

On Intertemporal Selfishness:
The Perceived Instability of Identity Underlies Impatient Consumption

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We explore connectedness to one's future self as an explanation of intertemporal preferences.

Smaller, immediate benefits may be preferred when you are more closely connected

psychologically to your tomorrow's self than to the later self that receives deferred benefits. We

show that when people's continuity with their future self is reduced, they accept smaller, sooner

rewards, wait less in order to save money on a purchase, and require a larger premium to delay a

gift card. When discontinuity with the future self is anticipated, people behave more impatiently—

speeding up the consumption of utility—than when connectedness to the future self is expected.

Many of the most important and difficult decisions we face in life hinge on the same underlying dilemma: how to choose when trading off consumption or happiness in the immediate future with (more) consumption or happiness delayed to the more distant future. In making decisions about one's career, about spending time and money promoting one's health, about what to buy and how much to spend or save, maximizing current welfare and maximizing lifetime welfare are often in conflict. Research on such dilemmas has been broadly defined as concerning choices between one option with higher immediate benefits but lower (or negative) long-term utility and another with lower immediate benefits but higher long-term utility. These two general categories of choice options have been described in various terms (e.g., virtues vs. vices, wants vs. needs; hedonic vs. utilitarian, luxuries vs. necessities), and high levels of choice of the former over the latter options has been characterized as exhibiting short-sightedness or impatience (Elster 1979; Hoch and Loewenstein 1991).

In this paper, we focus on a fundamental question raised by the literature on intertemporal choice: why do people's choices often seem short-sighted or impatient, and why do people differ in the degree of impatience revealed by the choices they make? In posing this question, we will focus on a subset of such dilemmas—intertemporal choices in which the tradeoffs between short and long-term benefits are made explicit—as an ideal setting in which to investigate the decision processes leading to impatience in decision making across a wide range of future-directed thought and behavior. Economists and psychologists have extensively studied how people make these kinds of intertemporal choices, and have offered metrics for judging the degree to which behavior conforms to or diverges from normative and descriptive models.

Much of the work on intertemporal choice has centered on the specific issue of temporal discounting: how people choose between smaller amounts of money or other goods in the

immediate future and larger amounts of money or goods to be received at a later date (Frederick, Loewenstein, and O'Donoghue 2002). In this context, the discount rate, the degree to which an outcome loses value by being delayed for a given period of time, can be interpreted as a measure of impatience (Ainslie 1975; Mischel, Shoda, and Peak 1988). Thus, we can restate the general question of (im)patience in intertemporal choices as asking why people exhibit such *high discount rates* (compared to market interest rates or some other norm) in their behavior and why different people exhibit different discount rates. Note that this question is distinct from the more widely studied question of why people express inconsistent time preferences as captured by *non-constant discount rates* (e.g. hyperbolic discounting; Ainslie 1975; Thaler 1981). It should also be noted that while the literature has documented numerous ways in which features of the decision problem can impact discounting, relatively little is known about why people systematically differ in their observed impatience.

We will argue that our understanding of what constitutes a reasonable discount rate (or, more generally, prudent vs. impatient choices) has been limited by the implicit assumption that people should maximize the utility of a constant self over one's lifetime. An alternative position, proposed by Derek Parfit (1984), is that a decision about consuming now or later should depend not only on the temporal distance between events, but also on the perceived continuity between one's present and future selves. In this view, the degree of concern one has for one's future self should be scaled by the degree of "psychological connectedness"—overlap in personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, ideals, etc.—held between one's current and future self. These properties have been proposed to define the mental ties between selves that comprise identity over time (Lewis, 1983; Perry, 1972; Unger, 1991).

We employ the notion of psychological connectedness—drawn from a literature in which there is an ongoing debate over its specifically *normative* implications (Parfit 1984, and see Dancy 1997 for an entire edited volume of dissenting views)—to test a *descriptive* account of people’s intertemporal choices. In our view, the greater the perceived connectedness to the future self, the greater people’s willingness to defer benefits to the future self, all else equal. Conversely, feeling disconnected from the future self will undercut the general motivation to preserve resources for the future self, causing a reduction in patience that is distinct from other factors that affect valuations of present and future outcomes.

Across four studies, we will show that connectedness contributes to differences in impatience across people and can be systematically manipulated to induce different degrees of impatience in subsequent choices. In Study 1, we show that being exposed to information about how one’s identity will or will not change over time leads to either more or less impatience in monetary tradeoffs. In Study 2, we replicate these results using both an actual life change which has the potential to result in decreased connectedness (college graduation) and choices with real outcomes. In Study 3, we show that merely increasing the perceived difficulty with which a participant could conceive of her identity as stable over time led to more impatient purchase decisions and more discounting. Lastly, in Study 4, we show that participants’ naturally occurring degree of connectedness predicts choices made three weeks later, and we examine the influence of connectedness along with several other time-varying processes that have been shown to affect impatience. Specifically, in Study 4, we provide evidence that the role of connectedness in intertemporal preference cannot be explained by the perceived stability of one’s tastes and preferences (e.g. projection bias, Loewenstein, O’Donoghue, and Rabin 2003), future anhedonia (Kassam et al. 2008), subjective time perception (Zauberman et al. forthcoming), and is not

confounded with standard individual difference indices of reward responsiveness and non-planning impulsiveness (Carver and White 1994; Patton, Stanford, and Barratt 1995).

