

**WHEN SHOULD I HAVE IT? THE EFFECT OF REPRESENTATION AND
PROCESSING CONCRETENESS ON CONSUMER IMPATIENCE**

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ABSTRACT

SELIN A. MALKOC: When should I have it? The Effect of Representation and Processing Concreteness on Consumer Impatience

(Under the direction of Gal Zauberman and James R. Bettman)

Consumers frequently make decisions about when to consume a product and what costs to incur to obtain sooner consumption. Prior research has demonstrated that consumers show decreasing levels of impatience as the length of delay for consumption gets longer (i.e., present-biased preferences or hyperbolic discounting). In this dissertation, I explore the roots of decreasing consumer impatience and identify factors that lead to differential sensitivity to time horizon. In two essays, I show that the concreteness of mental representation and of processing are two possible mechanisms behind present-biased preferences. I hypothesize that present-biased preferences are observed when mental representations and processing are concrete, and that this effect is attenuated when consumers think more abstractly.

In essay 1, I examine the role of representational concreteness by making use of two temporal frames (delay and expedite) that differ in their associated degree of concreteness. I show that (1) defer and expedite frames are associated with different patterns of discounting, (2) the two frames are associated with differential levels of

outcome concreteness, and (3) this variation in outcome concreteness can explain the difference in present bias.

In essay 2, I explore the role of processing concreteness (e.g., focusing on the big picture or on the details) in consumers' present bias. I hypothesize and show that consumers who think more concretely will be more prone to hyperbolic-like discounting compared to those who think abstractly - even when processing concreteness is manipulated using an unrelated task.

Taken together, this dissertation provides a better understanding of the psychological mechanisms driving intertemporal preferences in general and present-biased preferences in specific. I examine the cognitive underpinnings of present-biased preferences and use temporal framing (Essay 1) and prior decisions (Essay 2) to establish concreteness of outcomes and processing as potential sources of decreasing impatience. The results reported in this dissertation extend the current theorization in intertemporal choice, temporal framing, mental construal, and sequential decisions. These findings suggest that conceptualizing concreteness at multiple levels helps explain not only hyperbolic discounting, but also adds to the understanding of several related consumer behavior phenomena.

This dissertation is dedicated to my mom – Sibel Malkoc

For she has made me all that I am!

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(This may not be a German, but the length will be no less – so please bear with me)

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TABLE OF CONTENTS

	Page
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
 CHAPTER	
1 INTRODUCTION	1
THEORETICAL DEVELOPMENT	4
Concreteness – Abstractness	6
Concreteness-Abstractness and Present-Biased Preferences	8
2 ESSAY 1: DEFERRING VERSUS EXPEDITING CONSUMPTION: THE EFFECT OF TEMPORAL FRAMING ON SENSITIVITY TO TIME HORIZON.....	11
ESSAY 1 – THEORETICAL DEVELOPMENT	13
Temporal Framing: Delay versus Expedite.	13
Temporal Framing and Present-Biased Preferences	14
Concreteness and the Interactive Effect of Temporal Framing and Present Biased Preferences	14
EMPIRICAL APPROACH	19
EXPERIMENT 1A	20

Method	21
Participants and design	21
Procedure.....	21
Results	22
EXPERIMENT 1B	23
Method	24
Results	24
Discussion of Experiments 1A and 1B	25
EXPERIMENT 2	26
Method	26
Participants and design	26
Procedure.....	26
Results and Discussion	27
EXPERIMENT 3	28
Method	29
Participants and design	29
Procedure.....	29
Results	30
Manipulation check.....	30
The Moderating Effects of Visualization	31
Internal analysis of the concreteness manipulation check	31
Discussion	33

ESSAY 1 – GENERAL DISCUSSION	34
Theoretical Contribution	36
Implications and Conclusions.....	37
2 ESSAY 2: IT IS IN THE MINDSET! THE EFFECT OF PROCESSING CONCRETENESS ON CONSUMER IMPATIENCE	40
ESSAY 2 – THEORETICAL DEVELOPMENT	43
Processing Concreteness.....	43
Concreteness of Processing and Present-Biased Preferences	45
EXPERIMENT 1	47
Method	48
Participants and design	48
Procedure.....	48
Results	49
Present Bias.....	49
Thought Listings.....	50
Discussion	51
EXPERIMENT 2	52
Method	53
Participants and design	53
Procedure.....	53
Results and Discussion	54
EXPERIMENT 3	55
Method	56

Participants and design	56
Procedure.....	56
Results and Discussion	57
ESSAY 2 – GENERAL DISCUSSION	58
4 GENERAL DISCUSSION	63
APPENDICES.....	75
REFERENCES.....	78

LIST OF TABLES

Table	Page
1: Essay 1 – Means (Standard Deviations) of discount rates in Experiment 1A and 1B.....	66

LIST OF FIGURES

Figure	Page
1: Essay 1 – Experiment 1A results, showing the time horizon by temporal framing interaction.....	67
2: Essay 1 – Experiment 2 results, showing the time horizon by temporal framing interaction.....	68
3: Essay 1 – Experiment 3 results, showing the time horizon by temporal framing interaction for the control and visualization conditions.....	69
4: Essay 1 – Graphical illustration of the method for creating the similarity conditions using the concreteness measure. The figure illustrates the similar and dissimilar regions of concreteness in the defer and expedite frames.....	70
5: Essay 1 – Experiment 3 results, showing the time horizon by temporal framing interaction for the similar and dissimilar mental representations.....	71
6: Essay 2 – Experiment 1 results, showing the time horizon by alignability interaction	72
7: Essay 2 – Experiment 2 results, showing the time horizon by thinking abstractness interaction	73
8: Essay 2 – Experiment 3 results, showing the time horizon by abstractness prime interaction	74

CHAPTER 1 – INTRODUCTION

On any given day, consumers make several consumption related decisions. Most of these decisions involve tradeoffs between different levels of attributes. Consumers consider exchanging higher prices for better quality, more convenience for increased fees, and sometimes more speedy consumption for heightened costs. This dissertation examines this last tradeoff, i.e., consumer decisions that involve costs and benefits that are distributed over time.

Consumers make decisions regarding the timing of their consumption on a regular basis. For instance, consumers evaluate and decide on investments and savings (costs incurred now for future gain), redemption of cash refunds and rebates (a wait period followed by earnings) and indulgent consumption (benefits experienced now but with a cost (e.g., to one's health) incurred later). Another important instant of such tradeoffs involves delivery options for purchases. Here, consumers may need to decide between a fast more expensive delivery and a lengthier cheaper one. Such delivery cost tradeoffs have gained importance with the emergence of internet shopping. A recent poll indicated that in online purchase of consumer electronics, 35% of the consumers are concerned about shipping costs and some 23% of them are bothered by the delivery times (*The Wall Street Journal* 2002).

Given the pervasiveness of decisions regarding consumption timing and its related tradeoffs, it is important to explore how sensitive consumers are to the changes in consumption timing and the conditions under which differential sensitivity will be observed. One particular aspect of sensitivity to time horizon, impatience, is especially relevant to consumer decisions. Past research has shown that, when delaying outcomes, people are not only very impatient (use very high discount rates), but also show a declining pattern of average discounting as the length of delay gets longer – a pattern often referred to as present-biased preferences or hyperbolic discounting¹ (e.g., Strotz, 1955; Thaler, 1981). For example, Thaler (1981) found that to delay a \$250 lottery prize for 3 months, people required an extra \$50 (a discount rate of 73%). However, when delaying the same amount for 1 year, they required an extra \$100, implying a much lower (34%) discount rate.

Such displays of decreasing consumer impatience are important for several reasons. First, this pattern of behavior violates the normative assumptions implied by the discounted utility model (Samuelson 1937). Second, and more important, decreasing impatience leads to temporal inconsistencies. From a distance, consumers think that they will be patient (e.g., they believe that they will search multiple online retailers before making a purchase). However, when the time of action gets closer, tolerance for waiting declines and they behave impatiently (e.g., they once again select the retailer they visited on their previous purchase; see Zauberman 2003). Temporal inconsistency can lead to serious self control problems such as overspending and obesity, even when consumers

¹ The terms “hyperbolic discounting,” “present bias,” “decreasing impatience,” and “sensitivity to time horizon” come from different literatures. These terms will be used interchangeably, as purely descriptive labels, throughout this dissertation.

have the best intentions (see Lynch and Zauberman 2006 for a public policy analysis). In addition, studying the sources of present bias can potentially inform us about the underlying psychological mechanisms that govern intertemporal preferences in general. For all these reasons, this type of behavior – often referred to as hyperbolic discounting – has been intensively studied across disciplines.

Although there is extant research documenting present-biased preferences, relatively little is known about its underlying psychological mechanism. It has been argued that impulsiveness and impatience are among the drivers of hyperbolic discounting (e.g., Rachlin and Raineri 1992). Indeed, most explanations of hyperbolic discounting have focused on visceral mechanisms (e.g., Loewenstein 1996). Some current research, however, has argued that cognitive processes might be sufficient to lead to such preferences (Rubinstein 2003; Zauberman and Lynch 2005).

In this dissertation, I explore the roots of decreasing consumer impatience and identify factors that lead to differential sensitivity to time horizon. In two essays, I show that concreteness of mental representation and of processing are two possible mechanisms behind decreasing impatience. I hypothesize that decreasing impatience is observed when mental representations and processing are concrete and that this effect is attenuated when consumers think and represent events more abstractly.

Taken together, the goal of this dissertation is to provide a better understanding of the psychological mechanisms driving intertemporal preferences. I examine the cognitive underpinnings of present-biased preferences and establish concreteness of outcomes (Essay 1) and processing (Essay 2) as potential sources of decreasing impatience.

Furthermore, my research provides a better understanding of the implications of mental representation on processing.

THEORETICAL DEVELOPMENT

Intertemporal Choice and Present-Biased Preferences

Research on intertemporal choice has focused on understanding how people make decisions that involve tradeoffs of costs and benefits that occur over time. This research stream has used the normative discounted utility model (Samuelson 1937)² as a benchmark, and has demonstrated multiple departures from the model’s assumptions (for reviews see Frederick, Loewenstein, and O’Donoghue 2002; Read 2004).

Of all reported intertemporal effects, perhaps the best documented empirical regularity is present-biased preferences, or hyperbolic discounting (Benzion Rapoport and Yagil 1989; Strotz 1955; Thaler 1981). That is, when making a decision between smaller-sooner and larger-later rewards, individuals’ implied rate of discounting (i.e., the premium placed on shifting an outcome over a given time period) is higher over a short compared to a long time horizon. This phenomenon has been demonstrated repeatedly in both humans and in lower animals (e.g., Ainslie and Herrnstein 1981) and has been modeled using hyperbolic (e.g., Ainslie 1975; Ainslie and Haslam 1992; Kirby 1997) and

² The discounted utility model (Samuelson 1937) states that:

$$U^t(c_t, \dots, c_T) = \sum_{k=0}^{T-t} D(k)u(c_{t+k}) \text{ where } D(k) = \left(\frac{1}{1 + \rho} \right)^k$$

The utility, $U^t(c_t, \dots, c_T)$, over a given time horizon, t to T , is the weighted sum of instantaneous utility $u(c_{t+k})$, over that period. The rate of discounting is determined by the weight, $D(k)$, attached to utility at each time period. When the discount factor ρ is positive, utility will receive progressively less weight with time.

quasi-hyperbolic functions³ (e.g., Laibson 1997; O’Donoghue and Rabin 1999; Zauberman 2003). In hyperbolic and quasi-hyperbolic models, more weight is given to outcomes in the first period than in later periods, and this disproportionate weight is greater, the closer the first period is to the decision time.

Yet despite extensive evidence for behavior consistent with present bias, the exact psychological mechanism behind it is still unclear. Most explanations of present-biased preferences have focused on visceral mechanisms (e.g., Loewenstein 1996), arguing that impulsiveness and impatience are the main drivers of this effect (e.g., Rachlin and Raineri 1992). This line of research has suggested that forgoing a current outcome is painful and leads to a feeling of deprivation (Hoch and Loewenstein 1991), resulting in impulsiveness and impatience that manifests itself in present-biased preferences (e.g., Rachlin and Raineri 1992).

Some recent research, however, has argued that cognitive processes might be sufficient to lead to such preferences (Rubinstein 2003; Zauberman and Lynch 2005). A common idea in these cognitive perspectives is that timing of events leads to different mental representations of those events. Rubinstein (2003), for instance, has argued that the degree of similarity of outcomes at different points in time can explain several findings that have been previously interpreted as hyperbolic discounting. Consistent with

³ A quasi-hyperbolic discounting utility model (e.g., Laibson 1997) states that:

$$U^t(c_t, \dots, c_T) = D(0)u(c_t) + \beta \sum_{k=1}^{T-t} D(k)u(c_{t+k}) \text{ where } D(k) = \left(\frac{1}{1+\rho} \right)^k \text{ and } 0 < \beta < 1$$

The key difference between this model and the standard discounted utility model (e.g., footnote 2) is the differential weight given to the first period consumption (c_t) compared to all other consumption periods (c_{t+1}, \dots, c_T), holding the discount factor ρ constant. As β gets smaller, the utility at the first period $U^t(c_t)$ gets greater weight compared to the utility in all other periods, $U^t(c_{t+1}, \dots, c_T)$. That is, as β gets smaller, present bias gets larger.

this reasoning, in their recent slack theory Zauberman and Lynch (2005) showed that perceptions of relative slack of a given resource over time can account for different rates and patterns of discounting, including hyperbolic discounting. In this dissertation, I too argue that a cognitive mechanism – namely concreteness of mental representations and of processing – is one important driver of present-biased preferences.

Concreteness – Abstractness

The concreteness-abstractness continuum has been conceptualized in the literature in several ways. Most commonly, it has been defined as a characteristic of the stimulus (Brown 1958) and of the task (Osgood 1953). As a stimulus characteristic, concreteness refers to the degree to which an attribute directly represents an object or event (Brown 1958; Paivio 1971). For instance, words that represent tangible objects (i.e., apple) are said to be more concrete compared to those representing general concepts (i.e., fruit). Similarly, it has been found that action verbs (i.e., run) are more concrete compared to adjectives (i.e., energetic) (Semin and Fiedler 1988). Concreteness of the words or attributes in return determines the concreteness of the mental representations that are evoked. Abstract words require elaboration and visualization to obtain a mental image, whereas concrete words lead to images easier and faster.

Achieving abstraction requires the manipulation of spatially and temporally remote events. Either physically or psychologically distancing the object or event leads to more abstract representations of that event (Werner and Kaplan 1963). Proximal events and objects on the other hand, are more concrete and thus are dependent on the specific

situation. However, the more abstract the task, the more it requires taking account of dimensions other than the current time and context (Paivio 1971).

