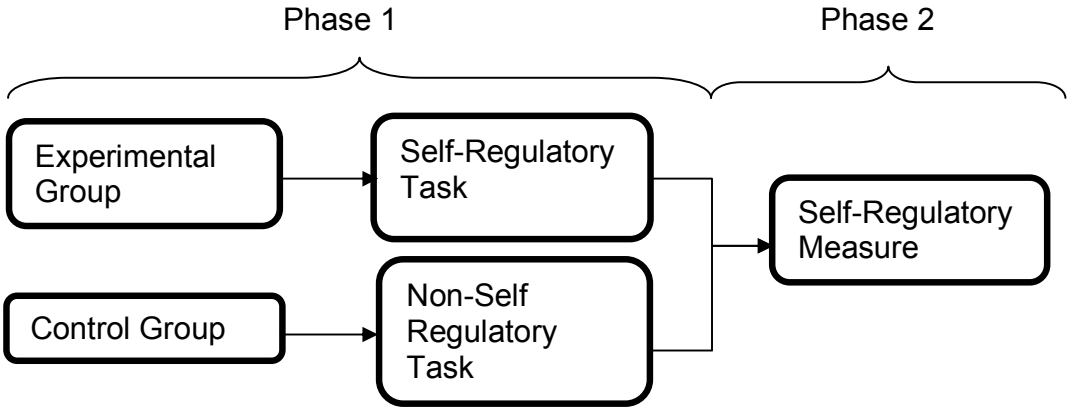


Figure 3-1: The typical two-task experimental paradigm used in strength model studies.

The tasks presented to the two groups during phase 1 are usually different in a subtle way, but with a crucial difference: whilst the *Depletion* task is self-regulatory in nature, the *Control* task is similar but without any active overriding of the self, which as discussed earlier is the definition of self-regulation (Heatherton & Baumeister, 1996). For example, one study asked participants to watch an emotionally upsetting film; the *Depletion* group was told to suppress their emotional reaction towards the film, whilst the *Control* group received no emotional-suppression instructions (Muraven et al., 1998, Experiment 1). It has consistently been shown that participants in the *Depletion* group consistently show inferior performance in the phase 2 self-regulatory task than participants in the *Control* group. Given that *Depletion* and *Control* groups differ only in the nature of the task performed in phase 1, the *Depletion* group's inferior performance in phase 2 is assumed to be caused their engagement in self-regulatory (vs. non-self-

regulatory) activities in phase 1. Based on this result, strength model researchers postulate that acts of self-regulation temporarily deplete some internal resources, which subsequently impedes individuals' self-regulatory performance in phase 2.

3.2 Overview of study

In study 1, participants were randomly allocated to one of two experimental conditions: *Stop* and *Not Start*. As this study's main aim was to compare the two self-regulatory strategies' relative difficulty against each other, it was not necessary to designate a control group. Each participant was first asked to rate their preference for two problem-solving games (either a general knowledge quiz or a Sudoku game, details of which will be discussed further below); participants in the *Stop* group were asked to first complete the game which they chose as more favourable followed by their less-preferred game (thereby having to self-regulate by ceasing a desirable activity), whereas participants in the *Not Start* group were asked to complete their less-favoured game first followed by their more-favoured game (thereby self-regulating by resisting from starting a desirable activity).

To increase participants' motivation and to prevent them from completely avoiding the less-favoured game, participants were informed that they have an

opportunity to win a cash prize if they score highly in their more-favoured task, but to be eligible for the prize they must achieve a certain level of performance (or "pass") the less-favoured task. The score required to qualify for the prize draw was never revealed to participants to avoid changing motivations when they approach or surpass the target (DeWall, Baumeister, & Vohs, 2008, Experiment 6). Participants were given a fixed amount of time (20 minutes) to complete as much of the two tasks as possible, but the amount of time that they spend on each task was left to their discretion. Since the participants were unaware of the score required to qualify for the prize, the best way for participants to maximise their scores on both tasks would have been to spend an equal amount of time on each task, i.e., ten minutes each. Participants were prompted on this point prior to the study's commencement but the ten minute suggestion was neither repeated again nor enforced. This was done to ensure that the participants' responses were performed with relatively little immediate external control (Kirschenbaum, 1987), thus amplifying the effect of *self*-regulation when it is eventually measured. Participants were also asked in advance how they intended to allocate those 20 minutes in order to gauge whether violation of this committed time (and the extent to which this commitment had been violated) had an effect on depletion (see section 3.4.2 for details). The length of each task had been designed to ensure that no participant would finish

either task within the time provided. Finally, the allocation of task order and which task carried the prize-winning opportunity was ostensibly random to avoid detection of the "favoured task = prize-winning opportunity" contingency.

In line with past self-regulation resource model research (e.g., Baumeister et al., 1998; Muraven et al., 1998), the impact of each self-regulatory strategy was determined via a measure that was designed to appear unrelated to the tasks presented in phase 1. Using a depletion measure that bore no obvious relationship to prior self-regulatory tasks demonstrates that a wide array of seemingly unrelated acts can draw upon the same pool of psychic resource (Muraven & Baumeister, 2000). The dependent measure was presented immediately after participants decided to end the first task. After the dependent measure was administered, participants were free to use the remainder of their allowed 20 minutes to complete their second task.

3.3 Method

3.3.1 Description of stimuli.

The general knowledge quiz consists of multiple-choice questions relating to a wide variety of fields and discipline, including current affairs, geography, history, and cultural events. An example of a general knowledge quiz item would be as follows:

Which is the capital city of Australia?

A. Sydney

B. Melbourne

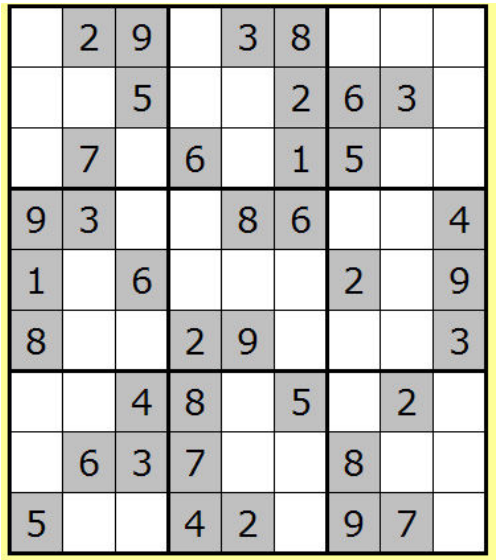
C. Canberra

D. Brisbane

E. Launceston

Participants were informed of the correct solution and their current score after every ten questions.

The Sudoku game, meanwhile, involved logical and spatial reasoning. The objective of the game is to fill a 9-by-9 grid (subdivided into nine 3-by-3 grids) with the numbers 1 to 9, such that each row, column and each of the nine subdivided 3-by-3 grid contains only one instance of each number. At the start of the game, some numbers were already filled in, and the player's task was to fill the gaps to satisfy the conditions explained above (an example is shown in Figure 3-2 below). Even though Sudoku can involve grids of other dimensions, this 9-by-9 configuration is typical of Sudoku games circulated daily in Sydney's metropolitan newspapers and magazines. The games used in this study were adopted from the website www.sudoku.com.au.



	2	9		3	8			
		5			2	6	3	
	7		6		1	5		
9	3			8	6			4
1		6				2		9
8			2	9				3
		4	8		5		2	
	6	3	7			8		
5			4	2		9	7	

Figure 3-2: Sample of a Sudoku game, at its starting position.

These tasks were chosen because they are both popular and familiar to undergraduate marketing students – the potential participant pool – yet each task requires a different mental process. Specifically, completing the general knowledge quiz requires the use of *Crystallised Intelligence*, which involves using information that is accumulated via prior learning and experience. On the other hand, the Sudoku game requires the use of *Fluid Intelligence*, which involves adaptation to novel situations and logical skills and is not dependent on acculturated knowledge. Crystallised and Fluid Intelligences were considered direct opposites to each other (Cattell, 1963). The questions for each task were carefully selected and tested to ensure that the two tasks

are seen as approximately equally difficult and enjoyable. This was confirmed by subsequent manipulation checks (please refer to Section 3.4.1 for details.)

3.3.2 Participants.

Two hundred and five marketing undergraduate and postgraduate students from the Faculty of Economics and Business, University of Sydney, took part in the study in exchange for course credit. Participants were recruited via an online announcement system operated by the Faculty, which describes the study as one that investigates people's problem-solving abilities. Participants are informed at the time of recruitment of the incentives: namely course credits and an opportunity to win a $200 cash prize for superior performance in a problem-solving exercise.

3.3.3 Dependent measure.

In this study, the dependent measure consisted of a "word-checking task" adopted from Moller, Deci and Ryan (2006, Experiment 3), presented as a "attention to detail" test. The task was chosen as it is unrelated to the depletion manipulation, yet still required self-regulatory exertion (Muraven et al., 1998). This is typically used in the strength model paradigm to show that all exertions of the self draws from a common psychic resource. In this world-checking task, participants were asked to read a two-

page excerpt and cross off words according to several conflicting sets of rules. It was argued that attempting to complete this task requires overriding one's dominant response of simply following one rule and ignoring the others, thus is self-regulatory in nature (Baumeister et al., 1998, Experiment 4). A "self-regulation score" (number of correctly marked items minus number of incorrectly omitted items) is the main dependent measure (in accordance to Moller et al., 2006).

3.3.4 Procedure.

Participants attended the study in small groups of 1 to 8 in Faculty computer laboratories. Upon arrival, participants were greeted, received instructions, and gave their informed consent (see appendix B for consent form.) Afterwards, participants were randomly allocated to individual computer workstations, where they read the following greeting message (see appendix E for all screenshots of the program):

> *"Welcome to the Problem Solving Study. We would like you to work on two different problem solving tasks: A General Knowledge Quiz, and a Sudoku Challenge. You have the chance to $200 cash prize if you do well in one of these tasks; we will tell you which one later. You have 20 minutes to complete both tasks."*

The study administrator further reinforced that although there is no clear requirement on how long each participant must spend on each task, it is advisable to allocate ten minutes to each. Participants were informed that they would not be allowed to switch back and forth between the two tasks, once they had decided to end the first task, they could not return to it later. Participants were then shown a detailed example of each task, during which they were again reminded that they have full control over their timing, by pressing a clearly labelled button. A timer was also clearly visible on the computer screen, indicating the number of minutes elapsed from the time participants commence the first task.

After participants saw an example of the two tasks, they were asked to rate how much they favoured each task (on a continuous scale anchored with Unfavourable [0] to Favourable [100]), and the number of minutes they had planned to spend on each task. Afterwards participants received a message informing them which task they would commence first, which task would carry the opportunity to win the $200 cash prize, and which task they must pass in order to qualify for the cash prize. As stated in section 3.2 above, participants in *Stop* received their more-preferred task first, and those in *Not Start* received the less-preferred task first; in both cases (and unbeknownst to the participants), the more-preferred task always carried the prize-winning opportunity,

and the non-preferred task carried the requirement to pass. If a participant gave equal favourability ratings for both tasks, they would be randomly allocated to either commence with the general knowledge quiz or the Sudoku game, and the prize-winning opportunity would be allocated according to their assigned condition (i.e., if *Stop* – task 1 has the incentive; if *Not Start* – task 2 has the incentive). Participants were also asked to estimate the number of minutes they plan to spend on each task. After that, they were asked to commence task 1.

When participants decided to terminate the first task, they pressed a button on the program clearly labelled "*Finish the [Name of Task]"*. They were then asked to provide their ratings on the following: (participants were also informed that the 20 minute timer was temporarily suspended, in order to prevent them from rushing through these items).