In the next section, we review the literature on impatience in decision making and the role of excessive discount rates. In particular, we will discuss the extant findings on interpersonal differences in discounting rates (impatience) and what factors have been found to affect patience. Then, we will describe our proposed framework for how connectedness to one's future self underlies intertemporal choices and explains differences in choices across people. In the subsequent sections, we present our experimental evidence for the fundamental role of connectedness in explaining impatience and discuss alternative explanations and the implications of our findings.

THEORETICAL BACKGROUND AND PROPOSED FRAMEWORK

Evidence for high discount rates

Contemporary views often charge people's behavior with short-sightedness (Ainslie 2001). In the context of intertemporal choice, impatience (or short-sightedness) is exhibited by consistently choosing sooner-smaller options even when the latter option is more than large enough to compensate for the delay (per some normative standard). Normative models (Koopmans 1960; Samuelson 1937) indicate that the premium needed in order to forego receiving money sooner rather than later (i.e. the discount rate) should depend primarily on how much interest could be earned on the money in the intervening time, taking into account liquidity constraints (e.g. Meyer 1976; Fuchs 1982) and economic factors such as inflation. In contrast, the literature has found that actual behavior is generally more impatient than what would be predicted by these views, characterized by disproportionate preference for smaller short-run outcomes (Laibson 1997), as compared either to one's own long-term preferences (e.g. preference reversals) or to market norms.

Numerous studies have attempted to estimate discount rates, using field and experimental studies, real and hypothetical outcomes and a range of elicitation methods. Frederick et al. (2002) summarize the literature as characterized by a “predominance of high discount rates – discount rates well above market interest rates,” although they note that many potential confounds inflate estimates of the discount rate. In addition to experimental studies with hypothetical choices, field studies have shown that high discount rates (or impatience) can be observed in everyday decisions, such as people’s choices of appliances (Hausman 1979) and military employees’ preferences for a large lump-sum payment over an annuity representing a higher than market interest rate (Warner and Pleeter 2001).

While much of the attention in the intertemporal choice literature has focused on the issue of *non-constancy* of discount rates, it is important to note that specifically impatience, as evidenced by unjustifiably *high discount rates*, presents a fundamental challenge to normative models of decision-making. Moreover, while non-constant discount rates can give rise to preference reversals, it is high discount rates that serve as a more direct model for general short-sightedness. The employees in Warner and Pleeter’s study who chose the relatively small lump-sum payment over the annuity were arguably not acting in their aggregate best interest, inasmuch as they deprived their future selves of income. This seeming short-sightedness persists whether their discount rates are constant over time or not (i.e. whether they later come to regret their choice or not). Thus, an understanding specifically of high discount rates as expressed in choice of smaller but sooner outcomes is critical to understanding short-sightedness across a wide range of behaviors.

Heterogeneity in discount rates and moderators of discounting

Of the research that has shed light on high discount rates, the primary focus has been on moderators of discount rates, both across people and across decision contexts. While generally high,

discount rates have been shown to be sensitive to the specific experimental elicitation methods used (e.g. choice, willingness-to-pay, matching, titration of indifference points). Furthermore, discount rates vary based on aspects of the broader choice context, such as the nature of the good being discounted (Madden et al 1996; Chapman 1996), the accessibility of justification cues (Kivetz and Zheng 2006) and the degree of goal conflict experienced in choosing (Urminsky and Kivetz 2009). These moderators have provided further support for the view that impatient choices and high rates of discounting arise from an underlying process of reasoning about the personal and situational benefits of trading off delay and money, rather than primarily being based on inferences about market rates, risk, and opportunity cost.

Furthermore, while discount rates are generally high, not everyone has equally high discounting. Discount rates have been found to exhibit reasonably high test-retest reliability as individual traits (Simpson and Vuchinich 2000), but vary systematically by age, gender, income and education (e.g. Cairns et al. 2000; Green et al. 1994; Green et al. 1997; Kirby and Marakovic 1996). Higher discount rates have also been found for heavy drinkers (Simpson and Vuchinich 2000), gamblers, and drug users (e.g. Petry and Casarella 1999; Madden et al. 1997; Kirby et al. 1999).

This large literature on interpersonal differences in discounting provides strong evidence that people often have fundamentally differing discount rates, often in ways that map onto more generalized short-sightedness. However, the behavioral correlates of discounting, in particular, raise questions as to potential confounds and the order of causality. Furthermore, very little has been established about why it is that some people have more reasonable discount rates while others express extremely high rates, and how those discount rates might be changed.

Connectedness to the future self and discounting.