Regardless of how it is defined, the concreteness - abstractness continuum has been found to affect a variety of cognitive phenomena. For instance, concrete words are recognized quicker (Strain, Patterson and Seidenberg 1995), are better remembered (Paivio 1971) and lead to narrower categorization (Rosch 1975; Tversky and Hemenway 1984), whereas abstraction increases comparability of otherwise non-comparable options (Johnson 1984). In addition, there has been some recent neuroscientific evidence suggesting that brain activation is different for concrete and abstract concepts (Binder, Westbury, McKiernan and Medler 2005), suggesting that both processing and representation might be different depending on concreteness level.

This more general aspect of concreteness – processing – has not been directly discussed in the previous literature. As mentioned before, most of the conceptualization and empirical evidence for concreteness – abstractness continuum concerned the mental representation of a specific task/word and its relation to the cognitions regarding this task/word. Thus, most of the work looked at specific representations and has not considered processing level effects of concreteness.

In this dissertation, I propose that the effect of an initial mental representation can have lingering effects on subsequent tasks and affect how they are processed. In Essay 1, I concentrate on the effects of concrete/abstract initial representations on consumers' intertemporal tradeoffs and on degree of present bias. In Essay 2, I conceptualize processing concreteness/abstractness as a mindset that is evoked in unrelated prior

settings (i.e., not due to the characteristics of a given stimulus or task) and explore the role of previously engaged tasks on the extent of present bias.

Concreteness-Abstractness and Present-Biased Preferences

The notion of differences in the concreteness of mental representations stemming from differences in psychological distance has recently been introduced to the intertemporal literature by Trope and Liberman in their Construal Level Theory (Trope and Liberman, 2000, 2003). This influential theory posits that temporal distance affects preferences for future events by systematically changing the level of abstraction at which the events are represented. According to construal level theory, individuals represent distant future events in relatively more abstract terms, whereas they represent near future events more concretely. These differences in representations lead to changes in attribute weights over time (see also Soman, 1998).

These findings suggest that temporal distance leads to systematic differences in the way information is processed, manifested in more abstract representation and thinking in the distant future. Drawing upon concepts from construal level theory, one can argue that because delaying consumption is a departure from the present, it anchors consumers on having the outcome in the near future and leads to concrete representations. The current scope of construal level theory, however, would not explain why and how the representation evoked would affect the consumers' degree of impatience at different times. Extending construal level theory, I argue that evoking concrete initial mental representations of the consumption episode influences subsequent decision processes regarding the timing of events.

I propose that the effect of an initial level of mental representation on subsequent processing can be understood as a type of blocking (Feldman and Lynch 1988; Miller, Barnet and Grahame 1995; Rescorla and Wagner 1972). Describing the situation in terms of a departure from the present leads to concrete representations and intensifies the focus on the present. This increased focus leads to present-biased preferences (i.e., hyperbolic discounting) when time horizon is incorporated into the decision. If this is true, however, increasing the abstractness of mental representations should attenuate the extent of present bias. In this dissertation, I propose two distinct ways in which such an effect can be observed: changes in the temporal framing of the task (delay versus expedite) and changes in the processing level.

In essay 1, I examine the role of representational concreteness of an outcome in decreasing consumer impatience by making use of two temporal frames (delay and expedite) that differ in their associated degree of representation concreteness. I hypothesize that changing the temporal framing of a situation shifts the degree of concreteness associated with that task. This shift in representation in turn affects the pattern of discounting. Specifically, since delay scenarios describe the situation as a departure from the present, the focal outcome is more proximal and is represented concretely (Paivio 1971). This concreteness increases the focus on the here and now and leads people to overweight the present, manifested in present-biased preferences. Conversely, expedite scenarios depict the situation as a deviation from the future, decreasing the proximity and making the task and the outcome more abstract. In reacting to the abstract outcomes, consumers are less focused on the present and less constrained by the current situation, attenuating the degree of present bias. Supporting

these assertions, in essay 1, I report results from five experiments and show that (1) defer and expedite frames are associated with different patterns of discounting, (2) the two frames are associated with differential levels of outcome concreteness, and (3) this variation in outcome concreteness can explain the difference in present bias.

After establishing outcome concreteness as a moderator of decreasing consumer impatience, in the second essay I explore the role of more general processing concreteness. I propose that shifts in the abstractness of processing (focusing on the big picture or the details) also moderate the degree of present bias. Specifically, I suggest that previously engaged tasks can alter consumers' initial processing level and that the processing level evoked in an unrelated setting might have lingering effects on subsequent timing decisions. This hypothesis is based on the idea that present bias can be thought as a temporal context effect and that decontextualized thinking would attenuate such preferences. Specifically, consumers who are thinking more concretely have a mindset that is highly context dependent. Such a mindset would lead to processing that is more focused on the specifics of the decision context and would replicate the patterns of present-biased preferences. Consumers who are thinking more abstractly, on the other hand, can process the big picture in a decontextualized manner and thus be more consistent in their intertemporal preferences. Accordingly, in essay 2, I present results from three experiments testing this hypothesis.

**CHAPTER 2 – ESSAY 1:
DEFERRING VERSUS EXPEDITING CONSUMPTION: THE EFFECT OF
TEMPORAL FRAMING ON SENSITIVITY TO TIME HORIZON**

Although consumers face decisions regarding consumption timing regularly, not all timing decisions are the same. Consider, for example, two consumers, Alex and Sasha, who have just purchased a DVD online and need to decide which shipping option to select. Alex's shipping is scheduled for the next day, but she has the option to delay her delivery for three days in return for reduced shipping cost. On the other hand, Sasha needs to decide between two, somewhat different, shipping options. Sasha's shipping is scheduled for four days later, but he has the option to expedite his delivery to the next day for an additional shipping cost. Will these two intertemporal decisions result in similar preferences? More importantly, would the two decisions lead to different consumer reactions if the later delivery option was in 10 days compared to 3 days?

The two scenarios above, although representing essentially the same timing/cost tradeoff, are framed differently. Alex is delaying the receipt of her DVD, while Sasha is expediting it. Loewenstein (1988) explored one of the implications of this framing difference and demonstrated that when delaying an outcome people require higher premiums than when expediting the same outcome (see also Benzion et al. 1989; Shelly 1993). I suggest that temporal framing of an event has additional important implications for consumer intertemporal decisions beyond different overall rates of discounting. In

particular, in this essay I make use of framing differences in order to establish outcome concreteness as a moderator of present-biased preferences.

I propose that the temporal framing of a consumption decision - delay vs. expedite - will lead to differential sensitivity of preferences to the time horizon over which the decision takes place, manifested as different degrees of bias towards the present (i.e., differential hyperbolic discounting). Under delay frames, consumers will be more present-biased and exhibit declining rates of discounting with longer time horizons, consistent with prior research (e.g., Thaler 1981). However, under expedite frames, this pattern will be attenuated, and consumers will be less present-biased, manifested in less steeply declining levels of discounting with time. I explore this proposed interactive effect and use it to better understand the psychological drivers underlying intertemporal decisions. I argue that the mental representations associated with the two temporal perspectives – more concrete representations in delay than expedite – may explain why consumers will be more present-biased in delay than expedite decisions.

In sum, I propose that demonstrating the differential sensitivity of consumers to time horizon under different frames is important to the study of consumer behavior. Extensive research in the intertemporal choice literature has consistently found present-biased preferences when delaying options over different time horizons. Establishing that expedite frames will systematically diminish this tendency would not only extend the implications of temporal framing (beyond higher discounting for delay vs. expedite), but will also shed light on the possible psychological mechanisms that are associated with hyperbolic discounting.

ESSAY 1 – THEORETICAL DEVELOPMENT

Temporal Framing: Delay versus Expedite.

First demonstrated by Loewenstein (1988), prior research has shown that people display higher discount rates when delaying a present outcome than when expediting a future outcome, keeping time horizon constant. For example, participants required \$126 to delay the receipt of a VCR for 1 year, but were only willing to pay \$54 to expedite the receipt of the same VCR by the same length of time (Loewenstein 1988; Study 1).

Loewenstein (1988) modeled this effect using a temporal reference point, in which consumption at different times is represented as a deviation (either a loss or a gain) from the current level of consumption (the reference point). That is, delaying consumption is a current loss and expediting it is a current gain. Since losses are discounted more than gains, Loewenstein hypothesized and found higher overall discounting in deferral than in expedite decisions, holding time horizon constant. This line of argument is consistent with work showing consumers' perceptions of loss relative to a reference point (i.e., an endowment) affect which aspect of the situation they focus on (Carmon and Ariely 2000; Johnson, Haubl and Keinan 2004). When delaying an outcome, consumers see it as a loss and increase their focus on what they forgo, which is not the case when they expedite an outcome and perceive it as a gain.

Extending Loewenstein's (1988) findings, Shelley (1993) demonstrated that the loss-gain difference assumed in the two temporal frames interacts with a loss-gain change in the outcome (e.g., a fine vs. a prize). Shelley's findings show that delaying a reward is similar to expediting a penalty (present loss) and expediting a reward is similar to

delaying a penalty (present gain). Such defer-expedite differences have been replicated under an identical elicitation procedure using a series of pair-wise choices (Loewenstein 1988; Experiment 2), with real outcomes (Loewenstein 1988), and with sophisticated participants (Shelley 1993). However, neither Loewenstein (1988) nor Shelley (1993) explicitly discussed how reference point differences in the two frames might influence consumers' patterns of discounting over different time horizons.

Temporal Framing and Present-Biased Preferences

In this essay, I focus on the implications of temporal framing (defer vs. expedite) for present-biased preferences. I propose that, consistent with prior research, consumers will show present bias when they delay outcomes, but that this tendency will diminish when they expedite outcomes. I argue that the two temporal frames anchor consumers on different consumption times. Delay frames anchor consumers on the present, leading to concrete representations of the consumption episode and resulting in present-biased preferences. Expedite scenarios, however, anchor consumers on the future, leading to more abstract representation of the outcome and attenuating present bias.

Concreteness and the Interactive Effect of Temporal Framing and Present-Biased Preferences

As discussed above, until now the effect of temporal framing – defer versus expedite – has been conceptualized in the literature in terms of a shift in reference points (e.g., Loewenstein 1988, Shelley 1993). But it is not obvious how a reference point shift would lead to differential present bias under the two temporal frames. I suggest that differences

in concreteness of representations can help explain such an interactive effect. This perspective is motivated by recent research proposing a cognitive interpretation of intertemporal preferences in general (e.g., Trope and Liberman 2003; Zauberman and Lynch 2005) and present-biased preferences in particular (e.g., Rubinstein 2003; Zauberman and Lynch 2005). Common to these perspectives is that timing of events leads to different mental representations of those events.

In particular, construal level theory (e.g., Trope and Liberman 2000, 2003) posits that temporal distance systematically changes the level of abstraction at which events are construed. According to construal level theory, people represent near future events in concrete terms, whereas they represent distant future events more abstractly. Such differences in representations lead to changes in attribute weights (Liberman and Trope 1998; Soman 1998), as well as in decision processes (Malkoc, Zauberman and Ulu 2005; Förster, Friedman, and Liberman 2004).

Drawing on concepts from construal level theory, I argue that initial representations under the two temporal frames are associated with different levels of concreteness. Specifically, I propose that delay frames, which describe the situation as a departure from the present, evoke concrete representations of the consumption episode. That is, consumers who think about delaying a current outcome represent this consumption experience vividly, with relatively detailed images and/or plans as to how the consumption experience will take place. On the other hand, expedite frames depict the situation as a departure from the future and evoke more abstract representations of the consumption experience, which are less vivid and involve less detail.

These differences in the initial representations relate to other research looking at intertemporal tradeoffs. For instance Metcalfe and Mischel (1999) argued that concrete mental images increase approach motivation, leading to difficulties in letting go of an outcome and in delaying gratification. Such increased focus on the forgone has been found to be associated with higher levels of endowment and loss aversion (Carmon and Ariely 2000; Johnson et al. 2004), affecting consumers' overall discount rates (Loewenstein 1988). As discussed earlier, Loewenstein's (1988) reference point argument suggests that delay frames lead the situation to be coded as a loss, influencing the extent of discounting. These findings, although consistent with my prediction that temporal frames lead to differences in representational concreteness and affect overall discounting, are inadequate in explaining why and how the initial representations would affect subsequent incorporation of different time horizons into decisions.

In examining the relationship between temporal framing and present bias, my conceptualization goes beyond the current scope of construal level theory. I am not simply interested in comparing decision processes for near (X_t) versus distant events (X_{t+n}). Rather, I consider the tradeoff between two temporally separated outcomes (X_t and X_{t+n}) as a function of the temporal framing. That is, I keep the two points in time constant and vary only whether people defer a near outcome ($X_t \rightarrow X_{t+n}$) or expedite a distant outcome ($X_t \leftarrow X_{t+n}$). I argue that the initial representation triggered under the two temporal frames influences subsequent decision processes regarding the timing of events.

Such lingering effects of mental representation can be conceptualized as a form of “blocking,” an idea with a long history in psychology (e.g., Feldman and Lynch 1988; Miller et al. 1995; Rescorla and Wagner 1972). Relevant to my conceptualization, a blocking argument related to memory accessibility asserts that the activation of one set of associations interferes with the retrieval and activation of other associations (Feldman and Lynch 1988; Hoch 1984). That is, associations have different degrees of accessibility, and the initially most accessible association influences subsequent activation. For example, an accessibility argument, has been used to explain “anchoring-and-adjustment” effects (Mussweiler and Strack 2001) by showing that an anchor facilitates the accessibility of confirming relevant information. Also, endowment with an option has been shown to influence which aspects of the situation are considered first, further impacting the relative accessibility of other aspects (Johnson et al. 2004).

The type of blocking I propose refers to the effect of the initial mental representation on subsequent representations. Specifically, once an outcome is represented concretely (abstractly), it is difficult to activate a subsequent more abstract (concrete) representation of that outcome. I suggest that in delay frames, consumers first think about having the outcome in the present, which leads to concrete representations. These initial concrete representations block the activation of subsequent more abstract representations that would have been evoked when moving the consumption to a later point in time, leading to present-biased preferences. In expedite frames, however, consumers first think about having the outcome in the future, which leads to more abstract representations. These initial abstract representations block the subsequent

concrete representations that would have been evoked when moving the consumption to the present. Since the representation is less concrete, present consumption is not as dominant, and present bias is diminished.

H1: Discount rates implied in decisions will decline more with time (i.e., show greater present bias) in decisions to defer compared to decisions to expedite.