- How much they have enjoyed the first task ("Not at all enjoyable" [0] – "Very enjoyable" [100];)
- How difficult it was to stop (for *Stop* condition)/persist with (for *Not Start* condition) the first task ("Not at all difficult" [0] – "Very enjoyable" [100];)
- How frustrating it was to stop (for *Stop* condition)/persist with (for *Not Start* condition) the first task ("Not at all frustrating" [0] – "Very frustrating" [100];)

- How difficult was the first task in general ("Not at all difficult" [0] – "Very difficult" [100];)
- The 16-item Brief Mood Introspection Scale (BMIS) (Mayer & Gaschke, 1988). Typical self-regulation studies (e.g., Baumeister et al., 1998; Muraven et al., 1998) included this measure to test an alternative explanation that differences in depletion were due to differential moods induced by the depletion manipulation.

After they had completed these items, participants were presented with a test of "attention to detail", which in fact was the dependent measure. Participants had not seen or been informed of this task prior to this point. The dependent measure consisted of an excerpt of approximately 500 words, taken from the novel *The Bell Jar* (Plath, 1963) (see appendix F for excerpt.) Participants were asked to tick off every word that contains the letter E or R, except:

- When the E is next to another vowel (e.g., MEAT;)
- When the R is between two vowels (e.g., BORING;)
- When the two above rules conflict (e.g., READING – R is not between two vowels; but E is next to one).

These rules were adopted from previous studies in self-regulatory depletion (Baumeister et al., 1998, Experiment 4; Moller et al., 2006, Experiment 3). It was

contended that whilst the initial rule (crossing off all words containing E or R) is sufficient easy to follow, the presence of the other rules require participants to override their dominant response to simply follow the initial rule. This overriding makes this task self-regulatory in nature. In accordance to Moller et al. (2006, p. 1032), a "self-regulatory score" was derived (by subtracting the number of correct responses from the number of incorrectly marked responses) as the main dependent variable, to avoid underestimating the depletion level of participants who simply cross off every instance of E or R, or overestimating the depletion level of those who sought to avoid errors by crossing off very few Es or Rs.

When participants had completed the dependent measure, they returned their responses to the study administer. They were then instructed to spend the remainder of their allotted 20 minutes on the second task. When they reached the end of that time, participants were fully debriefed, thanked, and dismissed. (Please see appendix C for the debrief form.)

3.4 Analysis and Results

The final sample consisted of 153 datapoints, after eliminating those of participants who failed to complete the dependent measure (N = 17), or failed to give

preference ratings for the two tasks (N = 32), or whose task 1 completion time data was defective (N = 3, the rationale for using task 1 completion time data will be explained in section 3.4.2 below). Please note that even if the data of participants who did not give their task-preference rating or had defective task 1 completion time data were included, the direction of the result does not change.

3.4.1 Manipulation checks.

Task 1-task 2 relative preferences. There is a significant difference in each condition's (pre-study) preference ratings for the two tasks, which is in the intended direction. Recall that *Stop* involves stopping a preferred activity and moving to a non-preferred one, whereas *Not Start* involves the opposite. Therefore it should be expected that *Stop* participants would prefer task 1 over task 2, and *Not Start* vice versa. Indeed, it was found that *Stop* participants significantly preferred task 1 to task 2 (N = 76, $M_{\text{TASK 1}}$ = 72.37, $SD_{\text{TASK 1}}$ = 15.99; $M_{\text{TASK 2}}$ = 41.64, $SD_{\text{TASK 2}}$ = 23.46; t = 11.54, p < .001;) and *Not Start* participants showed the reverse pattern (N = 80, $M_{\text{TASK 1}}$ = 45.30; $SD_{\text{TASK 1}}$ = 21.17; $M_{\text{TASK 2}}$ = 75.81; $SD_{\text{TASK 2}}$ = 13.31; t = -11.84, p < .001).

Difficulty and frustration of manipulation. *Stop* participants also rated the manipulation that they underwent (i.e., having to cease their more-preferred task) as more difficult (N_{STOP} = 68, $N_{NOT\ START}$ = 72, M_{STOP} = 59.19, $M_{NOT\ START}$ = 44.21, SD_{STOP} =

24.27, $SD_{\text{NOT START}}$ = 24.34, t = 3.65, p < .01) and frustrating (N_{STOP} = 68, $N_{NOT\ START}$ = 72, M_{STOP} = 56.63, $M_{NOT\ START}$ = 46.29, SD_{STOP} = 23.67, $SD_{\text{NOT START}}$ = 26.92, t = 2.42, p = .02) to achieve than those in *Not Start* (i.e., having to resist from prematurely engaging in the more-preferred task). These results provide some preliminary indication that the *Stop* manipulation is more effortful than *Not Start*.

Relative preferences for the two tasks. Clearly, each participant will differ in his or her evaluation of the two tasks and how the tasks compare. It is possible that participants in one condition may indicate a higher relative liking for their preferred task than the other condition. This increased liking, if confirmed, could lead to the alternative argument that self-regulation in that condition is more difficult because participants had to regulate against a relatively more attractive activity. Ultimately, this relative preference did not significantly differ across the two Regulatory Strategy conditions (N_{STOP} = 76, $N_{NOT\ START}$ = 80, M_{STOP} = 30.72, $M_{NOT\ START}$ = 30.51, SD_{STOP} = 23.22, $SD_{\text{NOT START}}$ = 23.04, t = .06, p = .96), indicating that any differences in the depletion measure cannot be attributed to greater relative liking for the preferred task in either Regulatory Strategy condition.

Perceived difficulty and performance of task 1. There were no significant differences in the two groups' ratings of the difficulty (N_{STOP} = 68, $N_{NOT\ START}$ = 72, M_{STOP} = 57.41, M

$_{NOT\ START}$ = 50.99, SD_{STOP} = 26.49, $SD_{NOT\ START}$ = 25.55, t = 1.46, p = .15) and performance (N_{STOP} = 76, $N_{NOT\ START}$ = 80, M_{STOP} = 43.66, $M_{NOT\ START}$ = 46.28, SD_{STOP} = 21.59, $SD_{NOT\ START}$ = 22.81, t = -.74, p = .46) on task 1 (during which participants underwent self-regulation). This eliminates the potential confound that depletion effects could have arisen from *Not Start* participants (for whom task 1 is the less favoured task compared to Task 2), in comparison to *Stop* participants, rating task 1 as more difficult and perceiving inferior task 1 performance.

Relative difficulty rating between the two games used. The general knowledge quiz was rated significantly more difficult than the Sudoku game, although this difference was not significant across the two Regulatory Strategy conditions. This was revealed by a Regulatory Strategy x task type 2-way ANOVA, evidenced by the non-significant interaction between the two factors (M_{STOP} = 57.01, $M_{NOT\ START}$ = 60.56, $M_{GENERAL\ KNOWLEDGE}$ = 67.87, M_{SUDOKU} = 49.78, $M_{STOP/\ GENERAL\ KNOWLEDGE}$ = 66.38, $M_{STOP/\ SUDOKU}$ = 47.63, $M_{NOT\ START/\ GENERAL\ KNOWLEDGE}$ = 69.29, $M_{NOT\ START/\ SUDOKU}$ = 51.83; SD_{STOP} = 25.26, $SD_{NOT\ START}$ = 23.34, $SD_{GENERAL\ KNOWLEDGE}$ = 17.59, SD_{SUDOKU} = 26.70, $SD_{STOP/\ GENERAL\ KNOWLEDGE}$ = 17.72, $SD_{STOP/\ SUDOKU}$ = 28.15, $SD_{NOT\ START/\ GENERAL\ KNOWLEDGE}$ = 17.47, $SD_{NOT\ START/\ SUDOKU}$ = 25.24, $F_{REGULATORY\ STRATEGY}$ (1, 312) = 1.92 p = .17; $F_{TASK\ TYPE}$ (1, 312) = 50.00, p < .01; $F_{REGULATORY\ STRATEGY\ x\ TASK\ TYPE}$ (1, 312) = .06 p = .80). Had the relative difficulty of the general knowledge quiz been

significantly higher in one of the conditions, it may be argued that any differences in depletion found in that condition is simply attributed to the greater difficulty of the task. As can be seen this was not the case.

Mood state. There were also no differences between the two groups on mood as measured by the four subscales of BMIS (Mayer & Gaschke, 1988) ($N_{STOP} = 76$, $N_{NOT\ START} = 80$. Pleasant/ Unpleasant scale: $M_{STOP} = 2.95$, $M_{NOT\ START} = 1.90$, $SD_{STOP} = 4.68$, $SD_{NOT\ START} = 6.17$, $t = 1.19$, $p = .24$; Arousal/ Calm scale: $M_{STOP} = 16.79$, $M_{NOT\ START} = 16.81$, $SD_{STOP} = 5.60$, $SD_{NOT\ START} = 4.20$, $t = -.03$, $p = .98$; Positive/ Tired scale: $M_{STOP} = 7.29$, $M_{NOT\ START} = 6.66$, $SD_{STOP} = 3.47$, $SD_{NOT\ START} = 3.28$, $t = 1.16$, $p = .25$; Negative/ Relaxed scale: $M_{STOP} = 7.37$, $M_{NOT\ START} = 7.91$, $SD_{STOP} = 3.17$, $SD_{NOT\ START} = 2.91$, $t = -1.12$, $p = .27$). This finding agrees with that found in previous self-regulation research (Baumeister et al., 1998), meaning that any differences found in the dependent variable cannot be attributed to differential mood state or arousal elicited by the two Regulatory Strategy conditions.

As previously stated, in order to maximise the difference in liking for the two tasks and magnify the effects of the manipulation, participants' preferred task contained the opportunity to win a cash prize, but they were required to score sufficiently well on the non-preferred task to qualify for the prize draw. This pass mark was never revealed

to participants, to prevent participants changing their motivation as they approach or surpass that pass mark (DeWall et al., 2008, Experiment 6). As part of the manipulation check, participants were asked what they believed the pass mark was. Seventy-nine participants recorded their response as zero. Since the survey was delivered electronically, it was not possible to determine whether this means they believed that there was no pass mark, or that they simply failed to answer the question. Please note that even if the data for these participants were removed, the general direction of the results did not change.

3.4.2 Results.

As discussed earlier, *Stop* participants rated their strategy (i.e., having to cease their more-preferred task) as more difficult and frustrating to achieve than those in *Not Start* (i.e., having to resist from prematurely engaging in the more-preferred task). This represents preliminary indications that *Stop* is more effortful than *Not Start*; however this relationship can only be fully tested by examining the differences in self-regulatory depletion across the two regulatory strategies.

As stated in the beginning of section 3.4, the final sample consisted of 153 datapoints, after eliminating those of participants who failed to complete certain key measures. Please note that even if the data of participants who did not give their task-

preference rating or had defective task 1 completion time data were included, the direction of the result does not change. As stated in section 3.2, the dependent variable consists of the difference between the number of correct and incorrect responses, in accordance to previous studies (Moller et al., 2006). An ANOVA was conducted to test the difference in depletion score between the two Regulatory Strategy conditions.

An additional covariate, *task 1 overtime*, was also included, which reflects the number of minutes participants actually spent on task 1 that exceeded their stated pre-task 1 intended completion time. This covariate was required because there were significant differences across the two conditions on this measure (as revealed by an independent-samples t-test with *task 1 overtime* as the dependent variable: $M_{STOP} = 2.73$; $M_{NOT\ START} = 1.15$; $SD_{STOP} = 4.50$, $SD_{NOT\ START} = 5.57$, $t = 2.41$; $p = .02$). It is possible that *Stop* participants suffered from greater self-regulatory demands not because of the strategy they used, but because they spent more time than they had committed in comparison to *Not Start* participants; that is, they may have under-regulated (spending more time than they should have on a more enjoyable task). It may be questioned why this analysis used task 1 overtime as a covariate, rather than simply using the number of minutes participants spent on task 1. It is felt that task 1 overtime can better capture under- or over-regulation, because participants were free to nominate how many minutes they

wished to spend on each task. If a simple measure of time spent on task 1 were to be used, then a *Stop* participant who spent 12 minutes on task 1 may be interpreted as being less regulated than one who spent 10 minutes. However, this interpretation could be incorrect if each participant's intended task 1 time was taken into account. Specifically, if the first participant had intended to spend 13 minutes on task 1 (and eventually spending 12), and the second participant had intended to spend 9 minutes (and eventually spending 10), then the interpretation would be reversed: namely, the first participant has over-regulated by one minute, and the second participant has under-regulated by one minute.