In this paper, we propose that the notion of connectedness to the future self plays a fundamental role in understanding impatience, shedding light on why discount rates are generally high, why some people are more impatient than others, and what kinds of interventions may lead to higher or lower discount rates.

In doing so, we draw on the views of Derek Parfit, who has argued that changes over time in the psychological properties that comprise the self can warrant a reduction in concern for a later self.

“We care less about our further future... because we know that less of what we are now—less, say, of our present hopes or plans, loves or ideals—will survive into the further future... We may, because of this, act knowingly against our own long-term self-interest... [If] what matters holds to a lesser degree, it cannot be irrational to care less.” (Derek Parfit 1976, p. 99)

In this view, the future self, given an extremely large reduction in connectedness, may be reasoned about almost as a distinct individual. We do not mean to overstate the analogy of regarding the future self as you would regard another—in our account, rather, the future self is seen as a continuation of the current self, to varying degrees. The future instantiations of the self may be nearly identical to the current self, or they may be substantially different, and this perceived degree of continuity leads to differences in patience.

The central idea is that when people are faced with explicit intertemporal tradeoffs, their allocations of benefits to the future selves are driven, in part, by how psychologically connected they feel to those future selves. Thus, decisions that appear short-sighted (characterized by a low decision weight on future consequences or an inflated discount rate) may in fact merely reflect an unwillingness to share resources with a future self who is evaluated to be substantially different from the current self.

In extending the notion of connectedness to a descriptive account of impatience, we define connectedness between the current self at time t_0 and a future self at time t_1 as the proportion of the

defining psychological features of the current self (potentially weighted by importance) that will persist in the self that will exist at time t_1 . This construct is relevant to discounting to the degree that people have different consumption utility functions for a more or less connected future self. In particular, if (a) people generally perceive diminution in psychological connectedness over time—that the defining features of the current self are not perfectly maintained, (b) the degree of perceived connectedness varies across people, and (c) the utility of consumption saved for a less connected future self is evaluated as lower than the same consumption by a perfectly connected future self, then we would expect to see varying but generally high discount rates.

It is important to distinguish the view we are proposing from previous discussions of “multiple-selves” in intertemporal choice (Milkman, Rogers, and Bazerman, forthcoming; Schelling 1984; Thaler and Shefrin 1981), which posit selves with different, competing interests and temporal horizons (e.g., myopic vs. far-sighted). The connectedness account, in contrast, is simply about allocating less to a future self that is seen as importantly different from the current self. Furthermore, we will distinguish our framework from a variety of influences on how people make inferences about the future which generally center on the utility that the future self will or should experience from consumption, rather than the degree to which the future self’s utility is considered to be the same as one’s own.

A small number of studies have directly investigated the role of connectedness in intertemporal choice. Most related to the current work, Bartels and Rips (forthcoming) investigated the role of connectedness in non-constant discount rates over time and found that declining discount rates for individuals over time correlated with perceived diminution in connectedness over time. They also showed that in third-party multi-period allocation decisions, people scheduled more benefits to occur before (vs. after) an identity-changing, connectedness-reducing event, compared to

periods in which no such event occurred. Thus, they provide an account of how connectedness relates to changing levels of patience over time for a given person, a relationship which generally takes the form of hyperbolic discounting, but which also responds to the timing of an individual's idiosyncratic connectedness-reducing events.

Frederick (2002) investigated the relationship between perceived connectedness to the future self and intertemporal choices and found no correlation between his measure of connectedness and higher discount rates across people. In contrast, in a paper reporting a provocative correlational result, Ersner-Hershfield, Wimmer, and Knutson (2009) asked participants to make judgments about the current self, future self, and other people, and found that those people for whom thinking about the future self most resembled thinking about other people (in terms of the neural activation elicited) tended to show greater devaluation of monetary rewards. Ersner-Hershfield et al. (2009) also present evidence that people who report having accrued higher total assets—more money invested in a home, in securities, in other material goods, and in the bank—tended to rate themselves as more similar to who they would be in 10 years than people who had fewer assets. Insofar as asset accrual is indicative of having acted in a forward-looking manner, this correlational result is also broadly consistent with the predictions tested in the current paper.

In the following studies, we will provide the first direct, experimental evidence that changes in connectedness to the future self cause differences in patience and that the influence of psychological connectedness on patience is distinct from the factors already identified in the literature as impacting people's relative valuation of sooner and later outcomes. Using both experimental manipulations of connectedness and naturally occurring variation in connectedness, we demonstrate that the role of connectedness in choices contributes both to overall high discount rates, as well as differences across people in discounting.

STUDY 1: CONNECTEDNESS AND DISCOUNTING OF GIFT CARDS

As an initial test of our hypotheses, in Study 1, we investigate the effect of manipulating connectedness on subsequent hypothetical choices between the immediate receipt of a gift card vs. a gift card bundled with an additional payment to delay receipt. After reading either that identity changes radically in early adulthood (especially during the college years) or that the core features of one's identity are fixed in early childhood (and stable during college), participants made a set of hypothetical choices between receiving a gift certificate later in the day, or receiving it in a year along with an additional payment to compensate for the delay. If, as we have argued, connectedness is a driver of discounting, then anticipating changes in the properties that comprise one's identity will make people more impatient, and participants exposed to the instability message should require a larger delay premium than participants exposed to the stability message.