Following this logic, any manipulation that makes mental representations under the two frames more similar should also moderate the hypothesized interactive effect of temporal framing and time horizon. One such manipulation is visualization. Prior research has shown that visualizing an event leads to more concrete representations of that event (Lowe 2004; Paivio 1971). Thus, visualizing future consumption in the expedite frame is predicted to increase the level of concreteness with which an outcome is initially represented, and therefore decrease the gap in representations under defer and expedite frames. Accordingly, more concrete representations should lead to pronounced present bias under both frames, eliminating the asymmetry stated in H1.

H2: Changes in the representations of the outcome will moderate the interaction of temporal frame and time horizon: the more similar the representation concreteness under the two frames, the smaller will be the difference in present bias. Specifically, visualization will increase concreteness and present bias under the expedite frame, reducing the difference in present bias between defer and expedite conditions.⁴

Next, I present results from four experiments. The first three experiments focus on the interactive effect between temporal framing and time horizon (H1) and

⁴ In terms of the quasi-hyperbolic discounted utility model (e.g., footnote 3), H1 indicates that β is smaller in defer than in expedite frames. I also theorize that greater concreteness will lead to increased present bias (and smaller β). H2 states that visualization leads to more equal β under delay and expedite frames, eliminating the difference in present bias.

systematically explore the interaction using within and between-subjects designs and with monetary and non-monetary outcomes. To explicitly test the proposed psychological mechanism (H2), the fourth experiment introduces direct manipulation of concreteness using a visualization task. Since all four experiments followed a similar overall structure, in the following section I first provide an overview of the general empirical approach.

EMPIRICAL APPROACH

The general task in all four experiments involves evaluating two options that are associated with different timing/value tradeoffs. Participants were presented with an outcome at a given point in time (either in the present or in the future) and were asked to indicate either the amount that they would give up (or give in addition to) in order to change the timing of the outcome (i.e., a matching task). In all studies, I manipulated two main factors: framing (delay vs. expedite) and the length of the prospective time horizon.

The temporal framing manipulation had participants either delay a present outcome or expedite a future outcome, holding the time interval constant. In the delay frame I asked participants to consider an outcome which is available to them at the present and to state their preference for delaying it to a future point. Conversely, in the expedite frame participants were asked to consider an outcome which is available to them in the future and to state their preference for expediting it to the present. In all experiments, the defer task was associated with a willingness-to-accept elicitation method and the

expedite task was associated with a willingness-to-pay elicitation method. Note that Loewenstein (1988; Experiment 2) shows that defer-expedite differences hold also under an identical elicitation procedure using a series of pair-wise choices. Thus, there is no reason to expect the current findings be affected by differences in the elicitation procedure.

In all four experiments, time horizon was manipulated by varying the future outcome timing(s), but different time horizons (years, months, and days) were used in different experiments. In addition, in experiments 1A and 1B, I also manipulated the magnitude of the outcome in order to stay as close as possible to the original paradigm (Thaler 1981). In Experiment 3 I introduced a visualization manipulation to test the proposed concreteness mechanism. Lastly, the experiments use a variety of hypothetical consumption scenarios. But since both of the basic effects (delay/expedite asymmetry and hyperbolic discounting) have been documented using both hypothetical and real outcomes (see Frederick et al. 2002), there is no reason to expect that the pattern of the interaction will be any different with real outcomes. In line with prior research, I used continuously compounded discount rates (e.g., Thaler 1981)⁵ as the dependent variable in the analyses.

EXPERIMENT 1A

This experiment was designed to test the predicted interaction of temporal framing and time horizon (H1). I predict that deferral scenarios will lead to present-biased

⁵ The discount rates were calculated with the following formula: $r = [\ln(X_{t+n}/X_t)]/n$, where X_t is the amount at the initial period and n is the length of time expressed in terms of years.

preferences (replicating prior findings), but that this tendency will be attenuated in expedite scenarios. To test H1 in the context of prior research, I used a modified task from Thaler (1981).

Method

Participants and design. One hundred and forty nine undergraduate students participated in the experiment to fulfill a course requirement. The study followed a 2 (framing: defer vs. expedite) x 3 (prize magnitude: \$15, \$250, \$3000) x 3 (time horizon: 3 months, 1 year, 3 years) mixed design. Framing and prize magnitude were manipulated between-subjects and time horizon was manipulated within-subjects.

Procedure. Participants were presented with a scenario, asking them to imagine winning a lottery worth \$15, \$250 or \$3000. Participants in the defer condition were told that their lottery winning was to be received the same day, but they could delay its receipt to a future time. They were asked to indicate how much they would need to be paid in order to wait. Participants in the expedite condition were told that there was a hold on their lottery winnings and were asked to indicate how much they would be willing to pay to have their winnings that day, instead of waiting. Time horizon was manipulated within-subjects by varying the duration of the wait period to be 3 months, 1 year, and 3 years.

Results

As described earlier, the dependent measure was continuously compounded discount rates; descriptive statistics are presented in Table 1. I conducted a 2 (framing) \times 3 (prize magnitude) \times 3 (time horizon) mixed ANOVA, treating time horizon as a repeated factor (see Table 1 for descriptive statistics). Replicating previous findings from the literature, I found a main effect for temporal framing ($F(1, 143) = 53.84, p < .001$); discount rates were higher for deferral ($M = 0.79$), compared to expedite decisions ($M = 0.13$). In addition, I also found a main effect for prize magnitude ($F(2, 143) = 15.34, p < .001$) and for time horizon ($F(2, 286) = 58.07, p < .001$), demonstrating a negative relationship of discount rates with both the prize magnitude (i.e., higher discount rates for smaller amounts) and the length of time horizon (i.e., higher discount rates for shorter time periods). These main effects are consistent with established findings, replicating the magnitude effect (Benzion et al. 1989; Loewenstein 1978; Thaler 1981), hyperbolic discounting (Benzion et al. 1989; Chapman 1996; Thaler 1981) and delay/speed up asymmetry (Loewenstein 1988; Shelley 1993).

More important, however, the analysis shows the predicted two-way interaction between time horizon and temporal framing ($F(2, 286) = 37.57, p < .001$), demonstrating greater present bias in the deferral than in the expedite decisions (H1). As can be seen in Figure 1, I find that across all amounts, discount rates decline significantly more with time in the defer ($M_{3m} = 1.416, M_{1y} = .631, M_{3y} = .324$) compared to the expedite condition ($M_{3m} = .190, M_{1y} = .110, M_{3y} = .075$). Comparing the linear trend for each participant across the three time-horizon conditions, I find a significantly steeper trend in

the delay ($M = -0.55$) than in the expedite condition ($M = -0.057$), $t(147) = 5.70$, $p < .001$.

Manipulating time horizon at three levels allows for a test of further implications that follow from H1. Specifically, H1 implies that the rate of decline from 3 months to 1 year should be more pronounced in the delay than in the expedite condition, but this difference should be attenuated when considering the decline from 1 year to 3 years. To test this prediction I calculated two ratios (3 months/1 year; 1 year/3 years) and computed a 2 (ratio) x 2 (frame) ANOVA. I found a significant interaction ($F(1, 134) = 6.78$, $p = 0.01$), indicating that ratio of discount rates from 3 months to 1 year was higher in the defer ($M_{defer} = 2.14$) than the expedite frame ($M_{expedite} = 1.37$), but that this difference was eliminated when comparing the ratio of 1 year to 3 years ($M_{defer} = 1.68$ vs. $M_{expedite} = 1.63$).

EXPERIMENT 1B

Experiment 1B was designed to test whether the results obtained in experiment 1A were an artifact of the experimental design, where time horizon was a within-subjects repeated factor. Although this is true for both conditions, this manipulation might have made the time horizon excessively salient to the participants. One might argue that if time is a dimension that is difficult to evaluate, it will have increased weight when compared jointly (Hsee et al. 1999). To conclusively rule out a saliency argument, Experiment 1B manipulated time horizon between subjects. I also used a different group of participants (MBA students).

Method

Participants were 212⁶ MBA students who completed the study during a 45-minute session to raise money for charity (they were paid \$10 each). The study followed a 2 (framing: defer vs. expedite) x 3 (prize magnitude: \$15, \$250, \$3000) x 3 (time horizon: 3 months, 1 year, 3 years) mixed design. Framing and time horizon were manipulated between-subjects, and prize magnitude was manipulated within-subjects. The experimental task and procedure was identical to Experiment 1A.

Results

I conducted a 2 (framing) x 3 (prize magnitude) x 3 (time) mixed ANOVA with prize magnitude as a repeated measure and the monthly premiums as the dependent variable. Descriptive statistics are presented in Table 1. Replicating experiment 1A, I found main effects for temporal framing ($F(1, 205) = 47.69, p < .001$), for prize magnitude ($F(2, 410) = 36.25, p < .001$), and for time horizon ($F(2, 205) = 18.52, p < .001$). More importantly, I also replicated the expected two-way interaction between time horizon and temporal framing ($F(2, 205) = 19.04, p < .001$), indicating a greater sensitivity of implied discount rates to time horizon when deferring ($M_{3m} = 1.410, M_{12m} = .467, M_{36m} = .228$) than when expediting ($M_{3m} = .106, M_{12m} = .174, M_{36m} = .847$).

⁶ One extreme observation in the \$15 prize/3 months/defer cell was dropped from the analysis. This participant indicated a response of 3000 that was 74 standard deviations above the mean of his/her cell without that response.

Discussion of Experiments 1A and 1B

In experiments 1A and 1B, using monetary gains as outcomes, I show systematic differences in the pattern of discounting when the scenarios are framed as deferral (compared to expedite). These results, using both within and between subjects manipulations, replicate prior findings of hyperbolic discounting (Thaler 1981) in the deferral, but not in the expedite condition. Specifically, I find that the discount rates implied in participants' responses are more present-biased (declining rate of discounting with time) when engaged in deferral decisions, but that this effect is significantly attenuated under decisions to expedite. The results of Experiments 1A and 1B support hypothesis 1, indicating that temporal framing of a decision context has implications in addition to higher discount rates for deferral (as compared to expedite) and affects the way in which consumers incorporate prospective time horizon into their decisions.

Overall, these findings support my theory, indicating that delay frames, which are associated with concrete representations, lead to an emphasis on the present, resulting in present-biased preferences. Expedite scenarios, on the other hand, describe the situation as a departure from the future and evoke abstract representations, which decrease the emphasis on the present, attenuating the extent of present bias.

To be able to relate the findings to previous literature, the first two studies used monetary gains to test the hypothesized interaction of temporal framing on the pattern of discounting (H1). However, many consumption decisions involve more hedonic outcomes. Experiment 2 tests whether my findings replicate when more hedonic non-monetary outcomes are considered.

EXPERIMENT 2

Experiment 2 aims to extend the findings by demonstrating that the results obtained with monetary outcomes in Experiments 1A and 1B are not domain specific. To show that the interactive effect of temporal framing and time horizon is not unique to monetary payoffs, but also applies to general consumption utility, Experiment 2 introduces concert tickets as the more hedonic and non-monetary outcome.

Method

Participants and design. Ninety eight undergraduate students completed the study for partial fulfillment of a course requirement. The study followed a 2 (framing: defer vs. expedite) x 2 (time horizon: 3 months, 1 year) mixed design. Framing was manipulated between-subjects and time horizon was a within-subjects factor.

Procedure. Participants were asked to consider having purchased an \$80 concert ticket to watch their favorite band at a local arena. Temporal framing was manipulated between subjects by informing participants about an option to either defer or expedite the concert date. Participants in the defer condition were told that their original ticket was for the coming weekend, but due to unexpected demand, they now have the option to postpone going to the concert and receive a refund. They were asked to indicate how much of a refund they would want in order to wait to see the concert. In the expedite condition, participants were told that they originally bought a ticket for a future date and, due to a change in demand, now they have the option to attend the concert this weekend. They were asked to indicate the amount they would be willing to pay in order

to not wait to see the concert. In both conditions, participants were informed that the only change would be the date of the concert, and the tickets would be for the same band, in the same arena, and the same seat. Time horizon was a within-participants factor (3 months vs. 1 year).

Results and Discussion

As before, continuously compounded discount rates were used as the dependent measure. A 2 (framing) x 2 (time) mixed ANOVA replicated previous findings; see Figure 2. The analysis showed a main effect for temporal framing ($F(1, 96) = 48.42, p < .001$), with higher discounting in the defer ($M = 1.59$) compared to the expedite condition ($M = .74$). In addition, I also found a main effect for time horizon ($F(1, 96) = 163.00, p < .001$), showing higher discount rates for 3 months ($M = 1.68$) compared to 1 year ($M = .68$). More importantly, I again obtained the predicted two-way interaction between time horizon and temporal framing ($F(1, 96) = 47.16, p < .001$), showing that the decline in discounting with time was more pronounced in delay decisions ($M_{3m} = 2.35, M_{1y} = .84$), compared to decisions to expedite ($M_{3m} = .96, M_{1y} = .51$).

Another way to test H1 is to examine changes in the ratio of discounting in different time horizons under the two frames. H1 implies that the ratio of discount rates over short periods to longer periods would be higher when delaying than expediting outcomes. To test this prediction, I calculated a (3 months/1 year) discount rate ratio, and used a single factor ANOVA with temporal framing as a between-subjects factor and the ratio as the dependent variable. As expected, temporal framing had a significant effect ($F(1, 93) =$

18.99, $p < 0.01$), showing that the 3 months/1 year ratio is higher in the delay ($M_{defer} = 2.80$) than the expedite scenario ($M_{expedite} = 1.96$).

The results from Experiment 2, which employed concert tickets as the focal outcome, replicated Experiment 1 findings, demonstrating that the results are not limited to monetary gains. Specifically, individuals showed preferences that imply a high discount rate for shorter periods, and this discounting sharply decreased with longer time periods (i.e., hyperbolic discounting). However, this effect was present only when participants were asked to consider delaying an outcome, but not when they were asked to expedite it.

In sum, supporting hypothesis 1, the first three experiments conclusively demonstrate a very robust interaction between the temporal framing of the decision and the timing of the outcome. However, the proposed psychological mechanism behind this effect is still untested. As discussed earlier, I propose that the two decision frames are associated with different levels of concreteness in consumers' mental representation, which then result in different patterns of discounting. The next experiment will test hypothesis 2 by directly manipulating concreteness using a visualization task.

EXPERIMENT 3

This experiment examines the potential psychological mechanism in more detail. Specifically, I explore the moderating effect of concreteness on the patterns of discounting by employing a visualization manipulation. I propose that the two frames are associated with different levels of representation concreteness, which result in different patterns of discounting. I expect that visualizing the consumption episode will

increase the similarity of mental representations under the two frames. Thus, the patterns of discounting under delay and expedite scenarios will be more similar after visualization, when the levels of representations are more equal, than under a condition of no visualization.