The ANOVA revealed that the mean depletion score for *Stop* was significantly lower than that for *Not Start* (M_{STOP} = 126.34; $M_{NOT\ START}$ = 144.39; SD_{STOP} = 51.29, $SD_{NOT\ START}$ = 46.70, $F(1, 150) = 4.49$; $p = .04$), indicating that *Stop* was the more depleting strategy. Task 1 Overtime was found to be a non-significant contributor ($F_{TASK\ 1\ OVERTIME}(1, 150) = .34$; $p = .56$), meaning that the longer Overtime *Stop* participants spent in task 1 (compared to *Not Start*) did not affect the main finding. Please see appendix A for outputs from the SPSS analysis.

As seen in section 3.4.1, factors such as mood, perceived task difficulty and perceived task performance during the self-regulatory phase were ruled out as potential

factors influencing differences in depletion patterns found in this study. Even though the general knowledge quiz was seen as significantly more difficult than the Sudoku game, this difference was not significantly different across the two Regulatory Strategy conditions and therefore did not impact the outcome.

3.5 Discussion of study 1

Study 1 provided some evidence supporting Thaler's (1983) contention that self-regulating by moderating consumption may be a mere illusion. When a choice exists between stopping a tempting activity and not starting it at all, the latter choice is probably the better decision. In study 1, it was found that the *Stop* strategy produced greater self-regulatory depletion compared to *Not Start*. This means that users of the *Stop* strategy (compared those who chose *Not Start*) are more likely to fail in their self-regulatory attempts. This effect was not affected by individuals' mood state, as shown by the BMIS, consistent with findings in previous self-regulatory studies (Baumeister et al., 1998). Additionally, a number of other alternative explanations had been ruled out, namely that participants in *Not Start* (who were required to complete the non-favoured task first), compared to *Stop*, suffered greater depletion because they perceived the task

they received during the depletion manipulation to be more difficult, or that their performance on that task is inferior, by virtue of their lower preference for that task.

As discussed above, it was found that *Stop* participants spent significantly more time on task 1 than *Not Start* participants. This variation in itself is not surprising, given that the *Stop* manipulation required making task 1 both highly favoured and lucrative (carrying the prize-winning opportunity). However it was necessary to determine whether this variation had an impact on the relationship between self-regulatory strategies and resource depletion, because it could have been argued that *Stop* was more depleting simply because participants in that condition spent more time self-regulating. This alternative explanation was not supported: analyses revealed that the amount of time participants spent on task 1 that exceeded their intended duration (task 1 overtime) did not significantly contribute towards the overall relationship between Regulatory Strategies and self-regulatory resource depletion. This result is in fact predicted by previous finding, in that regardless whether self-regulation was successful or not in task 1, self-regulatory depletion still took place in task 2 (e.g., Baumeister et al., 1998; Vohs & Heatherton, 2000). In other words, depletion in subsequent regulatory tasks would still manifest even if self-regulation in the prior task had been successful. In this study, the difference between the intended and actual time spent on task 1 can be considered as

indicative of their success or failure in achieving self-regulation. Specifically, participants who ceased task 1 on-time (in both strategies) or persisted more than they intended to (i.e., going over-time in *Not Start* or under-time in *Stop*) can be considered as successful self-regulators; whereas those who did not persist more than they intended to (i.e., going over-time in *Stop* or under-time in *Not Start*) can be considered as having failed in self-regulation. Those abovementioned strength-model studies explain why the amount of time spent on each task did not have an impact on the relationship between regulatory strategies and depletion.

There is one other possible explanation that the procedure and data in study 1 could not rule out: the *psychological distance* perceived by participants towards the more-favoured activity. This notion will be further elaborated below, but it is plausible that the perceived psychological distance differed between tasks and had systematically affected the results of study 1. A review of the psychological distance literature follows.

4 PSYCHOLOGICAL DISTANCE

4.1 Review of the psychological distance literature

The notion of psychological distance, and its role in human functioning and decision-making, had long been recognised. Jevons (1905) suggested that people feel pleasure or pain when they anticipate an event in the future, and the length of time before an event takes place can influence the degree of such pleasure or pain. Lewin (1936) expanded on Jevon's contention by suggesting that people's behaviour, at any given point in time, is influenced by "distances" from a myriad of stimuli in the environment, the distances of which can be altered to be closer to, or away from, people's conscious perception.

Whilst Lewin did not directly specify how an event's "distance" affects behaviour, his views gave rise to two important implications. First, it is possible to systematically manipulate the psychological distance of a stimulus in order to isolate the effect of changing that distance. Second, psychological distance is not limited to just any one sensory dimension; it is possible to remove an event from people's direct experience along any sensory dimension (Trope, Liberman, & Wakslak, 2007). Some of the proposed dimensions include t*emporal, spatial*, *social* and *hypotheticality* (i.e., how

likely an event is to occur). Psychological distance is said to be increased if the event under consideration is removed from one's immediate experience along any one of those dimensions (Bar-Anan, Liberman, & Trope, 2006). The different dimensions of psychological distance are said to be interrelated (Trope et al., 2007), meaning that if a stimulus is psychologically removed along one dimension, its effects should be compensated by moving the stimulus along another dimension in the opposite direction.

Studies across various disciplines have examined how an event's perceived psychological distance can influence the perceiver's judgement of it. Part of the literature discussed in section 2.1 – time-inconsistency, present-biased change in preferences (e.g., Ainslie, 1975; Loewenstein, 1996; O'Donoghue & Rabin, 1999; Strotz, 1955) – is concerned with how one's preferences relating to a particular event changes as it draws near, in a way that tends to favour immediate gratification that may conflict with the individual's long-term interests. The role of psychological distance had also been examined in relation to delay of gratification; specifically, researchers have investigated how changing the spatial distance of a reward influences children's ability to decline that reward in favour of a delayed, yet greater, reward (e.g., Metcalfe & Mischel, 1999; Mischel & Ebbesen, 1970). Research on the human self-regulatory process

has been augmented by the strength model of self-regulatory resource depletion (e.g., Baumeister et al., 1998; Muraven et al., 1998); however despite the link between psychological distance and delay of gratification having been established, the strength model literature is yet to examine in detail the role of psychological distance in resource depletion. Since psychological distance was identified as a possible explanation for the results found in study 1, this offers an opportunity for study 2 to establish this link.

4.2 How is psychological distance relevant to the current investigation?

In study 1, *Stop* participants were instructed to complete the more-favoured task first and switch to the less-favoured task; whereas *Not Start* participants were required to complete the less-favoured task first, during which they had to resist from switching to the more-favoured task. Accordingly, during task 1, *Stop* participants have immediate access to the more-favoured task; whereas *Not Start* participants had no access to their more-favoured task, but could only anticipate the more-favoured task later in time. In other words, during task 1, all *Not Start* (vs. *Stop*) participants faced a greater psychological distance from the more-favoured task.

In view of the earlier discussion on how psychological distance could impact upon self-control, it may be that the perceived psychological distance from the more

favoured task could have systematically affected the results in study 1. Specifically, it is possible that *Stop* was more depleting because the favoured task was closer to participants' immediate experience than it was in *Not Start*. Studies in delay of gratification found that the presence of either the immediate or the delayed reward reduces delay behaviour (Mischel & Ebbesen, 1970). This potential confound will be addressed in study 2 by separating the effects of psychological distance and regulatory strategies. This is achieved by introducing an additional factor to independently manipulate the psychological distance of task 2 when participants engage in self-regulation during task 1. This new *Psychological Distance* factor has two levels: *Near* (where task 2 was visible to participants as they completed task 1) and *Far* (where task 2 was not visible; i.e., the same configuration used in study 1). The addition of *Near* serves to make the favoured task immediately visible to *Not Start* participants during task 1. To balance the design, *Stop* participants will also see the less-favoured task when they complete task 1 (For full details of study 2 please refer to section 5 below).

The Psychological Distance factor used in study 2 adopts the assumption that psychological distance is multidimensional (Trope et al., 2007). In study 1, for *Stop*, the regulatory act is temporally distant (in that it was not due to happen for a short while;) in the *Near Psychological Distance* condition of study 2, by making the contents of task 2

immediately visible during task 1, the regulatory act is made physically proximal. Similarly, in study 1 for *Not Start*, the more-favoured task is temporally distant; in the *Near Psychological Distance* condition in study 2, the more-favoured task is made physically proximal. Since psychological distance dimensions are said to be interrelated (Trope et al., 2007), the effects of reducing the perceived distance of task 2 along the physical dimension should equal out the effect of increased temporal distance from task 2.

5 STUDY 2

5.1 Introduction to study 2

In study 1, it was established that the *Stop* strategy was more depleting than *Not Start*. Study 2 aimed to examine a potential alternative explanation: namely, to determine whether the psychological distance from the more-favoured task may have systematically affected the results found in study 1. This was achieved by independently manipulating the effect of psychological distance of task 2 as participants were completing task 1. Study 2 included a *Psychological Distance* manipulation with two levels: *Near* (where the anticipated task 2 was made present

during task 1) and *Far* (where the anticipated task 2 was not made present during task 1, i.e., identical to the setting in study 1). This new condition was fully crossed with the Regulatory Strategy condition, creating a 2 (Regulatory Strategy: *Stop* vs. *Not Start*) x 2 (Psychological Distance: *Near* vs. *Far*) full factorial design.

The manipulation of the Regulatory Strategy condition was similar to that used in study 1; that is, participants were asked to complete two tasks diverging in favourability, with *Not Start* participants completing the less-favourable task first (thereby self-regulating by resisting from switching to the favourable task), and *Stop* participants completing the more-favourable task first (thereby self-regulating by having to end the favourable task). This manipulation was slightly modified in study 2: rather than allowing participants to rate their own favourability for each task (and allocating task order according to their relative favourability ratings), the participants received two tasks that differed highly in favourability: a trivia quiz (identical to the general knowledge quiz seen in study 1) which was designed to be relatively enjoyable, and a mathematics task consisting solely of manually calculating three-digit multiplication problems, designed to be relatively uninteresting. The three-digit multiplication task was previously used by Muraven et al (1998) as a task that requires some exertion but does not deplete regulatory resources. As such, *Not Start* participants

completed the mathematics task (less-favourable) first; whereas those in *Stop* completed the trivia quiz (more-favourable) first.

The presentation of the tasks was designed carefully to maximally enhance the relative favourability for the two tasks. For instance, the layout of the trivia quiz was made colourful and vibrant, whereas the mathematics task was presented like an examination paper (see appendix E for screenshots of the program used to deliver the stimuli). Once again, in order to enhance interest in the favourable task whilst keeping the less-favourable task relevant, participants were offered the chance to enter a $200 cash prize by performing strongly in the trivia quiz, but they must to perform to a sufficient standard – achieve a "Pass Mark" – in the mathematics task to be eligible. Like in study 1, this "Pass Mark" was never revealed to participants, in order to prevent arousal levels as participants approach the target score (DeWall et al., 2008). As will be explained in Section 5.4.1 below, manipulation checks revealed that most participants rated the trivia quiz more favourably than the mathematics task, and that the relative favourability of the two tasks did not differ across any of the experimental conditions.

The Psychological Distance manipulation was operationalised by manipulating the manner in which the two tasks were presented on the computer screen. Specifically, in the *Near* condition, the two tasks were shown simultaneously on the screen, by

splitting the screen in two halves, with each task occupying one half of the screen. This means that when participants were completing task 1, they can also see task 2 on the screen, making task 2 immediately available in the participants' conscious experience. On the other hand, the visual arrangement of the two tasks in the *Far* condition was identical to study 1, i.e., tasks 1 and 2 were presented sequentially, with participants unable to see task 2 when they were completing study 1. Please refer to section 5.3.2 for more details on the procedures.