Method

Participants. One hundred four first through third year students at a large Midwestern university were approached in a dining hall on campus and agreed to fill out a short survey for a chocolate square.

Materials and design. In the high-connectedness condition, participants ($N = 51$) began by reading a short description of “recent research” suggesting that young adulthood is characterized by stability in identity (e.g., “the important characteristics that make you the person you are right now... are established early in life and fixed by the end of adolescence”). In the low-connectedness condition, participants ($N = 53$) read about instability (e.g., “the important characteristics that make you the person you are right now... are likely to change radically in young adulthood...”). Then, participants were asked for a one-sentence summary of the passage they read. Data from four participants were dropped because they left this response blank or because their paraphrasing

indicated misunderstanding or noncompliance. In developing this manipulation, we conducted pretests of the passages, and found that reading about the instability of one's identity over time significantly reduced rated connectedness ($p < .05$) but did not produce significant differences in people's reported liking of the future self, the perception that future self would be a better or worse person than the current self, the perception that the future was uncertain and unpredictable, nor did the manipulation significantly affect construal level (Vallacher and Wegner 1989) or mood (Watson, Clark and Tellegen 1988).

Next, participants in both conditions were asked to imagine being given a \$120 gift certificate, either for Target or for Expedia.com. We used two different cards to ensure the generalizability of results. They were then asked to make a series of choices between receiving the gift certificate later that day vs. receiving the gift certificate one year later and being paid an extra amount for the delay, using eight dollar values (0, 17, 34, 51, 69, 86, 103, and 120).

Participants then answered two kinds of manipulation checks: an assessment of connectedness and a rating of the believability of the passage they had read. To assess connectedness, we asked participants to "Please think about the important characteristics that make you the person you are now and circle the one diagram out of the six below that best reflects your opinion about the degree of connectedness between the person you are now and the person you will be in a year, where no overlap means 'completely different' and complete overlap means 'exactly the same.'" Participants circled one of the six Euler circles (see Figure 1). Responses were assigned numeric scores (e.g. a = 1 to f = 6).

Results and Discussion

Manipulation checks. Participants who read about stability rated themselves as more connected ($M = 4.43$, $SD = 0.73$) than did participants who read about instability ($M = 4.00$, $SD =$

1.07; $t(1,102) = 2.39, p = .018, \eta_p^2 = .05$), suggesting that our manipulation was effective in promoting perceptions of one's own identity as more (or less) stable over time and therefore more (or less) connected to one's future self. Furthermore, the stability and instability passages did not differ significantly in rated believability ($t < 1$).

Relationship between perceived (in)stability and discounting. Our measure of patience was the number of deferred options (waiting one year for the gift certificate) chosen out of the eight given, such that larger values indicated greater patience. Participants in the high-connectedness conditions were more patient, requiring a smaller delay premium, on average (\$49, inferred from $M = 5.14$), than did participants in the low-connectedness conditions (\$68, inferred from $M = 4.04$). This finding was consistent across the two types of gift certificates (Target and vacation). A 2 (Condition: High/Low Connectedness) x 2 (Good Type: Target/Vacation) ANOVA, finds only a main effect of Connectedness ($F(1,100) = 9.21, p = .003, \eta_p^2 = .08$); neither the effect of good type nor the interaction term reached significance ($F_s < 1$).

These results demonstrate both that perceived connectedness to one's future self can be manipulated, and, more importantly, that increasing perceived connectedness to the future self increases patience. In the next study, we will replicate these results while addressing several potential limitations of this study. First, we note that since the design of Study 1 used a mixed-outcome measure of patience, an alternative interpretation is that reading about instability of identity somehow affects the relative valuation of cash and gift cards. Thus, for example, the manipulation of connectedness could have lead people to value money more than either shopping at Target or going on a short vacation. To address this issue, in Study 2, we use choices involving only gift certificates of varying face value. In addition, we measure both anticipated changes in available time and money, in order to control for anticipated changes to objective circumstances over time that

should affect discounting. Furthermore, to generalize our findings to more realistic settings, participants in Study 2 read about the large or small changes in connectedness arising from an actual soon-to-be realized, concrete event (college graduation). We then asked participants to make real choices between a chance of winning either an immediate gift certificate of smaller value or a delayed gift certificate of larger value.

STUDY 2: CHANGES IN CONNECTEDNESS DUE TO COLLEGE GRADUATION

Method

Participants. One hundred four graduating seniors at a large Midwestern university were approached one to two weeks before their graduation date and filled out a short survey in return for entry into a lottery for which they could receive a gift certificate.