Method

Participants and design. Participants were 192 undergraduate students who completed the study as part of a one-hour experimental session. They were paid \$10 for their participation. The study followed a 2 (visualization vs. control) x 2 (framing: defer vs. expedite) x 2 (time horizon: 3 days vs. 10 days) mixed design. Framing and visualization were manipulated between-subjects and time horizon was manipulated within-subjects.

Procedure. Participants were asked to imagine purchasing a DVD from amazon.com and to make decisions about the DVD's delivery. Participants in the visualization condition (N = 96) were asked to write about receiving and watching this DVD with the following instructions:

“Before proceeding, please visualize the moment that you actually receive your DVD in the mail. Describe in as much detail as possible the events that would follow the actual receipt of this DVD. Make sure to include details like: When would you open the package? Where would you store the DVD? How long would you wait until you actually watch it? Would you watch it over the weekend or during the week? Would you watch it alone or with friends? You can also include any other detail you think is relevant.”

Participants assigned to the control condition (N = 96) did not see these instructions and proceeded directly to the main task. In the main task, I manipulated framing by

varying the default delivery timing of the DVD. Participants in the defer condition were told that their delivery is scheduled for the same day and that they have the option to delay it in order to save money. Participants in the expedite condition were told that their delivery was scheduled for a future date and that they could have the DVD earlier if they were willing to pay more. Participants were asked to indicate the amount they would pay (save) to expedite (defer) the delivery of the DVD by 3 days and by 10 days. Lastly, as a manipulation check, I measured concreteness of representations using an 11-point scale anchored at 1 (not concrete) and 11 (very concrete) by asking participants: “Next, please indicate how concrete your plans are for how and when you will watch this DVD.”

Results

Manipulation check. The analysis of the manipulation check data had two objectives: (1) to demonstrate that delay frames naturally lead to more concrete representations than expedite frames, and (2) to demonstrate that the visualization manipulation eliminates such a difference. Therefore, two planned contrasts were computed. To establish that delay frames lead to more concrete representations than expedite frames, I computed a planned contrast using only the data from the control condition, where no visualization took place. As expected, representations were significantly more concrete in the defer ($M = 5.58$) than in the expedite frame ($M = 4.45$), $t(94) = 2.09$, $p < .05$). To show that the visualization manipulation eliminates differences in concreteness, I analyzed the data from the visualization condition. As expected, I find that after visualization, the

difference in concreteness under the two frames is eliminated ($M_{defer} = 5.80$ vs. $M_{expedite} = 5.38$; $t(94) = .67, p = .50$).

The Moderating Effects of Visualization. To test H2, I computed a 2 (visualization) x 2 (framing) x 2 (time horizon) mixed design ANOVA with time horizon as a repeated factor and discount rates as the dependent measure. Supporting H2, results show a significant three-way interaction ($F(1, 188) = 4.72, p < .05$), indicating that visualization of the outcome moderated the interactive effect of temporal framing and time horizon (see Figure 3). I find that the control condition replicated my previous findings with a two-way interaction of framing and time horizon ($F(1, 94) = 7.58, p < .01$), showing a greater present bias in the defer ($M_{3d} = 22.13, M_{10d} = 11.64$) compared to the expedite frame ($M_{3d} = 13.04, M_{10d} = 6.94$). However, in the visualization condition this two-way interaction was no longer significant ($F(1, 94) < 1$), with similar degrees of present bias in defer ($M_{3d} = 17.41, M_{10d} = 9.45$) and in expedite ($M_3 = 18.22, M_{10} = 8.69$) frames. These results indicate that the visualization task increased the similarity of mental representations of the outcomes, attenuating the interactive effect of the framing and time horizon (actually eliminating it in this study). As before, I replicated the analysis by using the ratio of discount rates (3 days/10 days), with a marginally significant interaction of framing and time horizon, ($F(1, 183) = 2.88, p = .09$).

Internal analysis of the concreteness manipulation check. To provide further support for H2, I performed several internal analyses. The first analysis used a regression with the continuous measure of concreteness as an independent variable and the difference between discount rates at the two times as the dependent variable, indicating the degree

of present bias. This analysis ($N=192$) showed a significant main effect for concreteness (std. $\beta = .20$, $t = 2.81$, $p < .01$), demonstrating greater present bias for higher levels of concreteness. These results replicated when only the participants in the control condition ($N=96$) were used, (std. $\beta = .26$, $t = 2.55$, $p < .05$).

The second internal analysis was performed to directly test H2 and to further address a possible issue with the concreteness manipulation. Specifically, the visualization instructions explicitly referred to time, possibly increasing its saliency and causing the differences observed. To rule out this possibility as an alternative explanation, I created a variable, “concreteness similarity,” by grouping participants on their similarity of self reported concreteness on the manipulation check. For this analysis I used only the 96 participants in the control (no visualization) condition⁷ (see Figure 4 for a graphical illustration). Two groups were created, dissimilar and similar concreteness. In the dissimilar group, I included those who reported above median concreteness for defer (highest on concreteness) and below median for expedite (lowest on concreteness). In the similar group, I included those who reported below median concreteness for defer and above median for expedite. Therefore, participants in the similar group should be relatively more equal in terms of their concreteness level between the two frames than those in the dissimilar group. Based on H2, I expect a greater difference in present bias between defer and expedite frames when concreteness is dissimilar than when it is similar.

⁷ Results also hold when data from the visualization condition are included, with a significant interaction of framing and similarity ($F(1, 188) = 9.80$, $p = .002$).

This analysis supports this prediction. A 2 (similarity) x 2 (framing) x 3 (time horizon) mixed ANOVA, using discount rates as the dependent measure, showed a significant three-way interaction ($F(1, 92) = 6.31, p < .02$); see Figure 5. The results indicate that when participants have dissimilar levels of concreteness, the results replicate the moderating effect of temporal framing on the degree of present bias ($F(1, 54) = 15.80, p < .01$). However, when participants have more similar levels of concreteness, the moderating effect of temporal framing on present-bias is eliminated ($F(1, 38) < 1$).

Discussion

To test the moderating role of concreteness on the interaction between time horizon and framing (H2), Experiment 3 introduced a manipulation of mental representations using a visualization task. Across multiple analyses, I show that concreteness of mental representation of an outcome is one mechanism that drives this interactive effect. I found that delay frames trigger more concrete representations, leading to present bias, whereas expedite frames trigger relatively less concrete representations, attenuating this effect. I further demonstrated that the visualization manipulation increases concreteness and thus eliminates the different patterns of discounting between the two frames. These results demonstrate that if consumers have similar mental representations, the framing of the task (defer vs. expedite) no longer leads to differential impatience over time. In addition, this experiment employed even shorter time horizons (days) than previous experiments, further demonstrating the robustness of this effect.

Note that in the delay condition, the visualization manipulation actually decreased the extent of present bias, which I did not expect. To understand the reason for this effect I examined participants' written responses collected as part of the visualization manipulation. Examination of these written responses indicated that participants, in addition to describing the outcome in detail, also reported possible schedule conflicts for watching the DVD, as well as other feasibility-related issues. Thinking about the feasibility of the consumption episode might have affected their discount rates in a way consistent with my results (e.g., Liberman and Trope 1998). To address this issue directly, I conducted a simple post-test ($N = 53$), manipulating visualization in a way that focuses on the outcome and using only the delay frame. As expected, I found a significant two-way interaction ($F(1, 52) = 5.53, p < .05$), indicating that the present bias was more pronounced in the outcome visualization ($M_3 = 25.48, M_{10} = 13.36; diff = 12.12$) compared to the no visualization condition ($M_3 = 20.29, M_{10} = 12.83; diff = 7.46$). Taken together, these results establish concreteness as an important moderator of present-biased preferences.

ESSAY 1 – GENERAL DISCUSSION

A better understanding of the psychological mechanisms driving intertemporal preferences is critical to the study of consumer behavior. In this essay, I examined the implications of temporal framing for consumers' decisions involving different time horizons. I demonstrated that sensitivity of consumers' discounting to different time horizons (i.e., degree of present bias) is significantly more pronounced in deferral decisions

than in decisions to expedite. I also identified one psychological driver of this effect – concreteness of mental representations.

The empirical work showed that the way in which intertemporal consumption decisions are framed has a systematic and robust effect on how consumers value changes in consumption timing. Four experiments demonstrated that when a decision is framed as a deferral, consumers display present-biased preferences, manifested in high discount rates that decline sharply with time. However, this pattern of discounting is significantly attenuated when the same decision is framed as a decision to expedite. I consistently found support for my predictions in different domains, using within-subjects and between-subjects designs, monetary and non-monetary outcomes, long and short prospective time horizons, and with undergraduate and MBA students.

Experiment 3 provides direct evidence for a psychological mechanism by demonstrating that the concreteness of outcome representations moderates the interaction of temporal framing and time horizon. I show that the two frames are associated with different levels of concreteness. Deferral frames, describing a departure from current consumption, are associated with relatively more concrete representations and therefore result in present-biased preferences. On the other hand, expedite frames anchor expected consumption in the future, leading to relatively more abstract representations that do not induce the same degree of present bias. I show that when the concreteness of mental representations is similar between defer and expedite frames, there are similar levels of present bias in the two frames. In sum, four experiments support H1

and H2 and provide evidence for a mechanism that can help explain temporal framing, sensitivity to time horizon, and their interaction.

Theoretical Contribution

Prior research on intertemporal choice has consistently demonstrated that scenarios that are framed as deferral lead to higher overall discount rates than expedite frames (e.g., Loewenstein 1988). I extend these findings by showing that the implications of temporal framing go beyond overall higher rates of discounting and affect the pattern of discounting over time. The results also indicate that the commonly reported phenomenon of hyperbolic discounting (e.g., Benzion et al. 1989; Thaler 1981) might seem so robust, at least partially, due to the deferral framing that has been employed in these studies. This could be very important to researchers who design and measure intertemporal tradeoffs.

The results reported in this essay provide further evidence that cognitive factors, such as concreteness, moderate the rate and pattern of intertemporal discounting. As noted before, most existing accounts of hyperbolic discounting have focused on affective and visceral reactions (Ainslie 1975; Loewenstein 1996; Rachlin and Raineri 1992). Recent exceptions include a similarity-based account (Rubinstein 2003) and resource slack theory (Zauberman and Lynch 2005). This essay builds on and extends these more cognitive explanations by providing direct empirical evidence for concreteness as one of the psychological drivers behind present-biased preferences. My perspective is distinct in that it suggests that temporal frames are associated with different levels of outcome concreteness. I demonstrate that consumers with more concrete representations show

more present bias, regardless of the contextual factors (i.e., framing). Taken together, these results suggest that a cognitive account – concreteness of representations – might help explain not only present-biased preferences (i.e., hyperbolic discounting),⁸ but also temporal reference point effects (i.e., delay/speed-up asymmetry).

My theory and results also extend the current scope of the construal level theory (Trope and Liberman 2003). Until now, construal level theory has only examined the effects of differences in mental representations, but has not considered situations where multiple competing representations are activated. Thus, little is known about how the order of representations would effect the subsequent representations and resulting changes in preferences. To my knowledge, the current research is the first to demonstrate that the order in which the representations are evoked has an important effect, where the initial representation inhibits the activation of latter ones.

Lastly, on a more speculative note, I suggest that to better understand present bias it might be important to consider the links between affective and cognitive systems. My proposed cognitive mechanism focuses on changes in levels of concreteness. However, I conjecture that an important link might exist between the level of representation and the extent of situational impulsivity. That is, I suggest that consumers might not be impulsive when thinking abstractly, and a more concrete representation might be necessary to have impulsiveness manifested.

Implications and Conclusions

⁸ Note that I do not claim that cognitive processes can account for all prior findings results showing hyperbolic discounting. It is clearly a multiply determined phenomenon (see Zauberman and Lynch 2005).

While the main goal of this essay is to advance current theory of intertemporal processes, the results reported also have more applied implications. My results suggest that it is important to understand the implications of temporal frames when presenting consumers with timing decisions. Specifically, when considering multiple time horizons, consumers who are anchored in the present would be more willing to spend relatively more money to avoid a shorter over longer delay in consuming a product, compared to those who speed up the consumption of a product. For example, consider the implications of this effect for shipment options provided by companies. As demonstrated in the Experiment 3, if the default option given to the customers is to have immediate delivery, they will not only pay more to avoid delaying receipt of their items, but will also disproportionately value shorter delays. That is, in such situations, a 4-day delay might not be twice as bad as a 2-day delay, but rather will be only slightly more aversive. Alternatively, if the default shipment option is scheduled for the future and consumers evaluate a decision frame as expedite, they will be more proportional in their valuation of different waiting periods and linear pricing might be more effective.

It is also important for companies to understand the psychological effects the temporal framing of options has on consumers. Using delay frames might increase the willingness to incur costs to avoid very short delays, even when the companies would prefer the consumers to be patient. For instance, in the case of possible stock outs, companies often want consumers to not rush the orders and try to avoid dissatisfaction due to the delay. My results suggest that, under such circumstances, it might be more beneficial to use expedite frames in outlining delivery options. Current results further

suggest that the different effects under the two temporal frames relate to the level of mental representation, which can be under the influence of firms, at least to some extent. For instance, by providing consumers with vivid pictures or concrete definitions of immediate benefits, companies can alter consumers' level of impatience.

In conclusion, this essay has demonstrated that temporal frames (defer vs. expedite) will lead to different degrees of bias towards the present. I show that the extent to which consumers are sensitive to the time horizon in a given consumption situation depends on the temporal framing of the task. I further show that the reason we observe this effect relates to the level of mental representation associated with each temporal frame.

CHAPTER 3 – ESSAY 2

IT IS IN THE MINDSET! THE EFFECT OF PROCESSING CONCRETENESS ON CONSUMER IMPATIENCE

On any given day, consumers make multiple decisions, often moving from context to context. Every situation has the potential to alter consumers' decision making in later occasions, influencing their preferences. Recent research has examined how prior consumption decisions lead to differences in the activation of goals (Dhar and Simonson 1999, Novemsky and Dhar 2005) and personality traits (Bargh 1997; Bargh and Chartrand 1999; Khan and Dhar in-press), affecting subsequent behaviors, preferences and choices. I explore how prior tasks consumers engage in change their mindset (i.e., general processing level) and affect their consumption timing decisions. Specifically, I argue that while some contexts evoke concrete processing (focusing on the context), others facilitate abstract processing (focusing on the big picture), influencing consumers' timing decisions.