5.2 Summary of predictions and hypotheses

In summary, results found in study 1 should be replicated in the *Far* condition, namely *Stop* should be more depleting than *Not Start*. This is because, in *Far*, the manner of presentation of the two tasks was identical to the configuration used in study 1. On the other hand, effects found in study 1 should disappear in the *Near* condition, as the perceived psychological distance of task 2 is reduced (by making task 2 immediately available to participants' conscious experience during self-regulation in task 1).

H2: Psychological distance will moderate the efficacy of the regulatory strategies:

H2a: When Psychological Distance is Far *(i.e., when the contents of task 2 is not made visible during task 1),* Stop *is more depleting than* Not Start *(i.e., study 1 results will be replicated).*

H2b: When Psychological Distance is Near *(i.e., when the contents of task 2 is made visible during task 1),* Stop *should be no more depleting than* Not Start.

5.3 Method

5.3.1 Participants.

One hundred and twenty-four undergraduate and postgraduate marketing students from the Faculty of Economics and Business, University of Sydney, took part in the study in exchange for course credit. Participants were recruited via an online announcement system operated by the Faculty, which describes the study as one that investigates people's problem-solving abilities. Participants were informed at the time of recruitment of the incentives: namely course credits and the opportunity to win a $200 cash prize for superior performance in the trivia quiz.

5.3.2 Procedure and manipulations.

Participants attended the study in small groups (1-8) in faculty computer laboratories. Upon arrival, participants were greeted, received instructions, and signed a consent form (see appendix B for consent form). Afterwards, participants were randomly allocated to individual computer workstations, each containing a personal computer, blank papers, and a set of stereo headphones. Each computer displayed the following greeting message:

"Welcome to today's study. You have 20 minutes to work on two exercises:

- ***Trivia Challenge*** *- try to answer as many questions as possible for the chance to win a prize. The top 20 performers in the Trivia Challenge will enter a draw for a $200 cash prize.*
- ***Mathematics Quiz*** *– solve some simple maths problems, e.g. 123 x 456.*

  You must achieve a certain pass-mark in the Mathematics Quiz to enter the Trivia Challenge Cash Prize. If you don't pass the Maths Quiz, you cannot enter the Cash Prize."

The study administrator further reinforced that, even though there was no stipulation on how much time participants should spend on each task, it was advisable to allocate an equal amount of time (i.e., ten minutes) to each. This advice was given to

remind participants that both tasks were equally important towards winning the cash prize: superior performance on the trivia quiz was obviously needed, but since participants were not made aware of the "Pass Mark" required for the mathematics task, they would need to maximise their performance on that task too to become eligible for the prize draw. As such, the best strategy would have been to spend an equal amount of time on each task, that is, ten minutes each.

Participants were then shown a detailed example of the first task (*Stop* condition: trivia quiz; *Not Start* condition: mathematics task), during which they were again reminded of their control over the timing. Participants were also informed that the computer program would end once the participant has spent a total of 20 minutes on the two tasks. After these instructions, participants proceeded to their first allocated task.

The trivia quiz was identical in fashion to that used in study 1 (see section 3.3.1;) namely, the participant was asked a series of multiple-choice questions pertaining to general knowledge, each containing four alternatives, and they received performance feedback and correct answers after every ten questions. The mathematics task consisted of a series of three-by-three-digit multiplication items (e.g., 123 x 456). Participants were explicitly forbidden to use calculators or other electronic aids to complete this task, with

blank papers provided for rough working, and they were not given any performance feedback throughout this component, in order to prevent changing in arousal resulting from knowledge of the results (DeWall et al., 2008).

When participants decided to terminate task 1, they clicked on a button on the computer screen. Upon that, participants were shown the dependent measure, presented as a "Listening Exercise", and were told that the 20 minute timer was temporarily suspended during this exercise (in order to prevent participants from rushing through the dependent measure thinking that they may run out of time to complete task 2). The dependent measure consisted of a dichotic listening task, during which participants were required to listen for a series of words in their left ear, and write down all words they hear that fit a specific rule (in this case, words that contain the letter M or P), whilst ignoring a political speech delivered in their right ear (Baumeister, DeWall, Ciarocco, & Twenge, 2005, Experiment 4). For left-handed participants, the left/right ear designation was reversed, in accordance to procedure used by Baumeister et al. (2005) (See appendix D for a list of words used.)

When participants completed the dependent measure, they were shown detailed instructions of task 2 (trivia quiz if in *Not Start*; mathematics task if in *Stop).* The respective incentives for each task were reiterated to participants (i.e., opportunity for

the cash prize in the trivia quiz; requirement to pass to be eligible for the cash prize in the mathematics task), and they were allowed to complete that task for the remainder of the 20 minutes. By this stage, all participants had undergone self-regulatory exertion and had their depletion level tested, therefore the remainder of the 20 minute period was merely to fulfil the cover story. Once participants have spent a total of 20 minutes on the two tasks, the program terminated automatically, after which they were asked the following questions:

- How much have you enjoyed each of the two tasks ("Not at all enjoyable" [0] – "Very enjoyable" [100];)
- How difficult was it to stop (for *Stop*)/ persisting with (for *Not Start*) task 1 ("Not at all difficult" [0] – "Very difficult" [100];)
- How stressful was it to stop (for *Stop*)/ persisting with (for *Not Start*) task 1 ("Not at all stressful" [0] – "Very stressful" [100];)
- How frustrating was it to stop (for *Stop*)/ persisting with (for *Not Start*) task 1 ("Not at all frustrating" [0] – "Very frustrating" [100];)
- How difficult was it at the beginning of task 2 ("Not at all difficult" [0] – "Very difficult" [100])

- How stressful was it at the beginning of task 2 ("Not at all stressful frustrating" [0] – "Very stressful" [100])
- How frustrating was it at the beginning of task 2 ("Not at all frustrating" [0] – "Very frustrating" [100])
- The *Positive Affect/Negative Affect Schedule* (PANAS) (Watson, Clark, & Tellegen, 1988).
- The eight-item self-efficacy scale (Chen, Gully, & Eden, 2001).
- Participant's perceived performance on the two tasks compared to other participants ("Very poor" [0] – "Very good" [100]);
- Knowledge of purpose of study: what they think the pass-mark in the mathematics task was; and what they think the purpose of the study was. Participants were asked to type out the pass-mark, and were asked to write down what they thought the purpose of the study. Only one participant in the final valid sample (see section 5.4.1) believed the pass-mark to be zero, and the inclusion of this data-point did not impact upon the direction or significance of the results.

The PANAS (Watson et al., 1988) was included to measure participants' affective states after they have completed their manipulation. In study 1, it was demonstrated that the results found had nothing to do with different mood states experienced by

participants across the two conditions via the BMIS. This is consistent with previous self-regulation studies (e.g., Baumeister et al., 1998; Vohs & Heatherton, 2000). The PANAS was included to confirm this finding by using a different mood measure. The 20-item PANAS loads into two distinct factors, reflected in a single score for Positive-Affect (PA) and Negative-Affect (NA). It is expected that neither score would differ across any of the experimental groups.

The eight-item self-efficacy scale (Chen et al., 2001) was included to ensure that participants' self-efficacy level did not affect the results. Past research on the link between self-efficacy and self-regulatory depletion had produced mixed results. Some studies suggested that self-regulatory failure following prior exertion may have resulted from reduced self-efficacy following the exertion (Muraven & Baumeister, 2000); however this finding had been questioned by subsequent studies showing that "necessary mediators to self-efficacy" (namely mood, frustration and unpleasantness) did not correlate with self-control performance (Muraven & Slessareva, 2003). In addition, other studies found that even a successful act of prior self-regulation impedes subsequent self-regulatory exertions (e.g., Baumeister et al., 1998; Vohs & Heatherton, 2000). This result further questions the efficacy-depletion link, since if even successful

self-regulation leads depletion, it seems unlike that depletion could have been caused by decreased self-efficacy.

After participants completed the questions, they were fully debriefed, thanked, and dismissed. (See appendix C for the participant debrief forms.)

5.4 Analyses and Results

5.4.1 Final data and manipulation checks.

The final sample consisted of 83 datapoints, after removing the data of 11 participants who failed to make any responses in the dependent measure, and an additional 30 whose relative ratings for the two tasks were opposite to what was intended. As stated in section 5.4.1 above, even though participants generally rated the trivia quiz more favourably than the mathematics task (which is the intended direction), 30 participants made the opposite rating individually. Effectively, these 30 participants were using the reverse self-regulatory strategies as intended: those in *Not Start* (i.e., completing the mathematics task first) would be self-regulating by *stopping* their preferred mathematics task on-time; whereas those in *Stop* (i.e., completing the trivia quiz first) would be self-regulating by *not starting* their more-preferred mathematics task before the agreed time. The presence of these participants could have weakened

the overall effectiveness of the two Regulatory Strategy conditions, because these participants' regulatory strategies would have been in reverse to the intended strategy in each condition.

The results of the manipulation checks are listed below.

Relative favourability of the two tasks. Participants showed significantly greater preference for the trivia quiz than the mathematics task, as revealed by a paired-samples t-test ($M_{\text{TRIVIA QUIZ}}$: 65.25; $M_{\text{MATHEMATICS TASK}}$: 43.13; $t = 5.76$, $p < .05$). This direction was as intended. The relative favourability of the two tasks (i.e., difference between each participant's rating of the trivia and mathematics tasks) did not significantly differ across any of the experimental conditions (M_{STOP}: 35.92, $M_{NOT\ START}$: 44.75, M_{NEAR}: 42.97, M_{FAR}: 38.30, $M_{STOP/NEAR}$: 33.63, $M_{STOP/FAR}$: 37.90, $M_{NOT\ START/NEAR}$: 51.43, $M_{NOT\ START/FAR}$: 38.65; SD_{STOP}: 27.74, $SD_{NOT\ START}$: 29.34, SD_{NEAR}: 30.10, SD_{FAR}: 27.66, $SD_{STOP/NEAR}$: 28.64, $SD_{STOP/FAR}$: 27.44, $SD_{NOT\ START/NEAR}$: 29.50, $SD_{NOT\ START/FAR}$: 28.45; $F(1, 78)_{\text{REGULATORY STRATEGY}} = 2.18$, $p = .14$, $F(1, 78)_{\text{PSYCHOLOGICAL DISTANCE}} = .46$, $p = .50$, $F(1, 78)_{\text{REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE}} = 1.84$, $p = .18$).

Difficulty, frustration and stress felt. Separate 2 (Regulatory Strategy: *Stop* vs. *Not Start*) x 2 (Psychological Distance: *Near* vs. *Far*) ANOVAs were performed on participants' ratings of the difficulty, frustration and stress levels relating to the

manipulation, at the end of task 1 (e.g., "how difficult was it to stop (*Stop*)/persist with (*Not Start*) [name of task 1]?") None of the differences were significant except for:

- *Frustration of the manipulation*: *Not Start* participants found the manipulation significantly more frustrating than *Stop* (M_{STOP}: 11.18, $M_{NOT\ START}$: 23.64, SD_{STOP}: 21.31, $SD_{NOT\ START}$: 34.09, $F(1, 78) = 8.79$, $p < .05$). Likewise, *Near* participants found the manipulation significantly more frustrating than *Far* (M_{NEAR}: 26.00, M_{FAR}: 10.14, SD_{NEAR}: 34.90, SD_{FAR}: 20.54, $F(1, 78) = 8.79$, $p < .05$). The Regulatory Strategy and Psychological Distance factors also significantly interacted on this measure ($M_{STOP/NEAR}$: 0.00, $M_{STOP/FAR}$: 21.80, $M_{NOT\ START/NEAR}$: 49.52, $M_{NOT\ START/FAR}$: 0.00, $SD_{STOP/NEAR}$: 0.00, $SD_{STOP/FAR}$: 25.78, $SD_{NOT\ START/NEAR}$: 33.94, $SD_{NOT\ START/FAR}$: 0.00, $F(1, 78) = 58.17$, $p < .05$). This result was not expected as there is little a priori reason to speculate that any of the experimental groups would find regulation frustrating. In any case, this result did not significantly contribute to the overall regression model.
- *Stressfulness of the manipulation: Not Start* participants found the manipulation significantly more stressful than *Stop* participants (M_{STOP}: 33.97, $M_{NOT\ START}$: 46.84, SD_{STOP}: 28.11, $SD_{NOT\ START}$: 27.47, $F(1, 78) = 4.23$, $p = .04$). This result was not

expected, especially when compared to study 1 (where it was found that *Stop* participants found the manipulation more stressful).