Materials and design. College seniors were assigned to one of two conditions and read a passage that either described their imminent graduation as a major life event that would impart changes to one's identity ($N = 77$, low-connectedness condition) or as a smaller event that would not change one's identity ($N = 64$, high-connectedness condition). Specifically, they read:

“Day-to-day life events change appreciably after college graduation, but what changes the most [least] between graduation and life after college is the person's core identity... The characteristics that make you the person you are... are likely to change radically around the time of graduation [are established early in life and fixed by the end of adolescence]... Several studies conducted with young adults before and after college graduation have found large fluctuations in these important characteristics [have shown that the traits that make up your personal identity remain remarkably stable].”

Participants then wrote a one-sentence summary of the passage they had read. Data from seven participants were dropped because they left this response blank, or because their paraphrase indicated misunderstanding or noncompliance.

Next, participants chose between lotteries for delayed gift cards (as in Study 1, for either Target or for Expedia.com) of increasing value over time. Specifically, they read:

We will be giving away a free gift certificate to one of the participants in this survey. If your survey is chosen, you will receive a free Expedia.com gift certificate that could be used towards the purchase of a short weekend (2-night) trip to the U.S. city of your choosing. If your survey is chosen, you will receive the gift certificate either next week, when the drawing will occur, or in one year. What you would receive is determined by selecting at random one of the choices you make below. Since you may actually receive the option you choose, please make each of the following choices carefully.

Participants then made choices between a \$120 gift certificate in one week, when the drawing would be held, or to receive a larger-valued gift card in a year, using eight values (\$120, 137, 154, 171, 189, 206, 223, and 240).

Finally, two questions asked participants to indicate how much more or less free time and spending money they anticipated having a year from now (0 = much less money; free time; 6 = much more money; free time).

Results and Discussion

Relationship between perceived connectedness and patience. Our measure of patience was the number of deferred options (waiting one year for the gift certificate) chosen out of the eight given, where choosing more deferred options indicated greater patience. When participants were told their impending graduation presaged a major (vs. trivial) change in connectedness, they exhibited more impatience and were more likely to choose the smaller-sooner gift card (average discount factor—the ratio of \$120, the sooner amount, to the smallest deferred amount chosen— δ 's = .63 vs. .69, inferred from $M_s = 3.97$ and 4.91). As in Study 1, the finding was robust across both types of certificates: a 2 x 2 ANOVA finds only a main effect of low vs. high connectedness ($F(1,134) = 5.89, p = .017, \eta_p^2 = .04$) and fails to find a reliable effect of type of good or interaction between connectedness and type of good ($F_s \leq 2.43, p_s \geq .12$). Furthermore, the connectedness

manipulation did not appreciably affect beliefs about the availability of money or free time in the future ($ts \leq 1.22$, $ps \geq .22$), and our effect was robust ($F(1,135) = 5.27$, $p = .023$, $\eta_p^2 = .04$) when controlling for these beliefs by including them as covariates in the ANCOVA ($F_s = 1.09$ and 5.47 , $ps = .30$ and $.02$).

The results of Study 2 demonstrate that perceptions of the stability of one's identity, over a period of time punctuated by a major life event, exerts an influence on one's patience in real choice situations. This study highlights the key distinctions between our connectedness-based explanation for impatience and traditional discounting models. In our view, impatience over a given time period for an individual is determined not only by the length of the time interval and the economic circumstances affecting the availability of money and opportunity costs entailed by consuming sooner, but also by the changes to the self anticipated to occur in that time period. Important life events—marriage, divorce, entry or exit from college, the death of a loved one, etc.—can impart changes to the properties that define the self in ways that go beyond changes due to the mere passing of time (Liu & Aaker, 2007; Pillemer, Rhinehart, and White 1986). Like Study 1, Study 2 provides evidence that differences in anticipated change can make the difference between acting more or less patiently when faced with a choice that unfolds over a given period of time.

Furthermore, these results show that connectedness can help explain non-constant discount rates, such that discount rates change as a function of how much decrease in connectedness occurred in a given time period. Lastly, we note that, although the literature has documented no systematic differences in discounting for hypothetical and real rewards (Frederick et al. 2002; Johnson and Bickel 2002), the fact that the connectedness manipulation impacts choices for a chance of winning a real gift card provides further evidence for the robustness of the effect.

STUDY 3: ACCESSIBILITY-INDUCED CONNECTEDNESS AND PURCHASE TIMING

The results of the first two studies show that over periods of time where one might reasonably expect meaningful change in the properties that comprise one's identity, providing information that highlights the likelihood of decreased connectedness leads to more impatience in decision making (even when the stakes matter). Note, however, that the way in which people's perceived connectedness was manipulated relied on participants in different groups being presented with different information. A potential concern, then, is that participants' choices may have reflected a lay theory about what the appropriate effect of changes in identity on patience should be, rather than reflecting their true preferences. This concern is mitigated to an extent by Study 2's use of incentive-compatible choices regarding winning actual gift certificates, but to better address this concern, Study 3 manipulates connectedness while keeping the information content the same across the two conditions.