There are multiple ways in which a given situation can alter the level of processing, influencing consumers' subsequent decisions during related or unrelated tasks. Possible changes might be triggered by the previous decision context and the options considered, or simply by incidental factors in the environment (e.g., the type of mental elaboration an ad or a news article facilitates, roughly simulated in Experiment 2). For example, to illustrate the effect of a previous decision context (implemented in Experiment 1),

imagine a consumer who has set out to purchase a camera online. She has narrowed her choices down to two digital cameras, which vary on some of the attributes, but are otherwise similar. After comparing these attributes, she makes her decision and proceeds to ship her camera. How impatient would she be to receive this camera? Now imagine that the two cameras she was comparing are more dissimilar: a traditional and a digital camera, which would require more abstraction of the attribute level information. Would her impatience in receiving her camera be any different?

The two scenarios above, although representing similar choice situations (a product evaluation, followed by its shipment), differ in the type of evaluation the consumer engages in. Whereas the former scenario (two digital cameras) prompts an attribute level comparison (evoking a concrete mindset), the latter (a digital and a traditional camera) prompts an alternative level comparison (evoking an abstract mindset). In this essay, I examine whether such shifts in processing abstractness – facilitated by a prior task – influence consumers' intertemporal preferences in general and present-biased preferences in specific.

Research on intertemporal choice has explored extensively how tradeoffs that are distributed over time are made and how a given situation affects such decisions (Essay 1; Loewenstein 1988; Loewenstein and Prelec 1992; Trope and Liberman 2003; Zauberman and Lynch 2005). One of the main findings in this literature was that consumers are not only highly impatient, but also show a decreasing pattern in their impatience as time horizon gets longer (i.e., Thaler 1981). However, this research, whether offering an affective or a cognitive explanation, has conceptualized intertemporal decisions

independent of prior tasks and has focused on responses triggered by the focal outcome of the decision.

Unlike the prior research, in this essay, I explore instead the role of the concreteness of general processing style – evoked by prior decisions – in determining temporal inconsistencies in consumers’ preferences. Given that consumers constantly engage in sequential decisions, I propose that prior decisions and tasks, that are non-focal to the current decision, can alter consumers’ processing level. I further suggest that processing style – more concrete versus more abstract – affects the way that consumers make intertemporal tradeoffs. When consumers are in a concrete processing mode, they process information in a detailed and context dependent manner, leading to more present-biased preferences. When the processing mode is abstract, however, consumers process information in a decontextualized manner and see the big picture, leading to less present-biased preferences. In addition, I argue that such effects can be observed, even when the prior decision is totally unrelated to the timing decision.

In sum, examining the moderating role of general processing concreteness on declining consumer impatience (i.e., present bias) is important to the study of consumer behavior. All existing explanations of present-biased preferences focus on changes in representation of the focal outcome and do not consider the effect of prior decisions on general shifts in processing mode. Establishing that consumers’ timing decisions can be systematically influenced by previous tasks in which they have engaged would also add to current theorizing on sequential decisions, by showing that a prior task can change consumers’ processing focus, as well as their goals (Dhar and Simonson 1999; Novemsky and Dhar 2005) and self perception (Khan and Dhar in-press). Furthermore, demonstrating the role

of processing concreteness on present bias will extend the implications of mental representation theories (i.e., construal level theory; Trope and Liberman 2003), by establishing that representational changes can be associated with differences in processing and can have carryover effects to later decisions.

ESSAY 2 – THEORETICAL DEVELOPMENT

Processing Concreteness

Although concreteness of objects and mental representations has been a topic of interest to researchers for several decades (Johnson 1984; Paivio 1971; Rosch 1975; Strain et al. 1995; Trope and Liberman 2003; Tversky and Hemenway 1984), most of the research in this area has examined how the representation of a given event or an object affects cognitions related to that specific object. The main goal of this essay is to explore whether the concreteness or abstractness of how people process information in one task can affect subsequent, related or unrelated, decisions.

Recent research has provided some initial evidence for effects of concreteness of processing level, showing that people who process information more abstractly are more likely to see the big picture and process information in a decontextualized, general and abstract manner. For example, thinking about the future shifts processing from concrete to abstract (e.g., Trope and Liberman 2003) and facilitates generation of creative solutions (Förster et. al. 2004) and broader categorization (Liberman, Sagristano and Trope 2002). In addition, Malkoc, Zaubermaier, and Ulu (2005) demonstrated that the prominence of directly comparable (i.e., alignable) attributes in multiattribute choice

diminishes as time horizon lengthens, indicating a more abstract level of processing in the distant future.

There has also been research exploring the relationship of abstraction with non-temporal constructs. For instance, Semin, Higgins, Gil de Montes, Estourget and Valencia (2005, Experiment 1) showed that compared to people in a prevention focus, people who are in promotion focus use more abstraction in language. Fujita, Trope, Liberman and Levin-Sagi (in press) showed that people are primed to think abstractly perform better in a variety of self control tasks. Finally, there has been some recent neuroscientific evidence suggesting that brain activation is different for concrete and abstract concepts (Binder et al. 2005). Taken together, these findings suggest that abstraction can operate at the processing level and affect a variety of phenomena. In this essay, I explore the carryover effects of processing concreteness on subsequent decisions.

In support of this idea, processing orientation (global vs. local) during a task has been found to affect responses in several ensuing contexts. For instance, Förster and Higgins (2005) found that a more global processing style, manipulated through a perceptual letter identification task (i.e., Navon letters; Navon 1977), led to greater promotion regulatory focus, whereas a more local processing style led to greater prevention focus. Macrea and Lewis (2002) demonstrated that changes in processing orientation systematically interfere with the recall of unrelated visual information. More specifically, they found that in tasks that require holistic processing (e.g., face recognition), interrupting the process with a local processing orientation manipulation (e.g., verbal descriptions) decreased the accuracy of later recognition. Supporting this point, Finger (2002) showed that manipulation of processing orientation with visual and perceptual tasks (i.e., mazes) or

with instrumental music led to more general and broad thinking, increasing performance on subsequent tasks that require holistic processing (e.g., face recognition). These findings suggest that performance on a later task can be moderated by an unrelated task that primes a matching or non-matching processing style. I focus on sequential decisions and examine the role of abstract versus concrete processing evoked in an earlier decision on the intertemporal preferences (i.e., present bias) elicited in a later task.

Concreteness of Processing and Present-Biased Preferences

As discussed above, prior research has mostly examined intertemporal decisions independent of the prior tasks the consumer might have engaged in. I suggest that a previous decision might alter consumers' level of processing and that changes in processing concreteness might be sufficient to affect timing decisions in related, or even unrelated consumption settings. This conjecture is based on the results reported in Essay 1, which indicates that present bias can be thought of a temporal context effect and that decontextual thinking attenuates such preferences. Specifically, in Essay 1, I showed that differences in framing of the decision context (delay vs. expedite) affect the extent of present bias, suggesting that present-biased preferences might, at least partially, be determined by the context in which the decision is presented. If it is the case that intertemporal inconsistencies are highly context dependent, then prior tasks that make consumers think in a decontextualized manner should decrease their propensity to rely on the decision context and increase their propensity to be consistent in their intertemporal preferences. Accordingly, I argue that inducing consumers to process using a more

abstract and decontextualized mindset (compared to concrete and contextualized) would enable them to see the big picture and attenuate the extent of present bias.

Establishing this proposed effect would have substantial implications for consumer research. Consumers constantly engage in different decisions with varying degrees of abstractness and specificity. For instance, during a purchase decision, consumers can either make very detailed comparisons at the attribute level or compare products on a more general level using alternative-level evaluations (Johnson 1984). Such differences in comparison level are related to the degree to which consumers think and act concretely versus abstractly (Johnson 1984; Malkoc et al. 2005). Similarly, in deciding whether to purchase a new product, a consumer might think about how to use this product or why to purchase it. It has been shown that thinking about the why (more abstract) versus the how (more concrete) of a situation systematically changes people's processing focus (Fujita et al., in press). This perspective is distinct from previous research that has suggested differences in the representations of outcomes. Thus, I argue that a previously engaged decision or task might alter consumers' level of processing and affect their subsequent timing decisions in related and unrelated consumption decisions. In particular, I hypothesize that consumers in an abstract (as opposed to concrete) mindset will be less context dependent and take a broader perspective, leading to decreased present bias.

It is, however, difficult to manipulate the general style of processing and provide conclusive evidence with one manipulation. Therefore, across three studies I use multiple manipulations to vary general processing concreteness versus abstractness. The general empirical approach is to first have participants engage in a task that is theoretically

motivated and is hypothesized to change the level of processing concreteness, followed by a main task which involves making deferral decisions for different points in time. Next, I present results from these three experiments. Experiment 1 tests my hypothesis in a context where the prior decision is related to the timing decision. Experiments 2 and 3 provide a stronger test for my hypothesis, by testing the effect of totally unrelated tasks.

EXPERIMENT 1

The first experiment was designed to test whether abstraction in thinking, triggered during a related previous task, moderates the degree of present bias. I manipulated level of thinking by using a comparison task that presented options in a way that either made it easy to compare attribute levels or made it difficult to engage in attribute level comparison. Consumers rely more on non-alignable (difficult to compare) attributes in preference formation when they are in a more abstract mindset (manipulated by varying the length of the time horizon; Malkoc et. al. 2005). More importantly, Johnson (1984) showed that evaluating difficult to compare options facilitate abstraction in thinking. Accordingly, in this experiment, I manipulate the level of abstraction of processing by using alignable and non-alignable attributes to describe alternatives, and test its effect on consumers' subsequent judgments regarding willingness to delay outcomes over several periods. I predict that participants who are in a more abstract mindset will have less present-biased preferences.

Method

Participants and design. One hundred and two undergraduate students participated in this study. Participants were recruited in one of two ways. Some of the participants completed this study as a part of a 45-minute long experimental session and were paid \$10 in return. Others were recruited on campus to complete the task and were provided with a chocolate bar as their compensation. The data collection method did not interact with the variables of interest (all $F < 1$), so the data were collapsed on this variable. The study followed a 2 (alignability: alignable vs. non-alignable) \times 2 (time horizon: 3 days vs. 10 days) mixed design. Alignability was manipulated between-subjects and time horizon was manipulated within-subjects.

Procedure. The experiment had several parts. In the first part, participants were given a scenario asking them to imagine shopping online for a camera. They were provided with two options presented on seven attributes and were asked to compare and contrast these two cameras (see Appendix 1). In the alignable condition, participants compared two digital cameras with alignable differences. In the non-alignable condition, participants were asked to compare a digital camera with a traditional camera based on non-alignable differences. In both conditions, participants were asked to write their evaluations in as much detail as possible. Next, participants indicated their choice between these cameras. Lastly, they were asked to make a decision regarding the shipment of the camera they had chosen. Specifically, they were told that their delivery was scheduled for the same day and that they had the option to delay it in order to save money. They were asked

how much they need to save in order to delay the receipt of the camera. Time horizon was manipulated within subjects by varying the delivery delay to be either 3 days or 10 days.

Results

Present Bias. The dependent measure was daily premiums⁹, calculated by dividing the amount participants indicated would compensate for the delay in delivery by the number of days of delay. I conducted a 2 (alignability) x 2 (time) mixed ANOVA, treating time as a repeated factor. Replicating prior findings in the literature, time horizon had a significant main effect ($F(1, 100) = 57.05, p < .001$), indicating that participants' per day willingness to pay to avoid a delay in delivery was higher for 3 days ($M = 3.75$) compared to 10 days ($M = 2.47$). Alignability did not produce a significant main effect ($F(1, 100) = 1.34, p = 0.25$). More important, however, the analysis showed the predicted two-way interaction between time horizon and alignability ($F(1, 100) = 5.47, p < .05$), demonstrating greater present bias in preferences when participants compared products with alignable attributes, compared to those who compared products on non-alignable attributes. Specifically, as can be seen in Figure 6, in the alignable condition, daily premiums show a greater decline over time ($M_3 = 4.24, M_{10} = 2.56; F(1,50) = 54.649 p < .001, \eta^2 = .521$) than in the non-alignable condition ($M_3 = 3.26, M_{10} = 2.38; F(1,50) = 12.34, p < .001, \eta^2 = .198$).

⁹ Note that it is not possible to calculate discount rates in this experiment because the decision does not include an explicit base amount (i.e., the cost of the transaction in the absence of a delivery decision). To provide consistency, in this paper we report a simple measure of monthly premium across all three experiments. In Experiments 2 and 3, where compounded annual discount rates are possible to calculate, a similar pattern of results holds for this measure.

Thought Listings. To explore the effect of the alignability manipulation on participants thinking, I analyzed their written evaluation responses. Open ended responses were coded by an independent rater blind to the hypotheses. Coding consisted of classifying and counting the attributes mentioned by the participants as “given” (the attributes that were used to describe the options) and as “new” (the attributes that were generated by the participants). Based on my proposed process, I expected the participants in the non-alignable condition to generate more new attributes than those in the alignable condition, but for all participants to mention similar levels of given attributes. A 2 (attribute type: given vs. new) by 2 (alignability: alignable vs. non-alignable) mixed design ANOVA, with attribute type as a repeated factor, supported this prediction. As expected, I found an attribute type by alignability interaction ($F(1,100) = 16.22, p < .001$). Specifically, while participants in both conditions mentioned a similar number of given attributes ($M_A = 4.22, M_{NA} = 3.86; F(1, 100) = 1.07, p = .30$), participants in the non-alignable condition mentioned more new attributes ($M = 1.94$) than those in the alignable condition ($M = .25; F(1, 100) = 36.53, p < .001$).

To show more specifically that evaluating non-comparable products leads to relatively more abstract processing, a second independent rater classified the attributes mentioned as abstract or concrete. Concrete aspects of a product were defined as those that are directly associated with the object and represent the features a product possesses (e.g., Bettman and Sujan 1987). Similarly, abstract aspects were defined as attributes that are general, are inferred from concrete attributes and represent benefits that are provided by one or more attributes. I predicted that more abstract attributes would be

mentioned by the participants in the non-alignable condition than those in the alignable condition. I expected no differences in the number of concrete attributes mentioned. A 2 (attribute type: abstract vs. concrete) by 2 (alignability: alignable vs. non-alignable) mixed design ANOVA, with attribute type as a repeated factor, supported this prediction. As expected, I found an attribute type by alignability interaction ($F(1,100) = 13.56, p < .001$). Specifically, while participants in both conditions mentioned a similar number of concrete attributes ($M_A = 4.00, M_{NA} = 3.96; F(1, 100) = .01, p = .90$), participants in the non-alignable condition mentioned more abstract attributes ($M = 1.96$) than those in the alignable condition ($M = .41; F(1, 100) = 50.04, p < .001$).