In spite of these differences, neither stress nor frustration levels of the manipulation produced significant results when added to the regression model, and hence were dropped from the final analysis.

Affect. The 20-item PANAS (Watson et al., 1988) was used to examine whether the experimental groups differed in their self-reported affective ratings immediately after the experimental manipulation. No significant differences were found in positive affect (M_{STOP}: 27.15, $M_{NOT\ START}$: 29.16, M_{NEAR}: 28.03, M_{FAR}: 28.40, $M_{STOP/NEAR}$: 27.53, $M_{STOP/FAR}$: 26.80, $M_{NOT\ START/NEAR}$: 28.48, $M_{NOT\ START/FAR}$: 29.78, SD_{STOP}: 8.98, $SD_{NOT\ START}$: 8.90, SD_{NEAR}: 8.46, SD_{FAR}: 9.46, $SD_{STOP/NEAR}$: 7.72, $SD_{STOP/FAR}$: 10.23, $SD_{NOT\ START/NEAR}$: 9.25, $SD_{NOT\ START/FAR}$: 8.72, $F_{\text{REGULATORY STRATEGY}}$ (1, 78) = .98, p = .33; $F_{\text{PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .02, p = .88; $F_{\text{REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .26, p = .61) or negative affect (M_{STOP}: 17.95, $M_{NOT\ START}$: 16.36, M_{NEAR}: 16.73, M_{FAR}: 17.47, $M_{STOP/NEAR}$: 18.16, $M_{STOP/FAR}$: 17.75, $M_{NOT\ START/NEAR}$: 15.43, $M_{NOT\ START/FAR}$: 17.22, SD_{STOP}: 6.70, $SD_{NOT\ START}$: 6.45, SD_{NEAR}: 5.69, SD_{FAR}: 7.36, $SD_{STOP/NEAR}$: 5.69, $SD_{STOP/FAR}$: 7.68, $SD_{NOT\ START/NEAR}$: 5.50, $SD_{NOT\ START/FAR}$: 7.23, $F_{\text{REGULATORY STRATEGY}}$ (1, 78) = 1.26, p = .27; $F_{\text{PSYCHOLOGICAL DISTANCE}}$ (1, 83) = .23, p = .64; F

REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE (1, 78) = .57, p = .45) scores, confirming the study 1 finding that the mood state did not have an effect on the main dependent measure.

Self-Efficacy. The eight-item self-efficacy scale (Chen et al., 2001) was used to determine whether the manipulations differentially affected self-efficacy. Consistent with previous findings (Muraven & Slessareva, 2003), no significant differences were found (M_{STOP}: 67.39, $M_{NOT\ START}$: 65.32, M_{NEAR}: 65.92, M_{FAR}: 66.65, $M_{STOP/NEAR}$: 70.27, $M_{STOP/FAR}$: 64.66, $M_{NOT\ START/NEAR}$: 61.98, $M_{NOT\ START/FAR}$: 68.38, SD_{STOP}: 18.37, $SD_{NOT\ START}$: 24.07, SD_{NEAR}: 23.48, SD_{FAR}: 20.77, $SD_{STOP/NEAR}$: 18.00, $SD_{STOP/FAR}$: 18.76, $SD_{NOT\ START/NEAR}$: 27.37, $SD_{NOT\ START/FAR}$: 20.77, F REGULATORY STRATEGY (1, 78) = .23, p = .63 F PSYCHOLOGICAL DISTANCE (1, 78) = .01, p = .94; F REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE (1, 78) = 1.59, p = .21).

Perceived performance. None of the experimental conditions showed any significant differences in their self-appraisal of their performance on either the trivia or maths task (Perceived trivia performance: M_{STOP}: 46.18, $M_{NOT\ START}$: 47.86, M_{NEAR}: 47.43, M_{FAR}: 46.74, $M_{STOP/NEAR}$: 45.53, $M_{STOP/FAR}$: 46.80, $M_{NOT\ START/NEAR}$: 49.14, $M_{NOT\ START/FAR}$: 46.70, SD_{STOP}: 20.52, $SD_{NOT\ START}$: 25.21, SD_{NEAR}: 23.20, SD_{FAR}: 23.08, $SD_{STOP/NEAR}$: 20.70, $SD_{STOP/FAR}$: 20.87, $SD_{NOT\ START/NEAR}$: 26.65, $SD_{NOT\ START/FAR}$: 25.32, F REGULATORY STRATEGY (1, 78) = .12, p = .73 F PSYCHOLOGICAL DISTANCE (1, 78) = .01, p = .91; F REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE (1, 78) = .13, p = .72; perceived maths performance: M_{STOP}: 45.51, $M_{NOT\ START}$: 42.14, M_{NEAR}:

44.38, M_{FAR}: 43.12, $M_{STOP/NEAR}$: 49.11, $M_{STOP/FAR}$: 42.10, $M_{NOT\ START/NEAR}$: 40.10, $M_{NOT\ START/FAR}$: 44.00, SD_{STOP}: 28.47, $SD_{NOT\ START}$: 28.39, SD_{NEAR}: 30.74, SD_{FAR}: 26.20, $SD_{STOP/NEAR}$: 34.23, $SD_{STOP/FAR}$: 22.06, $SD_{NOT\ START/NEAR}$: 27.34, $SD_{NOT\ START/FAR}$: 29.81, $F_{\text{REGULATORY STRATEGY}}$ (1, 78) = .32, p = .57; $F_{\text{PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .06, p = .81; $F_{\text{REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .75, p = .39).

5.4.2 Results.

Table 5-1 below summarises the results. The main dependent variable is the mean depletion score, operationalised by the number of words correctly identified in the dichotic listening task. Lower score on this measure indicating greater depletion.

Regulatory strategy	Psychological distance	Mean depletion score	Standard deviation	N
Stop	***Near***	32.16	9.09	**19**
	Far	28.50	8.72	**20**
	Total	**30.28**	**8.98**	**39**
Not Start	***Near***	29.57	8.11	**21**
	Far	33.26	9.22	**23**
	Total	**31.50**	**8.81**	**44**
Total	***Near***	30.80	8.58	**40**
	Far	31.05	9.20	**43**
	Total	**30.93**	**8.85**	**83**

Table 5-1: Descriptive statistics of the dependent measure in study 2, after the data of 30 participants who preferred the mathematics task to the trivia quiz were removed.

A 2 (Regulatory Strategy: *Stop* vs. *Not Start*) x 2 (Psychological Distance: *Near* vs. *Far*) ANOVA was conducted with *task 1 completion time* as a covariate. Task 1 completion time indicates the number of second participants spent on the first task. This is similar to the covariate used in study 1 (task 1 overtime) in order to hold constant the variability in the time spent on task 1 across the conditions. Since participants were not given an opportunity to nominate the number of minutes they intended to spend on task 1, but rather being advised to spend ten minutes on each task, a "task 1 overtime" measure here would simply be a linear transformation of "task 1 time" (i.e. one may obtain "task 1 overtime" by subtracting ten minutes from "task 1 time".)

Unlike study 1, the amount of time spent on task 1 in the four experimental conditions did not significantly differ, as revealed by an ANOVA with task 1 completion time as the dependent measure ($F_{\text{REGULATORY STRATEGY}}$ (1, 78) = 2.64, p = .11; $F_{\text{PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .12, p = .73; $F_{\text{REGULATORY STRATEGY x PSYCHOLOGICAL DISTANCE}}$ (1, 78) = .64, p = .43). Nevertheless, this measure of task 1 completion time was retained in this analysis in order to maintain consistency with the analysis of study 1.

Regulatory strategy	Psychological distance	Task 1 completion time	Standard deviation	N

			(seconds)	
Stop	***Near***	636.78	211.14	**19**
	Far	555.63	241.70	**20**
	Total	**595.16**	**228.07**	**39**
Not Start	***Near***	695.38	273.86	**21**
	Far	727.73	467.79	**23**
	Total	**712.29**	**383.55**	**44**
Total	***Near***	667.54	244.78	**40**
	Far	647.69	467.79	**43**
	Total	**657.25**	**323.58**	**83**

Table 5-2: Descriptive statistics of task 1 completion time in study 2, after the data of 30 participants who preferred the mathematics task to the trivia quiz were removed.

The ANOVA revealed non-significant main effects for Regulatory Strategy and Psychological Distance (F (1, 78) = .79, p = .38; and F (1, 78) = .00, p = .95, respectively.) The mean depletion scores for each condition are shown in Figure 5-1 below. Additionally, the effect of task 1 completion time had no significant effect on the overall ANOVA model ($F_{\text{TASK 1 COMPLETION TIME}}$ (1, 78) = 3.35, p = .07), suggesting that the amount of time spent on task 1 by participants did not affect the overall result. This result was similar to that found in study 1. The interaction between Regulatory Strategy and Psychological Distance was significant (F (1, 78) = 4.33, p < .05). See Figure 5-1 for an

illustration of the interaction, and please see appendix A for outputs from the SPSS analysis.

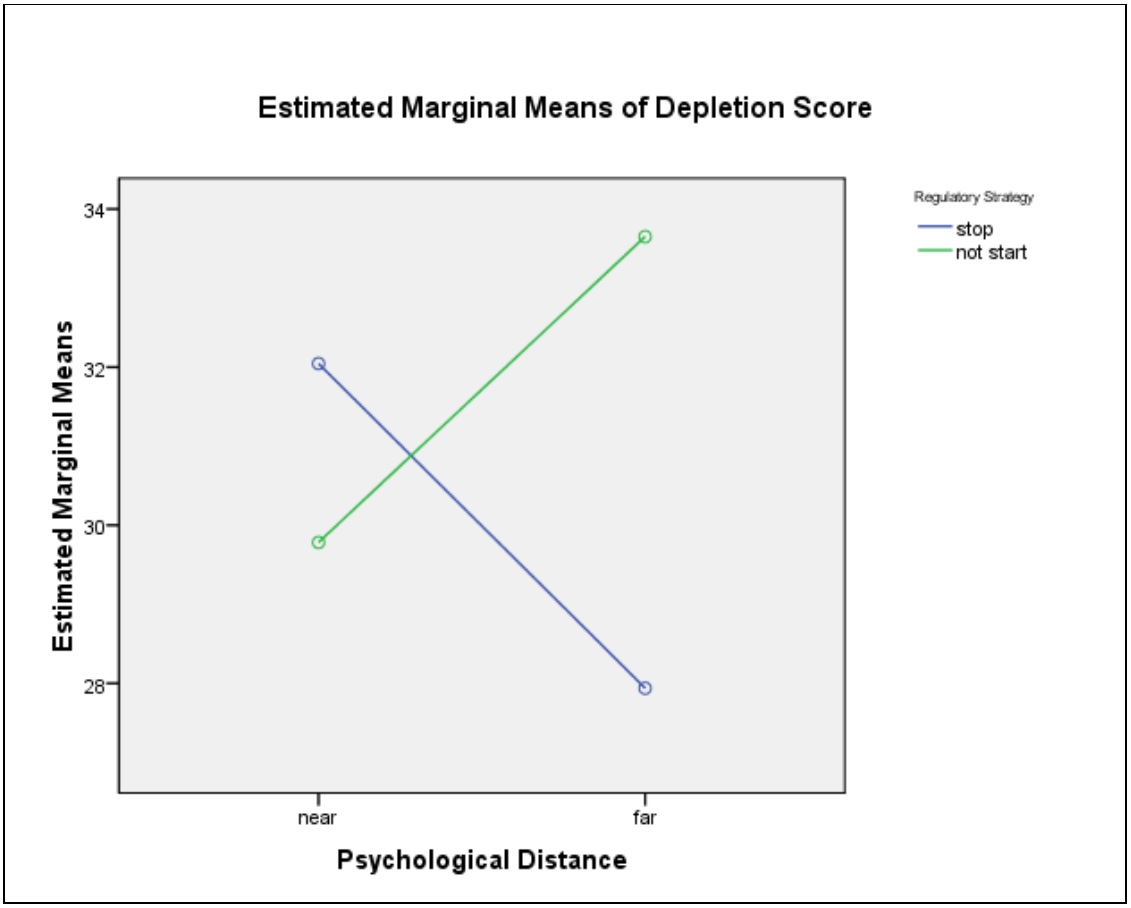


Figure 5-1: Graphical representation of mean depletion scores in the four experimental conditions in study 2.