In this study, we did not give participants different accounts of the relative (in)stability of their identity, but instead, used the inferences that participants reached from a metacognitive cue to manipulate their sense of connectedness to the future self. Specifically, we drew from the work on "accessibility experiences" (Schwarz 1998; 2004) to manipulate indirectly people's perceptions of the stability of their identity, by asking them to judge how difficult it would be to generate either 2 or 10 reasons why their identity will remain very stable over the next 12 months. This procedure has been widely used to manipulate consumers' evaluations (Novemsky, Dhar, Schwarz, and Simonson 2007; Wanke, Bohner and Jurkowitsch 1997). Participants asked to imagine how difficult it would be to generate two reasons should find the task easy, and therefore have no reason to doubt the stability of their identity. Conversely, participants in the 10 reasons condition should anticipate that

the task would be more difficult, and may use this anticipated difficulty as a cue to rethink whether or not their identity will remain stable.

In Study 3, we test the generalization of our hypotheses to two additional assessments of patience in intertemporal choice. One common decision that consumers face is when to purchase a product if they believe that prices will decline over time (Winer 1985). In particular, given the prevalence of price-skimming strategies, discussion of expectations for declining prices is widespread in the popular press for technology products, and has been shown to impact decision making (Ronen, Lucas, and Eden 1990). Thus, we presented participants with a realistic scenario in which they decided when to buy a computer, given an expected schedule of declining prices over the next twelve months, as well as a simple battery of preference matching tasks that assessed the discounting of money over time. We expect that participants who are asked to imagine generating 2 reasons why their identity will remain stable will perceive greater connectedness and will thus exhibit greater patience—will choose to purchase later and will discount money less—than participants in the 10 reasons condition.

Participants. Ninety-seven undergraduates at a large Midwestern university participated in exchange for \$2.

Materials and design. All participants were presented with a passage that conveyed that the evidence for the stability of identity over time is mixed, and that experts reach widely varying conclusions on the basis of these findings. Participants in the high-connectedness condition were then asked to judge how easily they could generate 2 reasons ($N=51$) why their own identity would remain very stable over the next 12 months, after reading that in a previous study, most participants were able to generate 2 reasons. In the low-connectedness condition ($N=46$), participants judged how easily they could generate 10 such reasons, after reading that most participants previously had been able to generate 10 reasons. (Both passages were, in fact, true: In a pre-test, most participants

were able to generate 10 reasons.) Participants marked their responses on a 1-7 scale, ranging from “No, I’m quite sure that I cannot retrieve 2 (10) reasons” to “Yes, I’m quite sure that I can retrieve 2 (10) reasons.”

Participants then rated the connectedness they perceived between the person they are now and the person they will be in a year as they did in Study 1 (see Figure 1). Next, they were presented with a choice about when to buy a computer which was expected to decline in price over the next 12 months. They read:

Imagine that you have a laptop that you use for your work. The laptop is pretty old, and it works, but it’s slow, heavy, and is lacking in some features you desire. You would really like to get a new laptop, and after doing some research you are considering purchasing the brand new laptop described below:

The laptop has just been introduced and is currently on sale for \$2000. You have a credit card to which you could charge the full amount. However, in doing your research, you find out that the price is expected to drop over the next year. So, you can buy it now at full price or get it for cheaper by waiting.

They then chose among five timing options, ranging from buying now for \$2000 to waiting a year and paying \$1000, in increments of saving \$250 for each additional three months of waiting. Lastly, after giving a rating of their current need for the computer, participants gave four preference matching responses, as below:

- 1) I would be indifferent between \$500 today and \$_____ in 12 months
- 2) I would be indifferent between \$_____ today and \$100 in 12 months.
- 3) I would be indifferent between \$100 today and \$_____ in 12 months
- 4) I would be indifferent between \$_____ today and \$500 in 12 months.

Results and Discussion

Manipulation checks. Participants in the 2 reasons (high-connectedness) condition rated that the reason-generation task would be easy ($M = 4.78$, $SD = 1.91$) compared to the ratings of the participants in the 10 reasons (low-connectedness) condition ($M = 3.93$, $SD = 1.89$; $t(1,95) = 2.22$, $p = .029$, $\eta_p^2 = .05$). Also, participants in the 2 reasons condition rated themselves as more connected

to their future selves ($M = 4.71$, $SD = 0.97$) than did participants in the 10 reasons condition ($M = 4.29$, $SD = 0.82$; $t(1,95) = 2.30$, $p = .023$, $\eta_p^2 = .05$).

Relationship between perceived (in)stability and discounting. In order to account for the effect of peoples' current need for a new computer on purchase timing, we included it as a covariate in an ANCOVA. We find that the manipulation of connectedness affects purchase timing ($F(1,94) = 5.47$, $p = .022$, $\eta_p^2 = .06$) controlling for computer need ($F(1,94) = 8.70$, $p = .004$, $\eta_p^2 = .09$). In particular, we find that, after residualizing on computer need, participants in the high-connectedness condition waited 1.78 months longer on average than did participants in the low-connectedness condition. This finding provides further support for our claim that higher connectedness to the future self promotes patience in a broad array of decisions that involve intertemporal tradeoffs.