More directly looking at the role of abstraction in shifting evaluations, once we controlled for the generation of abstract attributes, the effect of the alignability manipulation on the extent of present bias was no longer significant ($F(1, 99) = 1.82, p = .18$). A mediation analyses (Baron and Kenny 1987) confirmed our conclusion (the Sobel test of mediation was significant; $z(100) = 2.049; p < .05$). These findings indicate that the alignability manipulation indeed influenced participants' processing levels and that this change was responsible for the difference in present-biased preferences.

Discussion

The results of the first experiment are consistent with the claim that abstraction of thinking moderates the degree of present bias observed in consumers' preferences. Specifically, Experiment 1 employed an alignability manipulation, systematically varying the abstraction necessary to compare the two products (Johnson 1984; Malkoc

et. al. 2005), and showed that increased abstractness in thinking decreases the extent of present bias.

The first experiment, although showing the predicted effect of thinking abstraction on time preferences, used a manipulation that varied the abstraction in a way related to the focal outcome. That is, participants indicated their preference for delaying the receipt of a camera, which was also used to manipulate abstraction in processing. To further test my hypothesis, it is important to show that this effect can be replicated with a manipulation that is completely unrelated to the outcome which is to be discounted over time. The next experiment addresses this issue.

EXPERIMENT 2

The second experiment attempted to replicate the results of Experiment 1 using a processing concreteness manipulation unrelated to the main task. In the current experiment, I manipulated processing concreteness by asking participants to think about the implications of a (completely unrelated) policy issue either for a general group or for a specific individual. Prior research has shown that different information processing strategies are used in thinking about persons or groups; specifically, it has been argued that people employ more piecemeal processing in forming impressions of individuals but process information more holistically when thinking of and evaluating groups (Hamilton and Sherman 1996; Fiske and Neuberg 1990). Accordingly, I hypothesized that thinking about the broad implications of an issue for the general population would facilitate abstract level processing as compared to thinking about the implications of a policy for a

specific and concrete person. As before, I predict that participants who are in a more abstract mindset will have less present-biased preferences.

Method

Participants and design. One hundred and thirty seven undergraduate students participated in a one-hour long experimental session to fulfill a course requirement. This experiment was the first task presented to the participants in the session. The study followed a 2 (processing concreteness: abstract vs. specific) x 2 (time horizon: 4 weeks vs. 10 weeks) mixed design. Processing concreteness was manipulated between subjects and time horizon was a within subjects factor.

Procedure. The experiment had three parts. In the first part, presented as an unrelated task, participants were asked to think about the Digital Millennium Copyright Act (DMCA), passed to prevent music piracy over the internet. First I outlined the implications of this act on several constituencies (see Appendix 2 for the complete instructions). Participants were asked to think about the pros and cons of DMCA and its implications. In the abstract processing condition, participants were told to focus on how the general population of consumers would be affected by this act. In the concrete thinking condition, they were told to focus on a specific consumer, like their roommate, and think about how this specific person would be affected by this act. All participants were provided with extra space and were asked to write down their thoughts. Next, presented as a separate experiment, participants completed a cash refund study. They were told to imagine themselves purchasing a consumer electronic product that qualified

for a \$45 cash refund and were asked to make a decision regarding the time at which they would like to receive this cash refund. Specifically, participants were asked how much they would require to delay the receipt of this cash refund by 4 and 10 weeks. Finally, participants completed a written funnel debrief examining whether they detected any connection between the two tasks (Bargh and Chartrand, 2000). No participant reported detecting such a relationship.

Results and Discussion

The dependent measure in this experiment was weekly premiums. I conducted a 2 (processing concreteness) x 2 (time) mixed design ANOVA, treating time horizon as a repeated factor. Time horizon had a significant main effect ($F(1, 135) = 14.67, p < .001$), indicating that participants' willingness to pay to avoid a delay in the receipt of the cash refund was higher for 4 weeks ($M = 5.88$) compared to 10 weeks ($M = 4.24$). Processing concreteness did not produce a significant main effect ($F(1, 135) < 1$). More important, however, the analysis showed the predicted two-way interaction between time horizon and mindset abstractness ($F(1, 135) = 5.33, p < .05$), demonstrating less present bias when participants thought about the broad implications of this issue for a general population, compared to when they thought about its implications for a specific person. Specifically, as can be seen in Figure 7, in the concrete thinking condition, weekly premiums show a greater decline over time ($M_4 = 6.36, M_{10} = 4.07; F(1,70) = 17.42, p < .001, \eta^2 = .199$) than in the abstract thinking condition ($M_4 = 5.06, M_{10} = 4.42; F(1,65) = 1.287, p > .1, \eta^2 = .019$).

In sum, Experiment 2 manipulated processing concreteness using an unrelated task and replicated the results of Study 1 by demonstrating that mindset abstractness moderates the extent of present bias consumers show when making timing decisions. Specifically, when thinking about the implications of the Digital Millennium Copyright Act for a general population, participants' impatience declined less with time, compared to those who thought about the implications of this act for a concrete consumer. Experiment 2 provides further support for my hypothesis, indicating that concreteness of processing affects the way consumers discount over time, even when the manipulation of mindset concreteness is achieved using a totally unrelated task.

Study 2, although employing an unrelated task in manipulating mindset concreteness, might have confounded affective reactions with processing level effects. Specifically, one could argue that thinking about the consequences of this digital music policy on a very concrete person, like their roommate, might have put the participants in an emotionally hot state. That is, by making the focus of thinking more identifiable, this manipulation might have increased the vividness of the situation (Nisbett and Ross 1980) and led participants to be more emotional (Small and Loewenstein 2003). If this were the case, then changes in emotional arousal might account for my results. I address this issue in the next experiment by using an affect-free manipulation of processing concreteness.

EXPERIMENT 3

This last study manipulates general processing level using a priming task to rule out an affective explanation and further test the generalizability and robustness of my

hypothesized effect. Specifically, I used a scrambled word search task to evoke concrete or abstract processing. Such priming tasks have been used extensively in psychology to prime constructs and goals (Bargh, Gollwitzer, Lee-Chai, Barndollar and Trtschel 2001; Sheeran, Webb and Gollwitzer 2005). The manipulation involved searching for concrete versus abstract words (Semin and Fiedler 1988; Paivio 1971) in a word search puzzle. I predicted that participants who are primed with abstract words will be in a more general processing mode and will show less present bias compared to those who are primed with concrete words and are in a more specific processing mode.

Method

Participants and design. Two hundred and thirty one undergraduate students participated in a 30-min long experimental session and were paid \$5 for their participation. This experiment was the first task presented to the participants in the session. The study followed a 2 (prime: abstract vs. concrete) x 2 (time horizon: 3 months vs. 1 year) mixed design. Priming was a between subjects factor and time horizon was manipulated within subjects.

Procedure. The experiment had three parts. In the first part, presented as an unrelated task, participants were presented with a word search puzzle. The prime words in both conditions related to fruits (see Appendix 2). In the concrete condition, I used the names of ten fruits (e.g., apricot, strawberry). In the abstract condition, participants were provided with abstract concepts representing the characteristics of fruits (e.g., juicy, healthy). Upon the completion of this puzzle, participants were provided with a gift

certificates scenario, presented as a separate study. Participants were asked to imagine receiving a \$75 gift certificate from www.amazon.com and were asked to make a decision regarding when they would use this gift certificate. Specifically, they were asked how much they would require to delay the redemption of this gift certificate by 3 months or by 1 year. Finally, participants completed a written funnel debrief, and again no participant detected any connection between the priming task and the main task.

Results and Discussion

The dependent measure in this experiment was monthly premiums. I conducted a 2 (priming) x 2 (time) mixed design ANOVA, treating time horizon as a repeated factor. Time horizon had a significant main effect ($F(1, 229) = 45.03, p < .001$), indicating that participants' willingness to pay to avoid a delay in redemption of the gift certificate was higher for 3 months ($M = 7.28$) compared to 1 year ($M = 5.23$). Priming did not produce a significant main effect ($F(1, 229) < 1$). More important, however, the analysis showed the predicted two-way interaction between time horizon and concreteness priming ($F(1, 229) = 4.66, p < .05$), demonstrating decreased levels of present bias when participants are primed with abstract concepts compared to concrete words. Specifically, as can be seen in Figure 8, in the concrete priming condition monthly premiums show a greater decline over time ($M_3 = 7.56, M_{12} = 4.79; F(1,107) = 26.49, p < .001, \eta^2 = .198$) than in the abstract priming condition ($M_3 = 7.035, M_{12} = 5.611; F(1,122) = 16.93, p < .001, \eta^2 = .122$).

Experiment 3 used a supraliminal priming task to manipulate processing concreteness and replicated the previous findings. The results indicate that even when manipulated with a priming task, processing abstractness attenuates the extent of present bias. In particular, when participants were primed to think about concrete words, participants' impatience declined steeply with time. However, when they were primed to think about abstract words, this effect was significantly attenuated. In sum, the results of Experiment 3 provide further evidence for our hypothesis. Processing concreteness, manipulated with an unrelated task below awareness, led to differences in the extent of present-bias, supporting the notion that processing concreteness is an important determinant of decreasing consumer impatience.

ESSAY 2 – GENERAL DISCUSSION

A better understanding of the psychological mechanisms driving intertemporal preferences and their implications is critical to the study of consumer behavior. In this essay, I examined the role of prior decisions that invoke processing concreteness on preferences over time. The empirical work provided initial evidence for the hypothesis that prior decisions and tasks facilitate different processing levels and these differences in processing carry over to systematically affect consumer impatience. Three experiments demonstrated that when abstract processing is evoked during a prior task (related or unrelated to the focal decision), consumers' preferences show less present bias, compared to those who process more concretely.

In this essay, I use a triangulation method to test my hypothesis. Prior research has not directly considered and manipulated concreteness of processing. Based on research on several literatures, I identify factors that would affect the level of abstraction in thinking and representation, and use these factors to manipulate the construct of interest. That is, all of the reported studies use novel manipulations that are distinct from each other. However, taken together, the results present a coherent picture and provide strong support for the moderating role of processing concreteness on consumers' present-biased preferences.

Theoretical Contribution

Research on intertemporal choice has explored extensively how tradeoffs that are distributed over time are made and how a given situation affects such decisions (Essay 1; Loewenstein 1988; Loewenstein and Prelec 1992; Trope and Liberman 2003; Zauberman and Lynch 2005). The most established empirical finding in research on intertemporal choice is present-biased preferences – a decreasing level of impulsivity as time horizon gets longer. Research aimed at understanding the roots of such behaviors (i.e., Essay 1; Rachlin and Raineri 1992; Rubinstein 2003; Zauberman and Lynch 2005) has conceptualized intertemporal tradeoffs independent of prior decisions and focused on the responses evoked with respect to the outcome. This essay is the first to examine the effects of processing level on present-biased preferences by building on and extending research on concreteness-abstractness. This account is distinct from the previous explanations of present bias in that I propose and show that thinking of intertemporal

decisions as one in a sequence of decisions provides new insights about the underpinning of intertemporal processes. Specifically, the abstractness of mindset consumers bring to evaluating timing decisions (rather than affect or cognition evoked during the decision) moderates the extent of present bias.

This essay also builds on and extends the current state of theories of mental representation. Most discussions of this construct have focused on either the concreteness of objects (i.e., Brown 1958) or of the tasks (i.e., Osgood 1953). I propose and provide initial evidence for a different conceptualization of this continuum. Specifically, I argue that the concreteness of the mindset consumers have *before* reacting to situations is a critical aspect of abstractness/concreteness that has important effects on subsequent decision tasks in general and timing decisions in particular.

In addition, the current research adds to the growing literature on sequential choices. Consumption decisions are affected by both prior choices (Dhar and Novemsky 2005; Dhar and Simonson 1999; Khan and Dhar, in press) and unrelated tasks (LeBoeuf and Shafir 2004), suggesting that consumers' decision making can be systematically affected by actions in which they have previously engaged. Until now, this literature has focused on the effect of prior choices on consumers' goals and self perception. I concentrated on the different levels of processing evoked by prior tasks and showed that such processing differences can have lingering effects on consumers' timing decisions in both related (Experiment 1) or unrelated consumption situations (Experiment 2 and 3).

Implications and Conclusions

While the main goal of this essay is to advance current theory of intertemporal processes, my results also have more applied implications. The results suggest that how consumers make timing decisions is systematically affected by the tasks they have previously engaged in. The empirical work demonstrate that there are several ways in which consumers' processing concreteness can be affected, and each of these ways has a systematically impact on the degree of impatience consumers have when considering timing options.

This has important marketing implications. For example, online retailers have some control over the sequence of tasks consumers face. Providing consumers with more similar products to examine in a recommended set of options will enhance comparability and lead to more concrete processing (experiment 1). More concrete processing during choice then may result in enhanced willingness to pay to avoid delayed delivery (even for short periods). However, providing consumers with less comparable products might encourage more abstract processing and decrease this tendency to avoid delivery delay. Retailers might benefit from understanding such effects, because having impatient consumers who are willing to incur additional costs for speedy consumption is not always desirable for the companies (e.g., when current stock is limited). Without recognizing it, retailers might be influencing such timing decisions with the options they provide for comparison; accordingly, retailers should take the possible effects of consumer interfaces on intertemporal tradeoffs into account.

In conclusion, this essay has demonstrated that differences in levels of consumers' processing concreteness have systematic effects on timing decisions. That is, the extent to which consumers are sensitive to the time horizon in a given consumption situation depends on the abstractness of their mindset, which can be influenced by prior experiences.

CHAPTER 4 – GENERAL DISCUSSION

A better understanding of the psychological mechanisms driving intertemporal preferences and their implications is critical to the study of consumer behavior. In this dissertation, I examine cognitive underpinnings of intertemporal decisions in general and present-biased preferences in specific. In two essays, I show that concreteness of representations and processing are important drivers of decisions that involve tradeoffs distributed over time.

In essay 1, I examine the role of representational concreteness in decreasing consumer impatience by making use of two temporal frames (delay and expedite) that differ in their associated degree of representation concreteness. Specifically, I show that defer and expedite frames are associated with differential levels of outcome concreteness and that these differences in concreteness lead to different patterns of discounting over time. I find that a commonly reported intertemporal anomaly, present bias, is significantly attenuated in expedite frames.