Further analyses revealed that the only significant simple effect was that *Stop* was significantly more depleting than *Not Start* in the *Far* Psychological Distance condition only ($F(1, 78) = 4.47$, $p < .05$). The result shows that it was the inherent "nearness" of the tempting activity in the *Stop* condition and the distance of the

tempting activity in the *Not Start* condition in Study 1 that drove the results. Therefore, the request of Thaler's (1983) economists to have the cashews removed from the table makes sense. When Psychological Distance was *Near*, *Not Start* was no longer less depleting than *Stop*, thus the results seen in study 1 disappeared ($F_{\text{REGULATORY STRATEGY IN PSYCHOLOGICAL DISTANCE (NEAR)}}(1, 78) = 0.67$, $p = .41$). This suggests that when the more-favoured task was made psychologically proximal during self-regulation, the two self-regulatory strategies were equally depleting.

This result is contrary to an intuitive possibility: that the two *Stop* conditions and *Not Start*/*Near* would be equally depleting, and all three would be more depleting than *Not Start*/*Far*. That is because the more-preferred task is more proximal to perceivers in both *Stop*, and the *Not Start*/*Near*, conditions, compared to *Not Start*/*Far*. The proximity of this more-preferred task in these conditions may increase their self-regulatory demands. Whilst this intuition is acknowledged, the emerged result can also be explained this way: *Stop*/*Far* is more depleting than *Stop*/*Near* because participants in the former can engage in the more-preferred task without any reminder of the less-preferred task, unlike the latter. *Stop*/*Far* should also be more depleting than both *Not Start* conditions because *Not Start* participants were not immediately engaging in the more-preferred task. There is no a priori basis to predict the relative depletion patterns

of *Stop*/*Near* and the two *Not Start* conditions, so presumably they are equally depleting. Neverteless, it is acknowledged that the relatively impurity of the data (due to the number of datapoints being excluded) may have played a role in this intuitive result not being obtained. Future studies should attempt to rectify the impurities and ensure that the two tasks are designed in such a way to maximise differences in participant preferences for each task.

5.5 Discussion

The main objective of study 2 was to address a potential confound in the design of study 1, by controlling for the psychological distance between participants and the more-favoured task. The main effect found in study 1 (*Stop* being more depleting than *Not Start*) was no longer significant in study 2. More importantly, the interaction between Regulatory Strategy and Psychological Distance was significant. The results supported the suggestion made in section 3.5 that *Stop* could have been more depleting because the more-favoured task was in the participant's immediately experience, whereas for *Not Start*, the more-favoured task was only available in anticipation.

6 GENERAL DISCUSSION

6.1 Explicating boundary conditions of the principle of Diminishing Marginal Utility

The central research question here was to examine the relative difficulty of two self-regulatory strategies: to stop an already-commenced consumption episode, or to not start it in the first place. Thaler (1983) suggested that once a consumer begins consumption, there are circumstances where the probability of them being able to stop at an appropriate level is very low – even nonexistent, even though consumers often believe otherwise. This suggestion, however, is inconsistent with DMU and conventional economic theories, which would predict that not starting a consumption episode would be more difficult than stopping one, because the utility that the consumer experiences is highest for the first unit consumed; and utility deceases as each additional unit is consumed. Therefore, stopping should become increasingly less difficult. Study 1 lent tentative support for Thaler's contention. It was identified, however, that when participants engaged in self-regulation during task 1, the more-favoured task was always immediately available to *Stop* participants, but not to *Not Start* participants. This systematic discrepancy could have confounded the study's results. Study 2 addressed this issue by experimentally manipulating the physical

distance of the regulatory act. It was found that *Stop* was no longer more depleting than *Not Start* when the more-favoured task was made available to the conscious perception of *Not Start* participants.

Study 1 results confirmed what Thaler's (1983) Mirage had speculated: that once consumption started, it was difficult to stop consuming. Thaler's prediction was inconsistent with that made by DMU. DMU is a robust economic principle; however its descriptive validity has been increasingly scrutinised by emerging literature (e.g. Rabin, 2000a; Rabin, 2000b; Rabin & Thaler, 2001), as DMU makes predictions that are at odds with a number of real-world phenomena, such as predicting extreme and implausible levels of risk aversion (Rabin & Thaler, 2001) (please refer to section 2.1.2 for more details). The findings from the current research add to this literature by empirically confirming a boundary condition of the DMU's predictive effectiveness.

Study 1's finding, however, does not mean *Stop* is always more difficult to attain than *Not Start*. As stated in section 2 above, it is sometimes possible for consumers to stop their consumption at the appropriate time. If *Stop* were entirely impossible then the whole question over the relative merits of *Stop* and *Not Start* would be rendered irrelevant, because consumers would simply never contemplate *Stop* as a possibility. Thaler's (1983) Mirage and past research had not explicitly examined circumstances

under which *Not Start* could be as difficult to achieve as *Stop*. Study 2 empirically demonstrated a boundary condition to Thaler's prediction: namely, reducing the psychological distance of the rewarding event can hamper an individual's efforts to not start consuming, to the extent where their effort would be just as depleting as if they were self-regulating by stopping.

6.2 Boundary conditions on the strength model of self-regulatory resource depletion

The current research also adds to existing literature by explicating a boundary condition of the strength model of self-regulatory resource depletion. The strength model stated that, once an individual engages in a self-regulatory episode, their subsequent ability to self-regulate would become temporarily depleted (e.g., Baumeister et al., 1998; Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000). The existing literature on strength model, however, is yet to examine in detail the circumstances under which depletion may be exacerbated or attenuated. Existing findings assert that once an individual engages in a self-regulatory endeavour, their subsequent ability to self-regulate would be somewhat adversely affected. Recent research has begun to explore some of those boundary conditions. For example, it had been found that if the

two self-regulatory acts were of similar "control processes", rather than being irrelevant to each other, prior self-regulation would actually enhance, rather than hamper, subsequent self-regulation (Dewitte et al., 2009) (see also section 2.3). Specifically, it was found that individuals who were asked to self-regulate by resisting food intake showed better subsequent performance at another food-resistance task (similar control processes), but suffered from depletion if they were subsequently asked to complete an anagram task (dissimilar control processes) (Dewitte et al., 2009, Study 2). The current research adds to this emerging literature by examining how two self-regulatory strategies could have different implications on individuals' subsequent ability to self-regulate. Specifically, both strategies under investigation, *Stop* and *Not Start*, were acts of self-regulation, in that they both required an individual to actively override their dominant response (i.e., to continue consuming in *Stop*; and to begin consuming in *Not Start*, respectively) (Baumeister & Heatherton, 1996). The strength model, in its present form, would have only predicted that both strategies would lead to some subsequent depletion, without being able to explicate the two strategies' relative effectiveness to each other. Findings from the current research empirically addressed this question: ordinarily, *Stop* leads to greater depletion than *Not Start*.

Furthermore, the present research empirically examined a possible mechanism which underlies self-regulatory resource depletion, namely the psychological distance of the stimulus that consumers regulate against. Specifically, whilst it was demonstrated that *Stop* is generally more difficult to achieve than *Not Start*, this difference is attenuated by manipulating the psychological distance that is perceived by the consumer from the anticipated activity (i.e. the less-favoured activity in *Stop*, and the more-favoured activity in *Not Start*, respectively). This result means that altering the psychological distance of an upcoming event can affect one's self-regulatory depletion rate. The role of psychological distance had been linked to self-regulation performance in past research, however the process by which psychological distance affects self-control had not been explicated, nor has the strength model examined the implication of psychological distance on depletion. Some of the relevant existing research is discussed below.

A number of early papers had speculated on how individuals may change their preferences in favour of an immediately gratifying event as that event draws near, which (if infringes against their long-term wellbeing) may invoke the need for self-regulation (e.g., Ainslie, 1975; Strotz, 1955). An extensive field of further research had examined how the perceived value of outcomes could be manipulated depending on

the psychological distance perspectives adopted by the perceiver (e.g., Bar-Anan et al., 2006; Loewenstein, 1988; Trope et al., 2007). Those existing studies did not directly address the question of how the perceived psychological distance of an event impinges upon self-regulation against it. Results from those studies could be invoked to infer that more self-control is required for an immediately available outcome, based on the assumption that people tend to change their preference in favour of immediate gratification (O'Donoghue & Rabin, 1999).

One of the first attempts to directly test the role of psychological distance on self-control came about in the delay of gratification literature. Those studies generally attempted to explicate circumstances under which people (especially children) would choose a small-yet-immediate reward over a large-yet-delayed reward (Metcalfe & Mischel, 1999; Mischel, Ayduk, & Mendoza-Denton, 2003; Mischel & Metzner, 1962). One of the circumstances tested was whether reducing the physical proximity of either the delayed or the immediate reward would impinge upon delay behaviour (Mischel & Ebbesen, 1970). It was found that when the delayed (and greater) reward was made immediately visible, individuals became less inclined to choose that delayed reward. In other words, Mischel and Ebbesen's finding linked the reduction of psychological

distance of an anticipated event to reduced ability to self-regulate (in the form of delaying behaviour).

The strength model of self-regulatory resource depletion, in its current form, is yet to deal with the implication of psychological distance. As previously discussed, the strength model would have assumed that an act of prior self-regulation would adversely affect subsequent self-regulatory acts. There is no discussion yet on the potential role played by psychological distance, despite the link found by Mischel and Ebbesen (1970). The present research further added to the strength model literature by exploring the psychological distance of an anticipated event as a boundary condition to self-regulatory depletion. Specifically, in study 2, it was found that reducing the psychological distance of the anticipated task 2 (less-favoured task in *Stop*, and more – favoured task in *Not Start*) attenuated the advantage held by *Not Start* over *Stop*, in that both strategies became equally depleting. This result would have been predicted by delay of gratification studies (Mischel & Ebbesen, 1970), but the present research represents the first empirical confirmation of this boundary condition for the strength model.

Finally, as stated in section 2.3 earlier, studies used in the strength model literature had yet to examine the depletion implication of ceasing an already-

commenced consumption episode. Most of the studies used to examine depletion were of a not-start nature; that is, resisting from some kind of consumption or activity (e.g., food, mood, thought suppression). Critics argued that should self-regulation be defined as an act of active overriding of self, then the strength model should also examine self-regulation by action rather than resistance (Carver & Scheier, 1996). The present study established that the *Stop* strategy is at least as depleting as the standard *Not Start* strategy used in typical strength model studies. This demonstration establishes an impetus for further investigations into how other self-regulatory strategies may differentially affect depletion patterns, further contributing towards the strength model literature.

6.3 Other Contributions

In addition to the discussion above, the current research contributed to the literature and provides opportunities for future research in several other domains. They are classified as follows and will be expanded below:

1. Implication of the perceived psychological distance of events on self-regulation, and ultimately on the self's executive function;
2. Implication towards studying the multidimensionality of psychological distance.