We also looked at the degree of patience expressed in the matching task for each participant to assess whether inducing belief in the stability of one's identity affects patience for money. Consistent with the findings for the computer purchase task, participants in the high-connectedness (2 reasons) condition had higher discount factors (computed as average ratio of sooner-smaller amount / average later-larger amount given for the four responses; $M \delta = 0.65$, $SD = 0.26$) than participants in the low-connectedness (10 reasons) condition ($M \delta = 0.48$, $SD = 0.25$; $t(1,95) = 3.25$, $p = .002$, $\eta_p^2 = .10$). These results are also consistent with the view that our manipulation of connectedness gave rise to a generalized increase in patience, not limited to a given elicitation method or product domain.

The results of Study 3 provide evidence that psychological connectedness influences patience as expressed on two measures, using a more subtle manipulation of perceived connectedness to the future self. Participants who were given no reason to doubt the stability of their identity-comprising features over the next year waited longer to buy a computer which declined in

price and discounted money less than participants who were made to feel they would be more likely to change over time.

STUDY 4: TRAIT-LEVEL CONNECTEDNESS AND SUBSEQUENT DECISIONS

Study 4 tests whether naturally-occurring individual differences in perceived connectedness to the future self relate to individual differences in patience. In doing so, Study 4 addresses two remaining possible concerns. One goal was to test whether the observed effects on impatience might be attributable to highlighting the notion of connectedness for our participants prior to their choices, or whether the effects extend to more natural contexts in which people might or might not spontaneously reflect on connectedness when making choices. Recall that in Studies 1-3, we manipulated perceived connectedness and then asked for people's preferences. In Study 4, we instead employed a re-contact methodology. In the first stage, we measured connectedness (without manipulating it). Three weeks later, in a separate study, we re-contacted participants and collected preference data followed by measures of other psychological constructs known to affect intertemporal choice. Importantly, the follow-up study was conducted online in such a way that participants did not know what any of the subsequent questions would be when making their initial intertemporal choices.

The second goal of Study 4 was to assess the impact of a host of other variables that could contribute to possible alternative explanations for our findings. We have already addressed some rationales for discounting having to do with the various objective factors that might covary with time (e.g. anticipated availability of money and time, current need for the computer). In this study, we also consider several psychological factors, distinct from connectedness, that have been proposed to influence intertemporal preference. In Study 4, we simultaneously assess the

relationship of connectedness and these alternative psychological factors with patience to address the question of how large an impact connectedness has on patience relative to the impact of other psychological factors that have been linked to patience.

In order to test whether rated connectedness has a unique influence on patience when controlling for other potentially explanatory variables, we included measures of (i) anticipated similarity of current and future preferences, or degree of “projection bias”, (ii) future anhedonia, (iii) time perception, (iv) reward responsiveness, and (v) non-planning impulsiveness at the end of the second survey. We next briefly enumerate how each of these variables relates to time preference.

The first factor—projection bias—is, in some sense, a component of psychological connectedness, but whereas connectedness concerns a global assessment of all of the psychological factors which comprise one’s identity, projection bias concerns specifically the projection of stable *tastes and preferences* into the future. Compared to the case where a high degree of similarity between current and future preferences is projected (Loewenstein et al. 2003), when people do not project their current tastes onto a later self, they might choose to consume sooner, rather than later, because the delayed benefit might not fit the future self’s taste as well as it fits the current self’s tastes.

The second variable captures an affective forecasting phenomenon where people view both positive and negative outcomes as less extreme the farther into the future these outcomes occur. This “future anhedonia” might cause people to consume benefits sooner, rather than later, when their positive qualities are more intense (Kassam et al. 2008).

The third variable, time perception, has been implicated by Zauberman et al. (forthcoming) as a partial explanation for hyperbolic discounting and for high discount rates in the near future. In this view, people may have stable discount rates of reasonable magnitude based on their *subjective*

perceptions of time. That is, the proportion of value retained over a given delay is linearly-related to the perceived the duration of the delay, rather than the actual duration. In this view, the documented effects of short-sightedness may be attributable to a perceptual bias in which near future time periods are perceived as longer in duration than equivalent but more distant time periods.

The fourth and fifth variables represent standard components of the multiple-selves self-control theories, which assume that the exercise self-control involves an impulsive agent who desires some reward but is over-ruled by the far-sighted agent. The reward responsiveness subscale of the Behavioral Activation Scale (Carver and White 1994) measures individual differences in the degree of desire, and the self-control subscale of the non-planning impulsiveness scale (Patton, Stanford, and Barratt 1995) measures individual differences in the ability to resist such temptations. People who score high in reward responsiveness may be more susceptible to factors that induce impulsivity in discounting tasks (Van den Bergh, DeWitte, and Warlop 2008), and non-planning impulsiveness has been linked to higher discount rates (Hinson, Jameson, and Whitney 2003).