In essay 2, I explore the role of processing concreteness in general. I propose that shifts in the abstractness of processing (focusing on the big picture or the details) would also moderate the degree of present bias. Specifically, consumers who are thinking more concretely would be more prone to hyperbolic-like discounting compared to those who are thinking abstractly. More importantly, such a pattern of results might be obtained even

when information processing concreteness is manipulated with an unrelated task. Three experiments, which employ different and novel manipulations of processing concreteness, consistently support this prediction.

This dissertation contributes to existing theory in several ways. First, in Essay 1, I extend the implications of different temporal frames from overall discount rates to patterns of discounting over time. Specifically, the results of my experiments show that framing a decision as delay versus expedite systematically affects people's sensitivity to changes in time horizon. To my knowledge, the current research is the first to explore the effects of temporal framing on discounting future outcomes over different time horizons.

The current results also indicate that the commonly reported phenomenon of hyperbolic discounting (Benzion et al. 1989; Thaler 1981) might seem so robust, at least partially, due to the deferral framing that has been employed in these studies. These results also provide further evidence that cognitive factors, such as concreteness, moderate the rate and pattern of discounting. This finding has important implications for researchers of intertemporal choice, who measure preferences over time.

Furthermore, results reported in Essay 2 suggest that these cognitive effects can be obtained whenever concreteness of processing is manipulated, with prior related or unrelated tasks. The conceptualization and empirical findings in Essay 2 are the first in the literature to indicate that intertemporal decisions can be affected by the processing style used in prior decisions.

This dissertation also extends the current scope of research on concreteness in general (e.g., Pavio 1971) and construal level theory in particular (Trope and Liberman 2003). Most existing discussions of this construct have focused on either the concreteness of

objects (i.e., Brown 1958) or of the tasks (i.e., Osgood 1953). In this dissertation I provide evidence for a different conceptualization of this continuum. Specifically, I demonstrate that the mindset consumers bring to a decision setting has systematic effects on latter decisions. I demonstrate one class of such effects for timing decisions.

In addition, this dissertation examines situations where multiple competing representations are activated. Until now, research on mental representations (e.g., Trope and Liberman 2003) has only examined the effects of differences in mental representations. Thus, little is known about how the order of representations effects subsequent representations and resulting changes in preferences. This dissertation is the first to demonstrate that the order in which the representations are evoked has an important effect, where the initial representation inhibits the activation of latter ones.

Lastly, this dissertation extends the growing literature on sequential choices. Recent research has demonstrated that consumption decisions are affected by both prior choices (Dhar and Novemsky 2005; Dhar and Simonson 1999; Khan and Dhar, in press) and unrelated tasks (LeBoeuf and Shafir 2004), suggesting that consumers' decision making can be systematically affected by actions in which they have previously engaged. Until now, this literature has focused on the effect of prior choices on consumers' goals and self perception. In Essay 2, I concentrated on the different levels of processing evoked by prior tasks and showed that such processing differences can have lingering effects on consumers' timing decisions in both related or unrelated consumption situations.

Table 1

Essay 1 – Means and (Standard Deviations) of discount rates in Experiment 1A and 1B.

		3 months			1 year			3 years		
		\$15	\$250	\$3,000	\$15	\$250	\$3,000	\$15	\$250	\$3,000
Experiment 1	Defer	2.500 (2.046)	1.142 (1.199)	0.522 (0.733)	1.008 (0.788)	0.568 (0.510)	0.292 (0.331)	0.450 (0.342)	0.322 (0.267)	0.197 (0.162)
	Expedite	0.394 (0.600)	0.118 (0.204)	0.065 (0.057)	0.195 (0.205)	0.084 (0.070)	0.055 (0.047)	0.129 (0.143)	0.058 (0.039)	0.041 (0.041)
Experiment 1A	Defer	2.029 (1.841)	1.222 (1.366)	0.980 (1.232)	0.759 (0.908)	0.363 (0.367)	0.279 (0.335)	0.303 (0.209)	0.198 (0.135)	0.184 (0.168)
	Expedite	0.167 (0.388)	0.090 (0.106)	0.062 (0.081)	0.251 (0.553)	0.159 (0.429)	0.112 (0.397)	0.112 (0.172)	0.082 (0.090)	0.060 (0.065)

Note. In Experiment 1A amounts were manipulated between participants and time horizon within participants, while in Experiment 1B amounts were manipulated within participants and time horizon between participants.

Figure 1

Essay 1 – Experiment 1A results, showing the time horizon by temporal frame interaction.

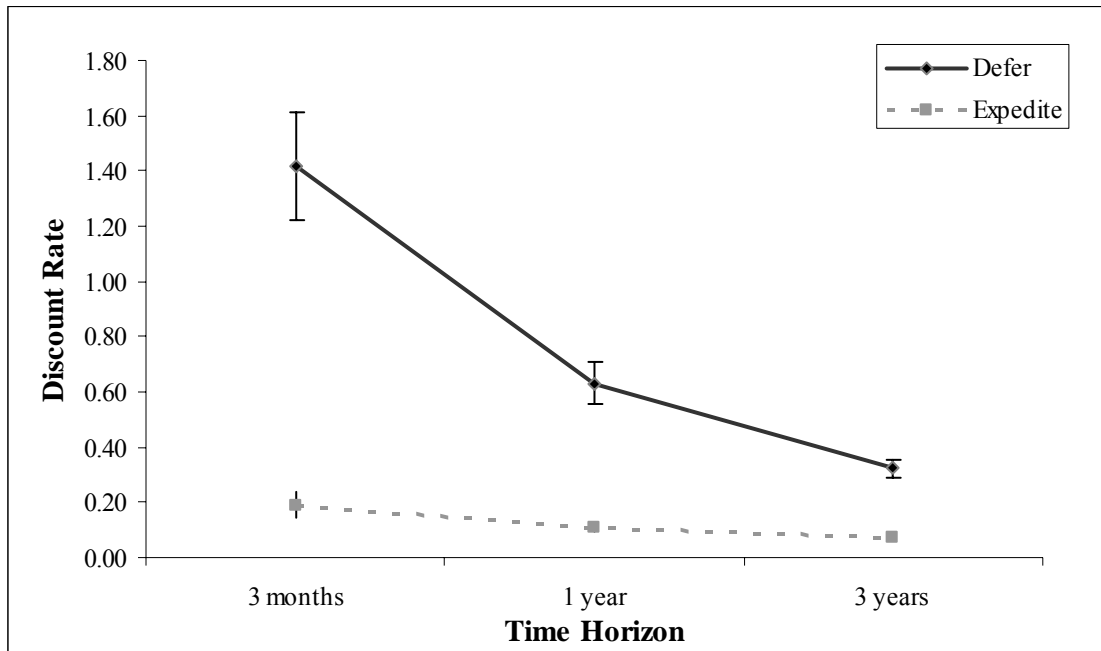


Figure 2

Essay 1 – Experiment 2 results, showing the time horizon by temporal frame interaction.

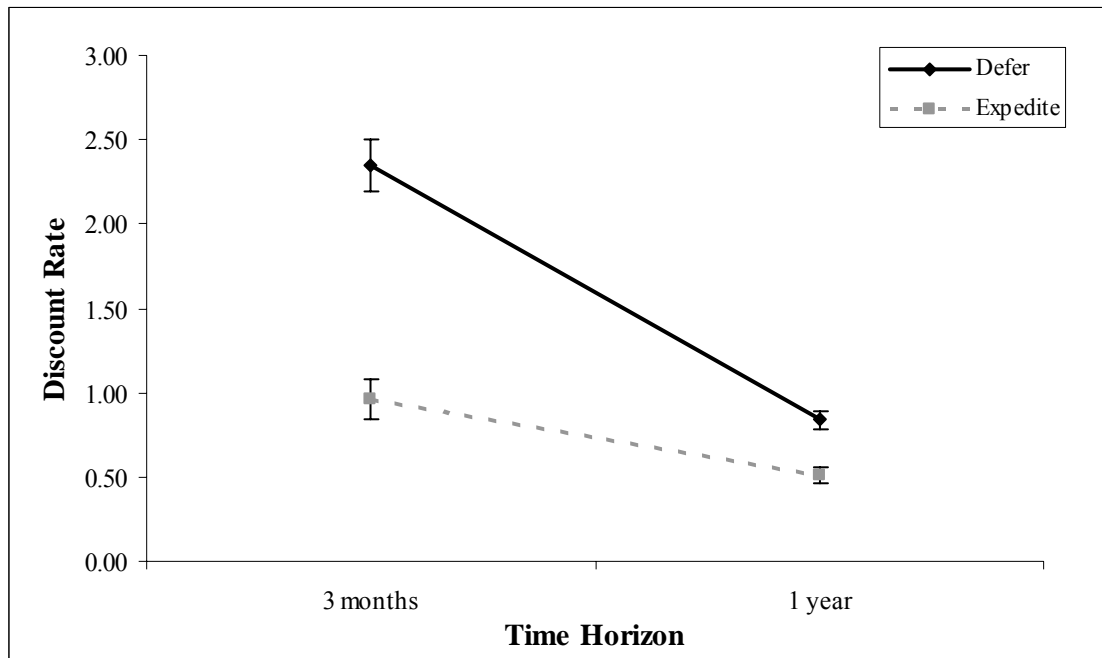


Figure 3

Essay 1 - Experiment 3 results, showing the time horizon by temporal frame interaction for the control and visualization conditions.

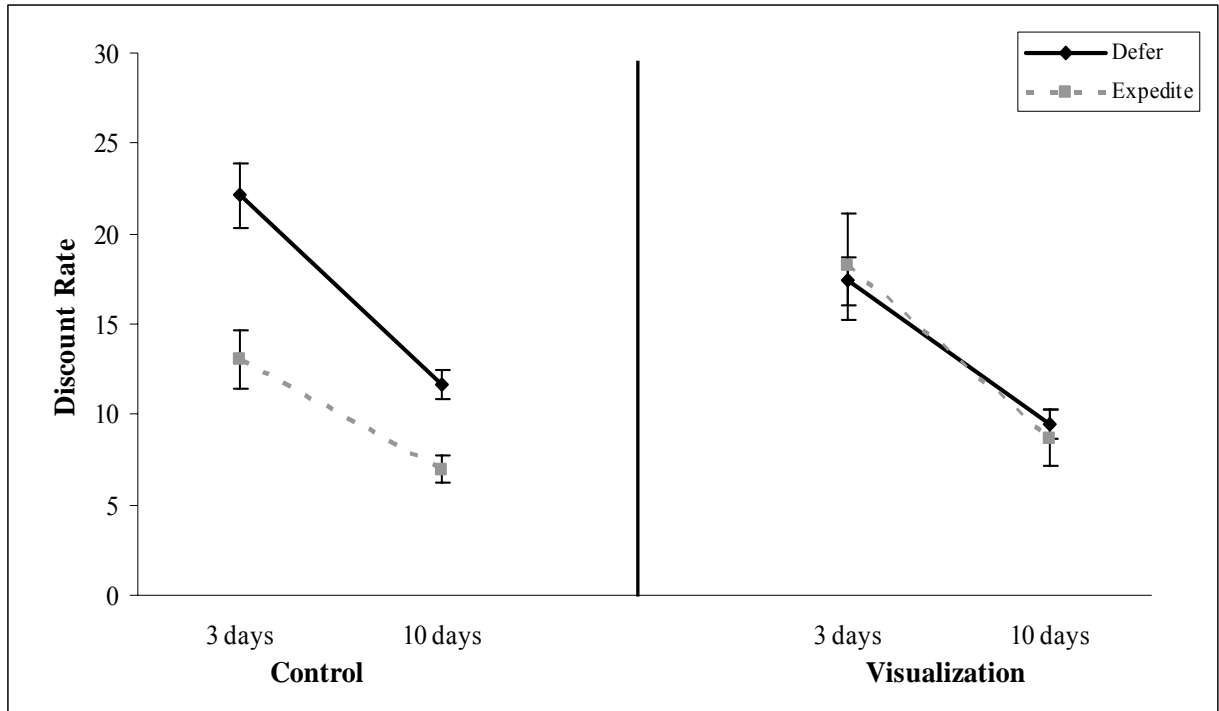


Figure 4

Essay 1 – Graphical illustration of the method for creating the similarity conditions using the concreteness measure. The figure illustrates the similar and dissimilar regions of concreteness in the defer and expedite frames.

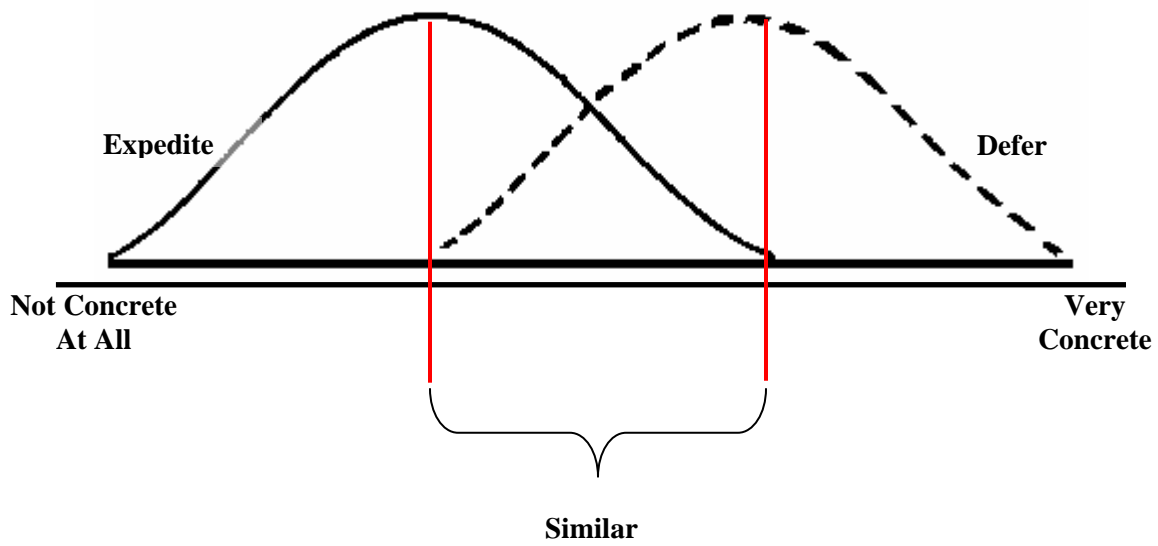


Figure 5

Essay 1 – Experiment 3 results, showing the time horizon by temporal frame interaction for similar and dissimilar mental representations.