6.3.1 Potential effect of psychological distance on the self's executive function.

The present research has also established a foundation towards better understanding how psychological distance of stimuli in the environment affects people's executive functioning. As discussed in section 4.1 above, Lewin (1951) contended that individuals' behaviour at any given moment is governed by the wide range of stimuli in their environment, and that the "distance" of those stimuli affects how much impact they impose on behaviour; however there is no precise specification on how this occurs. The present research showed the manner in which the perceived psychological distance of an anticipated event affects self-regulatory efficacy against that event. In other words, psychological distance affects self-regulation. As stated earlier, even though the strength model was originally devised to examine the implications of self-regulatory exertions, subsequent studies have found that self-regulation draws upon the same psychic strength as other executive functions (Vohs, Baumeister, Schmeichel, Twenge, & Nelson, 2008). The implication here is that if an activity is shown to deplete one's self-regulatory resource, then it is also likely to impair other domains of executive functions.

Executive functioning covers many facets, such as the ability to actively engage in choices, decision-making, and active volitions (Vohs et al., 2008). These abilities

contribute to the uniqueness and complexity of human life. Even though human behaviour is governed by automatic processes most of the time (Bargh, 2002), the occasional moments when people have to exercise their volition and make active choices become a crucial feature of human functioning (Baumeister et al., 1998). The increasingly complex nature of human life means that the number of stimuli in people's environment and the number of choices they face daily are both continually multiplied (Schwartz, 2000). Even though having no choices is clearly not ideal and traditionally seen as suboptimal (Thaler, 1983), consumer research literature had reported that excessive amount of choices could bring about negative feelings (Mick, 2005).

Given the importance of volitional choices in daily functioning, there is a case to further examine factors that affect people's ability to carry out those choices in a way that best serves their long-term well-being. It appears that the psychological distance of stimuli in the environment would be an important determinant towards this ability. The current investigation has made this linkage.

6.3.2 Implications toward a multi-dimensional view of psychological distance.

As discussed earlier, it was suggested that psychological distance can be manipulated along a number of different sensory dimensions, including spatial, temporal, social, and hypotheticality (Bar-Anan et al., 2006). Trope et al (2007) suggest

that the various dimensions of psychological distance are interrelated. An implication of this assertion is that if an event is moved along one dimension, the effect of that manipulation can be reversed by moving the same event in the opposite direction along another dimension. This implication is yet to be directly tested, however, with past empirical studies involving manipulation of only one psychological distance dimension at a time. For example, delay of gratification studies manipulated the physical dimension of an outcome and how that affects people's ability to delay a greater reward (e.g., Mischel & Ebbesen, 1970); whilst various studies examining how events were viewed and construed according to how the event is framed along a temporal dimension (e.g., Trope & Liberman, 2003).

The present research (specifically study 2) contributed to the literature by showing that psychological distance dimensions can be interrelated. This was accomplished by observing the behavioural consequences of manipulating two psychological distance dimensions concurrently. Specifically, study 2 tested whether it was possible to reverse the effect of moving an event along one dimension, by moving that same event along another dimension in the opposite direction. This was operationalised by introducing the Psychological Distance factor, containing the *Near* (where the anticipated task 2 was made visible during the first task) and *Far* (where the

anticipated task 2 was not made visible to subjects during the first task) conditions. The effect of the new *Near* condition is to reduce the physical distance of the second task, which in the *Far* condition and in study 1 were temporally distant. If the interrelatedness assertion of psychological distance dimensions were correct, then the effect of increased temporal distance seen in study 1 should be reduced by decreased physical distance used by the *Near* condition of study 2. Indeed this result was found: in the *Near* Psychological Distance condition, the two self-regulatory strategies were as depleting as each other. The implication here is that the depleting effect of the temporal distance was being reversed by reducing the same event's physical distance. Previous studies in psychological distance have not examined how the effect of moving a stimulus along one dimension can be reversed by moving the same stimulus along another dimension in the opposite direction.

It is hoped that the present research has provided the impetus to more precisely determine the consequences of concurrently manipulating multiple psychological distance dimensions. For instance, would the study 2 finding (i.e., in *Stop*, reducing the physical distance of the regulatory act made the condition as depleting as *Not Start*) hold if participants were required to resist from the tempting stimulus for not ten minutes, but for one hour? How could social distance and hypotheticality of situations

(the other two forms of psychological distance proposed by Trope et al. (2007)) affect self-regulatory depletion? Previous studies have demonstrated that social exclusion can have a deleterious effect on self-regulation (Baumeister et al., 2005) such as increased propensity to engage in aggressive behaviour (Twenge et al., 2001); could the adverse consequences of increased social distance be compensated by reduced distance from another dimension? The studies presented here provide a platform to examine these questions.

7 FUTURE DIRECTIONS

The present research was limited in its ability to examine a wider scope of theoretical issues relating to self-regulation and psychological distance. Several ways to further explicate the effects of psychological distance on self-regulatory resource depletion were offered in section 6 above. The methodology used in the current studies can also be extended to encompass a wider range of self-regulatory phenomena. A number of proposed research projects are presented below that may bring further contribution to literature.

7.1 Research proposal 1: Regulating against an active action versus against a passive inaction?

In both studies 1 and 2, participants were offered a choice of two tasks that differed in desirability. Each task, be it a trivia quiz, mathematical task or Sudoku puzzle, requires some degree of active engagement. In reality, however, self-regulation does not always involve choosing between two tasks that both require such active engagement. Self-regulation often involves choosing between some sort of activity and mere passive inaction. For example, a research student may have to choose between resting idly or work on a research paper (assuming that the research paper is not immediately more desirable than resting, but is ultimately beneficial to the career of the student). This strategy is similar to *Stop*, but instead of ending an activity that is immediately desirable, the person ends a period of inactivity, and moves onto an activity that is not immediately appealing but is ultimately beneficial. This strategy could be called *Start*. Conversely, the same research student may have to choose between continuing to work on a research paper and stop working and start daydreaming. This kind of self-regulation is similar to *Not Start*, but instead of resisting from starting a desirable activity, the person is resisting from ending a less-than-desirable but ultimately beneficial activity. This strategy could be called *Not Stop*.

In the above examples, note that the immediately desirable alternative to writing the research paper (i.e., resting idly) is one that does not require much active engagement. This is in contrast to the two studies conducted in the current research, where each of *Stop* and *Not Start* involved two separate tasks which both require actual activity. If the relative efficacy of the two new strategies introduced here were to be compared, it would be hypothesised that *Not Stop* is more depleting than *Start*. This is because when one uses the *Not Stop* strategy, they are moving from a position of active action to one of passive inaction. It had been found that volitional actions draws upon the same psychic resource as that required in self-regulatory acts (Vohs et al., 2008). In other words, deploying the *Not Stop* strategy would result in resource depletion via two channels: the self-regulatory act of resisting from stopping what they were doing, and the active volition required to continue their present course of action. In contrast, the *Start* strategy involves moving from a position of idleness to one of action. Prior to the switch into action, the regulator is not required to exercise any active volition. Therefore there is only one way by which the regulator's self-regulatory resource is consumed: via the act of switching to action itself.

Having said that, it is not immediately clear that the two concurrent acts of self-regulation required in *Not Stop* does indeed lead to more depletion, compared to the

single act of self-regulation required in *Start*. Existing strength model literature has yet to answer the question of whether the rate of subsequent depletion is proportional to the number of concurrent multiple self-regulatory acts being committed beforehand. This proposed study may not offer an answer immediately, but its results may stimulate further research to shed light on the nature of self-regulatory depletion.

As outlined at the beginning of the section, *Stop* and *Not Start* are self-regulatory strategies that each requires two actions; whereas *Start* and *Not Stop* are ones that require only one action (and passive inaction). It is also possible to compare the efficacy of *Stop* and *Not Start* against *Start* and *Not Stop*, which poses the question: is it more difficult to self-regulate when one has to choose between two actions, or to choose between action and mere idleness? This has implications towards whether resistance against undesirable impulses can be enhanced by making alternative activities available to the regulator. For instance, if it is found that strategies that have an alternative activity (Stop and Not Start) are less depleting, then it can be suggested that one can improve their chances of succeeding in self-regulation by engaging in an alternative activity.

7.2 Research proposal 2: can the knowledge of harsher penalties against self-regulatory failure reduce self-regulatory resource depletion?

The performance of actions to override an impulse is not the only component towards self-regulation. Effective self-regulation has at least three ingredients: the existence of *standards* to which the regulator must adhere; *monitoring* mechanism to detect deviation from those standards; and an *operate* phase which acts to rectify that deviation (Baumeister & Heatherton, 1996; Carver & Scheier, 1982). Devising and executing strategies like those used in this study is only part of the "operate" phase of self-regulation; other successful strategies may target the standard and monitoring phases. Several possible studies are proposed whereby the effectiveness of altering the standards and monitoring phases of self-regulation can be determined by assessing the degree of self-regulatory resource depletion that takes place.

One of the propositions relate to an alternative strategy to "stop": altering the consequences associated with overriding a pre-set preference in favour of a future preference (Thaler & Shefrin, 1981). For instance, a dieter may explicitly record their dietary intake which "seems to act as a tax on any behavior [*sic*] which [the individual] views as deviant" (p. 397); or an alcoholic may ingest the drug Antabuse which induces illness if they consumes alcohol. The tactic of actively monitoring one's consumption is

commonly used in credit and diet clinic settings (as observed by Thaler and Shefrin). This tactic still allows the individual to change their preference (so is distinct from a "not start" strategy, because *Not Start* precludes the regulator to deviate from their original plan;) however it requires establishing measures to ensure that if the individual deviates from his or her original plans, there would be additional adverse consequences (above and beyond just the loss of long-term well-being as a result from this deviation; for instance, ingesting Antabuse makes the person vomit, thus providing for an immediately adverse consequence as well as the long-term health effects of alcoholism). The existence of this immediately adverse consequence should increase the likelihood of the regulator monitoring their own behaviour in order to avoid that consequence. Therefore, it is tentatively hypothesised that if the regulator is made aware of the gap between their current and desired states, he would suffer from less depletion when he is required to self-regulate, compared to another regulator who has no such augmented monitoring mechanism.

The standard of regulation can be manipulated by changing the severity level of the self-regulatory demand. For example, when a regulator attempts the "not start" strategy, she has several options regarding how strong the regulatory standard is: total refusal against any level of consumption (of the particular stimulus in question) is the

strongest form (Strotz, 1955); however less rigid forms of this strategy allows individuals to limit the *range* or *class* of discretion allowed on the consumption (Thaler & Shefrin, 1981). Limitation by range is accomplished by setting a limit on how much the regulator may consume the tempting object; whereas limitation by class is accomplished by identifying different variations of the tempting object and prohibit consumption of one (or some) of those variations. For example, a recovering problem gambler may either limit their consumption by setting a rule to carry no more than $20 in cash (limiting by range, so that the maximum amount this person can gamble is the $20 they carry;) or they may choose to avoid electronic gaming machines but impose no conditions on other forms of gambling like horse racing and lottery tickets (limiting by class, so that this person is only banned from playing gaming machines but not other forms of gambling.)

Thaler and Shefrin (1981) assumed that a strategy of total abstinence is more difficult to achieve than less-extreme rules. Their assumption can be tested by hypothesising that a regulator who is required to completely precommit against an object of temptation will suffer from greater self-regulatory depletion than one who limits their consumption by range or class. For example, participants may be shown a range of tasty treats; the "total abstinence" group may be asked to not consume any of

the treats; the "limit by class" group may be asked to only refrain from eating one type of treats (e.g. chocolate, but are free to consume other treats available;) and the "limit by range" group may be asked to only consume a set amount of treats (e.g. a maximum of two pieces of chocolate, one piece of cake). It is tentatively hypothesised that the "total abstinence" group would experience the greatest level of depletion. No a priori hypothesis can be offered regarding the relative depletion rates of "limit by range" versus "limit by class", but these two groups are expected to experience less depletion than participants who are asked to abstain totally.

7.3 Research proposal 3: what is fundamental about "tempting" stimuli?

In the current research, participants in both studies were asked to complete two tasks which differed in desirability. The relative preference of the two tasks was measured after participants had viewed a sample of each task prior to the commencement of the study. There remains a question, however: if an activity is rated as more preferable than another available alternative, does it necessarily make it more tempting?

Loewenstein (1996) observed that people often engage in behaviours that do not conform to their long-term self-interests, with the full knowledge that their decision is

not optimal but feel an experience of being "out of control". This observation in itself is not new, as a large body of literature had already explored the behavioural consequences of time-inconsistent preferences in favour of immediately gratification (please refer to section 2.) The novel aspect of Loewenstein's contention is that this kind of suboptimal decision-making can be attributed to the operations of "visceral factors", which include drive states such as hunger, pain, sexual desires, emotions, and cravings for addictive drugs. Loewenstein (1996) suggested that there are two underlying assumptions on how visceral factors operate: firstly, visceral experiences can disproportionately influence behaviour to the extent that all other goals are temporarily ignored. Secondly, people are likely to underestimate the influence of visceral factors in the future or in the past, or those that are experienced by other people.

In his 1996 paper, Loewenstein suggested that existing literature on decision theory had not adequately addressed the kind of "out of control" experience that people feel when they succumb to temptations that compromise their ultimate well-being. Decision theory, at that point, had viewed momentary conflicts between visceral influences and long-term self-interest simply as a matter of competing reasons for behaving in different ways (Tversky & Shafir, 1992), and treated all behaviour as volitional. Loewenstein questioned this viewpoint. Specifically, Loewenstein stated that

when visceral influence is low, people are able to act rationally to satisfy their long-term needs (e.g. a slightly-tired driver can act to alleviate their tiredness or refrain from driving); whereas when visceral influence is extremely high, people do not perceive themselves to be making decisions at all (e.g. a very tired driver may involuntarily fall asleep at the wheel.) It is when people are influenced by a moderate level of visceral influence that they are most likely engage in what they perceive as "irrational" behaviour (e.g. a moderately tired driver choosing to continue to drive to their own detriment.)

If Loewenstein's (1996) contentions were correct, one would require the highest level of self-regulation when the visceral factors involved in the regulatory episode is moderately strong. In other words, using the self-regulatory resource depletion paradigm, a self-regulatory episode involving moderate levels of visceral influence should induce the highest level of resource depletion, compared to situations involving very low or very high levels of visceral influence. When visceral level is extremely high, people are usually left in a stage where they become incapable to make decisions; whereas when visceral level is very low, people can generally continue to act in accordance to their long-term goals.

Visceral influences can be manipulated. As Loewenstein (1996) stated, visceral factors exert disproportionately high influence when it is in the present. It is possible to increase the degree of visceral influence by asking individuals to imagine themselves being in the midst of a consumption episode. This method was used by Gold (1994), who asked participants to recall as vividly as possible an episode of unprotected sexual intercourse, and asked participants to nominate the most salient justifications when they decided to not use condoms. Then participants were asked to evaluate how rational those heat-of-the-moment justifications were in the present. Gold (1994) found that this method reduced the subsequent incidence of unprotected sex among the participants; however the study's implication towards the current research is that it is possible to enhance the visceral influence of a stimulus, without necessarily subjecting individuals to the stimulus. In other words, the strength of the visceral factor can be manipulated by asking participants to imagine, as vividly as possible, a consumption episode. For example, participants may be asked to resist from chocolate consumption in a standard strength model paradigm; the "high visceral influence" group would be asked to imagine vividly the colour, aroma and taste of the chocolate; whereas the "low visceral influence" group would be asked to simply refrain from eating the chocolate. The participants would then be subjected to the depletion measure. It is hypothesised

that the high visceral influence group would suffer from greater depletion than the low visceral influence group. Note that for ethical reasons, it may not be practicable to establish an "extremely high visceral influence" group; however if one does exist, depletion in this group would be lower than the high visceral influence group, because people would simply not have the capacity to make decision under this kind of extreme influence.

8 CONCLUSIONS

The main impetus of the present research was to examine Thaler's "Mirage" paradox (1983); specifically, the focus was on the relative efficacies of two self-regulatory strategies: stopping an already-commenced consumption episode versus not starting it at all. It was found that the *Stop* strategy was more psychologically demanding; however the deleterious effect of this strategy could be compensated by altering the psychological distance of the impending task that the participants were anticipating.

This research provided important contributions in two ways. Firstly, these studies expanded on the strength model of self-regulation, specifically by adding to an emerging literature which explores the boundary conditions under which the model

operates. Secondly, the current research added to discussion on the circumstances under which DMU does not adequately predict optimal behaviour. Both contributions are important towards the present paradigm in consumer behaviour research. As explained in Section 2.1 above, the dominant research paradigm has shifted away from assuming consumers as rational information processors; instead, both the long-term rational concerns and short-term emotional factors would require consideration (Hoch & Loewenstein, 1991). In order for consumers to protect their overall wellbeing, consumers need self- regulation to avoid acting on immediate gratifications that may jeopardise their long-term interests (Metcalfe & Mischel, 1999). Further understanding of the mechanisms of self-regulation is thus important towards consumer behaviour research. Meanwhile, DMU is a robust principle which underlies many economic theories; however its descriptive validity has come under scrutiny (e.g. Loewenstein & Thaler, 1989). Results from the current research aims to further add to the discussion by explicating a particular circumstance under which DMU's predictions were contrary to actual behaviour.

The present research has potential to act as impetus in both psychology and marketing disciplines. The role of visceral factors (Loewenstein, 1996), for instance, appears to be central to the phenomenon of impulsive shopping (Rook, 1987; Rook &

Fisher, 1995); however the implication of visceral factors on self-regulation has not been empirically examined. The current research is aimed at setting the platform for further insight into the strategies and behavioural consequences of self-regulation, and how this very vital branch of human functioning can be improved.

APPENDIX A – SPSS PRINT-OUT OF RESULTS FROM STUDIES 1 AND 2

(see following pages)

APPENDIX B – CONSENT FORM USED IN STUDIES 1 AND 2

Study 1

The Problem Solving Study

You are invited to participate in a study about people's problem-solving abilities and general knowledge performance, with the opportunity to win a cash prize. You will be asked to complete questions on logical reasoning and a wide range of general knowledge.

If at any time you feel that you would rather not continue with your participation in the study, you are welcome to inform the study administrator and discontinue participation in the study.

I have read and thoroughly understand the information above

Name	SID	Date	Signature

Study 2

Truly Trivial – A Study of Trivia Games

We are interested in understanding how people approach trivia questions and games, and how their approach is related to solving other types of problems, such as mathematics.

You are invited to participate in a study in which you will be asked to participate in a trivia quiz, a mathematics quiz, and a few other questionnaires.

If at any time you feel that you would rather not continue with your participation in the study, you are welcome to inform the study administrator and discontinue participation in the study.

I have read and thoroughly understand the information above

Name	SID	Date	Signature

APPENDIX C – PARTICIPANT DEBRIEF FORMS FOR STUDIES 1 AND 2

Study 1

Debrief

The Problem Solving Study

We would like to ask you not to discuss the purpose of this study with your fellow students, as knowledge of the true nature of the study might compromise its validity.

Results of the Problem Solving Study prize draw will be available on Blackboard (or other appropriate outlet) at the end of the semester.

Every day, people are faced with temptations that seem enjoyable in the immediate present, but may compromise their more future goals and aspirations. Self-regulation is often required to overcome those temptations to help achieving those long-term goals.

There are two kinds of self-regulatory strategies: ceasing an already-commenced tempting activity, or not starting one in the first place. We are interested in finding out the relative merits of each type of strategy.

The dependent variables are measured to test the research ideas. In this study, the dependent variables are:

1. The time you spent answering the task which can lead to the prize draw (something fun) versus the task which you need to do in order to qualify for the prize draw.
2. Your performance on the Word-Checking Exercise.

The independent variables are manipulated to test the research hypothesis. In this study the independent variable is:

1. Whether you did the “prize draw” task first, or the “qualifying for prize draw” task first.

If you have any questions, please feel free to ask at any time.

Thanks for your participation. If you have any further questions, please contact:

Elizabeth Cowley - e.cowley@econ.usyd.edu.au/ 9351-6433

If you have any concerns or complaints about the conduct of a research study can contact the Manager for Ethics Administration, University of Sydney on (02) 9351 4811.

Thanks again.

Study 2

Debrief

"Truly Trivial" – A study of trivia games

Every day, people are faced with temptations that seem enjoyable in the immediate present, but may compromise their more future goals and aspirations. There are two kinds of self-regulatory strategies: ceasing an already-commenced tempting activity, or not starting one in the first place. We are interested in finding out which is more demanding on individuals.

The dependent variables are measured to test the research ideas. In this study, the dependent variables are:

3. The time you spent answering the Trivia Challenge (something fun) and the Mathematics Quiz (something mundane yet you're supposed to do).
4. Your performance on the Listening Exercise.

The independent variables are manipulated to see which one of the two self-regulatory strategies is more demanding, and whether the relative psychological distance between the Trivia Challenge and the Maths Quiz influenced the way you achieved this self-regulation. In this study the independent variables are:

2. The presentation of the two tasks – whether they were presented simultaneously (low psychological distance) or sequentially (high psychological distance).
3. Whether you worked with the Mathematics Quiz or the Trivia Challenge first.

We would like to ask you not to discuss the purpose of this study with your fellow students, as knowledge of the true nature of the study might compromise its validity.

Results of this study and the Trivia Challenge prize draw will be available on Blackboard at the end of the semester. If you have any questions – please feel free to ask.

Thanks for your participation. If you have any further questions, please contact:

Elizabeth Cowley - e.cowley@econ.usyd.edu.au/ 9351-6433

If you have any concerns or complaints about the conduct of a research study can contact the Manager for Ethics Administration, University of Sydney on (02) 9351 4811.

Thanks again.

APPENDIX D – WORDS USED IN THE DICHOTIC LISTENING TASK (STUDY 2)

The following is a list of words used in the dichotic listening task in Study 2. Bold words are the correct solutions.

the	into	three	**might**	father	**himself**	close	**seemed**
and	**more**	**must**	sound	night	**money**	though	**kept**
to	to	does	sore	to	didn't	idea	notice
is	**him**	even	thought	being	**morning**	lived	strong
that	**time**	well	few	second	trees	**became**	**probably**
he	know	such	always	soon	body	at	birds
was	then	here	show	story	**family**	grow	horse
are	been	why	often	since	turn	yet	sounds
with	who	**help**	asked	days	face	less	stand
they	**people**	years	don't	**paper**	cut	wind	start
be	**made**	away	going	**mere**	**group**	behind	class
from	did	off	school	better	half	letter	slowly
have	only	old	until	across	red	four	river
by	find	great	**form**	today	**plants**	letters	**common**
had	**may**	**man**	**keep**	however	wanted	able	**American**
but	long	**small**	feet	**means**	eat	shown	quickly
all	very	found	side	its	united states	English	find
when	words	between	boy	told	kinds	**perhaps**	round
there	just	should	**animals**	**miles**	gave	six	girls
and	**most**	**home**	enough	ways	**open**	fire	ball
which	get	give	**sometimes**	whole	lines	green	tried
said	back	line	head	**example**	really	built	questions
do	before	own	kind	several	**remember**	ran	**meaning**
each	good	read	**almost**	answer	**triple-0**	town	instead
how	right	look	**page**	see	front	owe	held
out	used	also	earth	**top**	**American**	hot	already
then	**many**	another	far	three	inside	hold	taken
many	any	never	high	**point**	**making**	list	finally
so	**same**	left	**mother**	**play**	early	hundred	
would	**come**	along	**parts**	five	learned	ten	

APPENDIX E – SCREENSHOTS OF THE STIMULUS-DELIVERY PROGRAM

APPENDIX F – EXCERPT USED IN THE WORD-CHECKING TASK (STUDY 1)

(see following page)

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