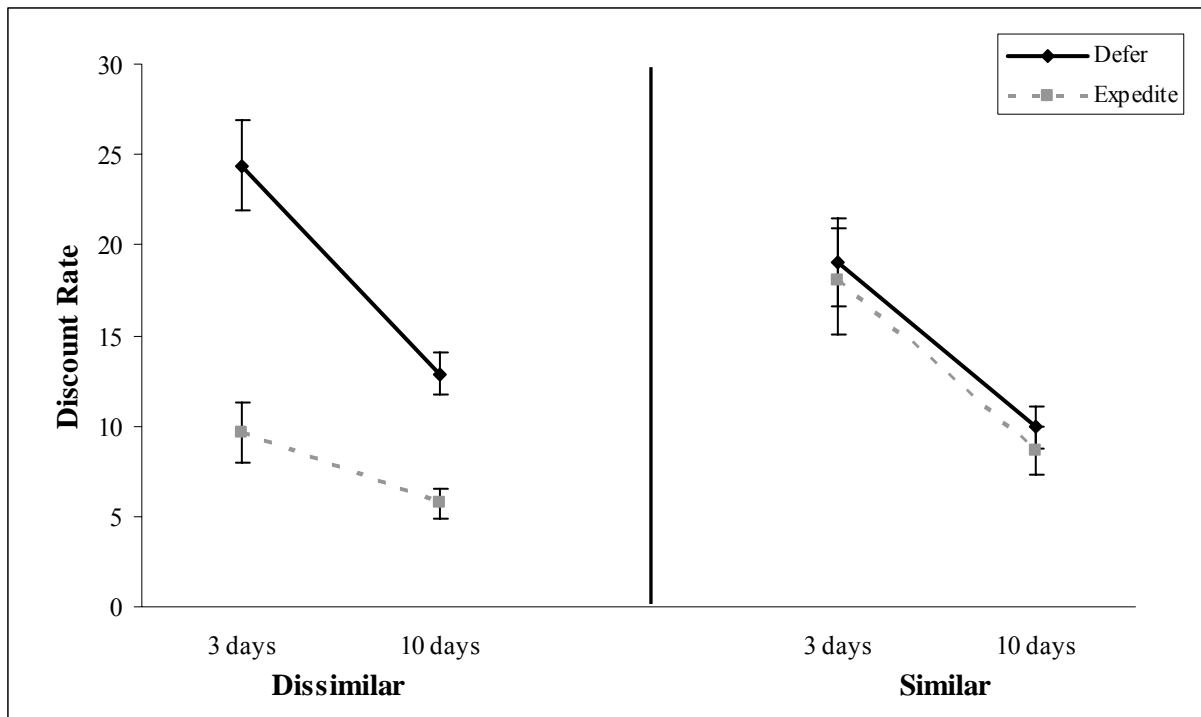


Figure 6

Essay 1 –Experiment 1 results, showing the time horizon by alignability interaction.

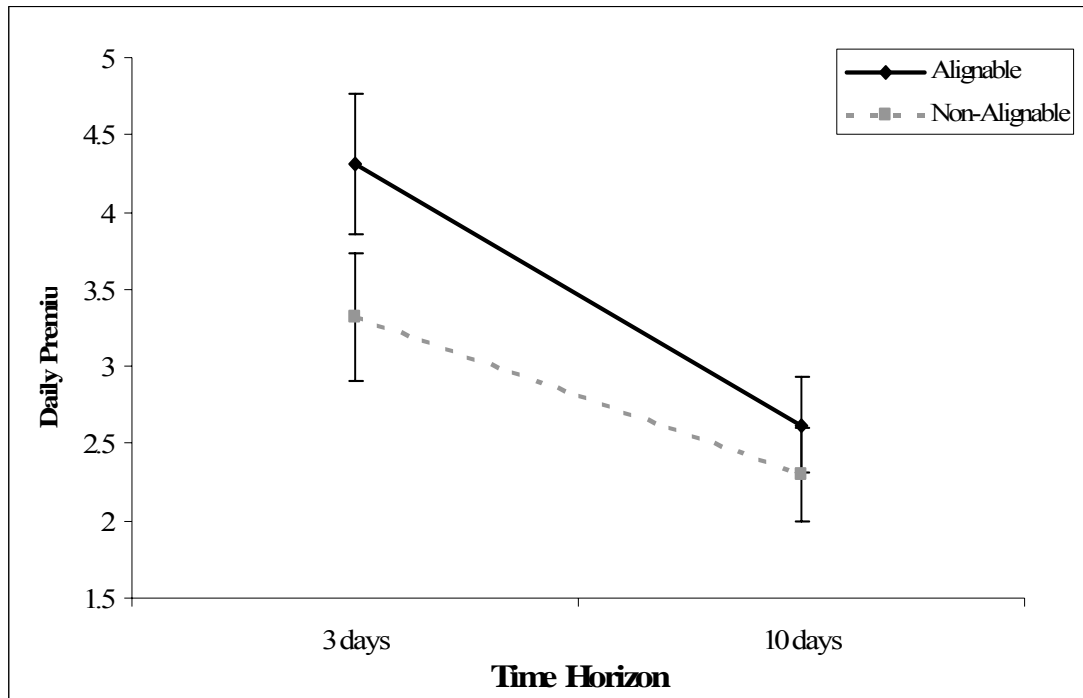


Figure 7

Essay 2 – Experiment 2 results, showing the time horizon by thinking abstractness interaction.

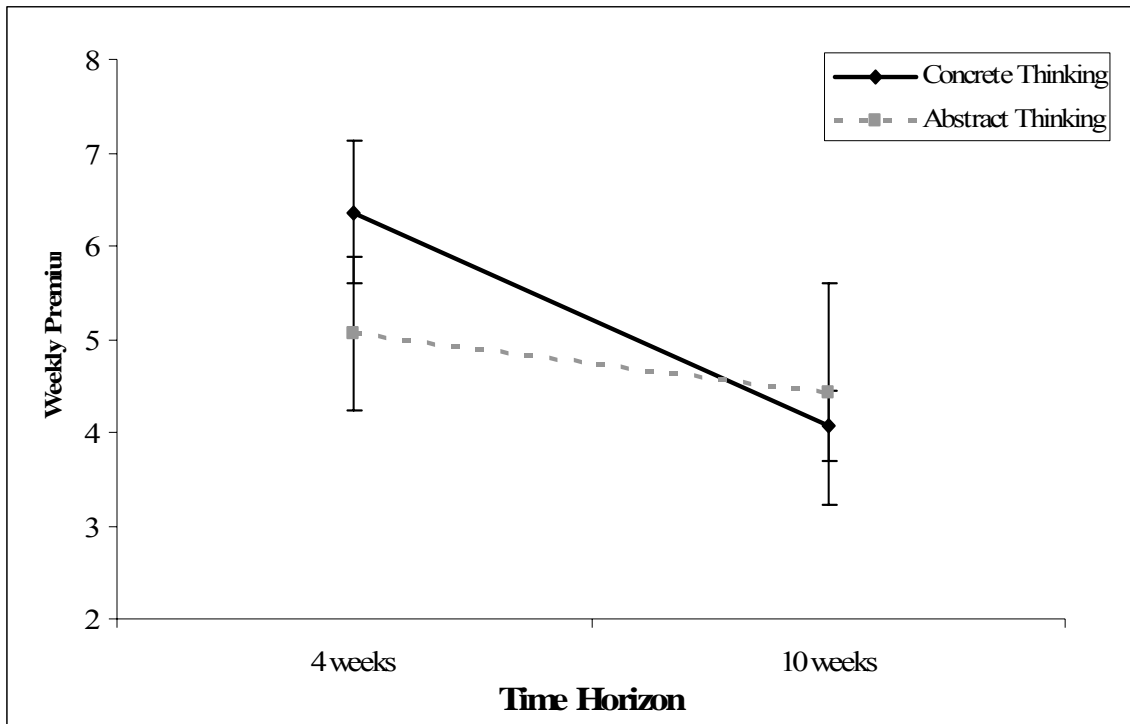
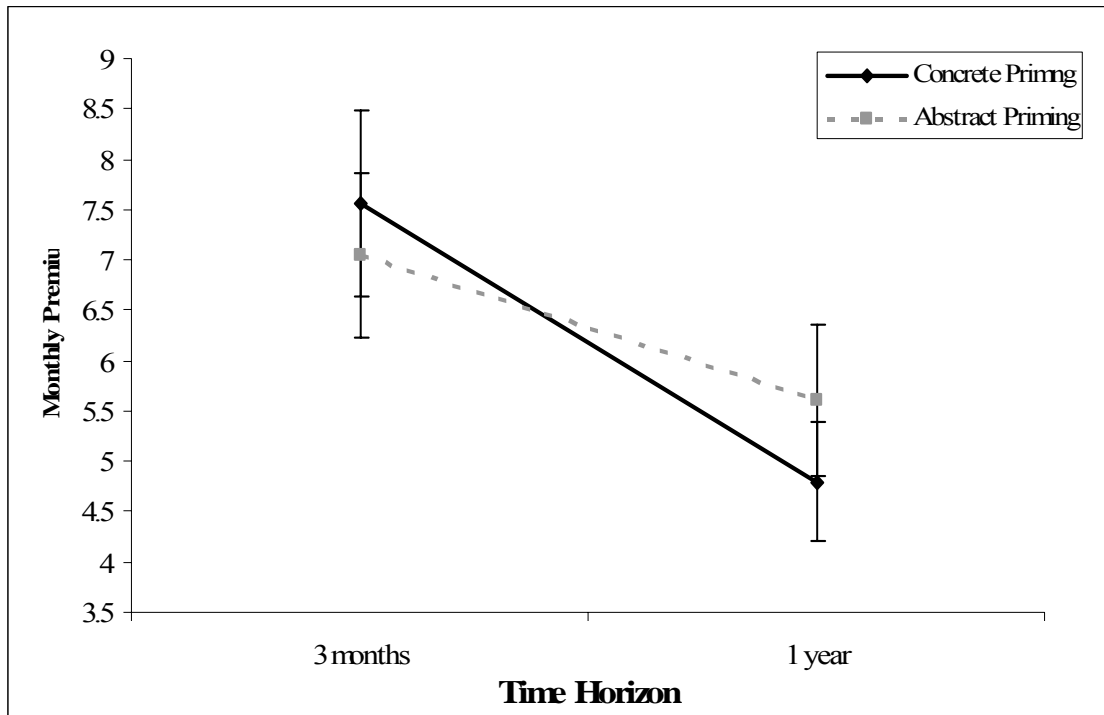


Figure 8

Essay 2 – Experiment 3 results, showing the time horizon by abstractness priming interaction.



APPENDIX I

Essay 2 – Stimuli used in Experiment 1

ALIGNABLE CONDITION

DIGITAL CAMERA			TRADITIONAL CAMERA	
Camera Size	Compact		Camera Size	Compact
Battery Life	4 hours		Battery Life	6 hours
Resolution	3 megapixel		Resolution	4 megapixel
Optical Zoom	3x		Optical Zoom	2x
Digital Zoom	2x		Digital Zoom	3x
Interchangeable Lens	None		Interchangeable Lens	None
Print Quality	Medium		Print Quality	Medium

NON-ALIGNABLE CONDITION

DIGITAL CAMERA			TRADITIONAL CAMERA	
Camera Size	Compact		Focus	Auto, Manual
Battery Life	4 hours		Shutter Speed	2 frames /second
Resolution	3 megapixel		Flash	Integrated
Optical Zoom	3x		Power Source	2 AA batteries
Digital Zoom	2x		Resolution	4000x6000
Interchangeable Lens	None		Screen	LCD
Print Quality	Medium		Picture Preview	None

APPENDIX 2

Essay 2 – Stimuli used in Experiment 2

Concrete Thinking Condition

In this short study we are interested in the opinions of UNC undergraduate students about the Digital Millennium Copyright Act (DMCA). DMCA was passed to prevent music piracy over the Internet. Music piracy is the unauthorized duplication of an original recording without the consent of the rights owner, which is becoming increasingly frequent with the growth of the internet.

The Digital Millennium Copyright Act effects several parties and has implications for numerous issues. For instance, DMCA has an impact on the artists who create the record, the recording companies who produce the record and the consumers who purchase and enjoy the record. A wide variety of issues are influenced by this act. These issues include, but are not limited to the rights of the artists, the wellbeing of the music industry and general economy, as well as the welfare of consumers.

We ask that you think about a specific case relating to digital music piracy and the Digital Millennium Copyright Act. Next, please think about the pros and cons of the DMCA and its implications for a specific consumer. **In doing so, please focus on how an individual consumer of music, like your roommate, is affected by this act.**

Abstract Thinking Condition

In this short study we are interested in the opinions of UNC undergraduate students about the Digital Millennium Copyright Act (DMCA). DMCA was passed to prevent music piracy over the Internet. Music piracy is the unauthorized duplication of an original recording without the consent of the rights owner, which is becoming increasingly frequent with the growth of the internet.

The Digital Millennium Copyright Act effects several parties and has implications for numerous issues. For instance, DMCA has an impact on the artists who create the record, the recording companies who produce the record and the consumers who purchase and enjoy the record. A wide variety of issues are influenced by this act. These issues include, but are not limited to the rights of the artists, the wellbeing of the music industry and general economy, as well as the welfare of consumers.

We ask that you think about a specific case relating to digital music piracy and the Digital Millennium Copyright Act. Next, please think about the pros and cons of the DMCA and its implications for consumers in general. **In doing so, please focus on how the general population of consumers is affected by this act.**

APPENDIX 3

Essay 2 – Stimuli used in Experiment 3

Concrete Priming Condition

M	Y	R	R	N	P	D	P	Z	G
U	R	C	A	E	J	P	I	A	R
L	R	V	R	E	G	F	N	N	A
P	E	O	E	Y	P	R	E	A	P
S	B	E	R	R	M	D	A	N	E
L	W	T	O	C	I	R	P	A	S
M	A	V	T	I	K	X	P	B	W
N	R	H	C	A	E	P	L	F	N
F	T	H	S	A	L	D	E	O	C
O	S	C	H	E	R	R	Y	U	E

Apple
 Pear
 Banana
 Cherry
 Plum
 Pineapple
 Strawberry
 Grapes
 Apricot
 Peach

Abstract Priming Condition

F	Y	Z	D	T	V	I	K	N	J
R	E	F	R	E	S	H	I	N	G
E	H	K	V	E	P	M	P	L	W
S	J	Q	A	M	A	I	T	A	A
H	R	S	N	T	Q	H	R	R	R
S	U	O	I	T	I	R	T	U	N
G	T	V	T	F	R	U	I	T	Y
Y	H	T	L	A	E	H	V	A	F
Y	C	I	U	J	K	E	S	N	M
C	X	K	Z	Z	I	W	U	V	Y

Fruity
 Vitamin
 Healthy
 Natural
 Juicy
 Fresh
 Raw
 Nutritious
 Ripe
 Refreshing

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