These factors have been linked to people's relative valuations of the short-term and longer-term outcomes, as revealed by people's choices. We argue that psychological connectedness predicts intertemporal choice over and above these other contending variables, and it does so even in a context in which the idea of connectedness to the future self is not brought to mind by the study's procedure. So, Study 4 assesses the contribution of connectedness to patience relative to the influence of several other relevant psychological factors.

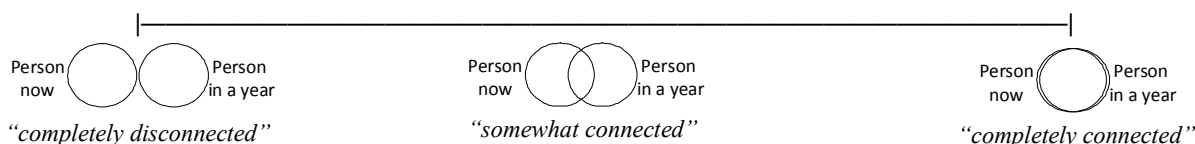
Participants. Ninety four undergraduates at a large Midwestern university participated in the first round of data collection, 57 of whom agreed to participate in the second round of data collection when re-contacted. Participants in the first survey were paid \$1 for their time, and those

who agreed to participate in the second survey participated in exchange for entry into a lottery for a \$50 gift certificate.

Materials and design.

First survey. Participants in Study 4 gave three sets of connectedness ratings. First, they were instructed to “think about the important characteristics that make you the person you are now—your personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, and ideals—and circle the one diagram out of the six below that best reflects your opinion about the degree of connectedness between your current and future selves, where no overlap means “completely different” and complete overlap means “exactly the same.”” As in Study 1, participants selected a pair of Euler circles to indicate perceived connectedness.

Next, participants were asked to think again about these identity-comprising properties and to give a similarity rating to indicate connectedness, where “0 means ‘completely different’ and 100 means ‘exactly the same’.” Finally, participants were asked to draw a mark on a line to rate connectedness, as below:



The use of multiple measurement procedures enabled us to limit the impact of elicitation method-specific biases. Participants were told that we would like to contact them later in the academic quarter to participate in a later study and were asked for their email addresses.

Second survey. Approximately three weeks later, we re-contacted our participants, offering them an opportunity to participate in a second round of data collection. Those who agreed were first presented with a titration task similar to the one used in Study 2. Specifically, they made choices between receiving a \$50 gift card for Amazon.com (if their survey was chosen) in a week, when the

drawing would be held, or to receive a larger-valued gift card in a year, using eight values (\$50, 58, 66, 74, 82, 90, 98, and 106). Next, they responded to items which measured (i) projection bias, (ii) future anhedonia, (iii) time perception, (iv) reward responsiveness, and (v) non-planning impulsiveness (see Appendix).

Results and Discussion

To measure the unique impact of psychological connectedness on discounting, for each participant, we *z*-transformed each of their three connectedness ratings (Euler circles, similarity rating, and line scale) and computed the average of these *z*-scores to arrive at an index of connectedness that yields high internal reliability (Cronbach's $\alpha = .906$). We used this index, along with the alternative variables, to predict people's discounting, as expressed in their choices of gift certificates. Notably, those who agreed to participate in the second survey did not differ in connectedness from those who declined (Mean composite *z*s = 0.00 and -0.02, $t < 1$).

As in previous studies, our measure of patience is simply the number of deferred, larger rewards chosen. Table 1 reports the results of simple correlations between patience and each of our predictor variables in the first column, and the results of a multiple regression fitting each predictor variable simultaneously in the next two columns.

Place table 1 about here

Our index of psychological connectedness in the first survey was significantly correlated with patience for receiving a gift card, as measured three weeks later. In addition, projection had a marginally significant effect, such that those who anticipated that their tastes would change exhibited less patience. None of the other measures had a significant correlation with patience in the gift card task.

More importantly, connectedness predicts patience even when controlling for other factors which have been shown, in other circumstances, to exert their own influences on patience. This finding is particularly striking, given that we measured each construct (connectedness and patience) uncontaminated by the other construct. Specifically, the measures of connectedness from the initial survey were elicited without intertemporal choices having already been made salient, and the measure of patience from choices in the second survey collected three weeks later was elicited without connectedness having been made salient in that survey. Thus, the fact that psychological connectedness remains a significant predictor of patience, even when all of the factors are entered in the regression simultaneously (model $R^2 = .20$), provides strong evidence for both the distinctiveness and pervasiveness of psychological connectedness as an explanation for discounting.

GENERAL DISCUSSION

The four studies described here show that people's beliefs about the stability of the important characteristics that determine their identity over an interval of time also determine the patience they exhibit over that interval. People who perceive relatively less connectedness to their future selves require a larger delay premium to wait for a gift card, are more likely to favor smaller-valued gift cards over larger-valued, delayed gift cards, are less willing to wait to buy a computer which declines in price, and discount the value of money more than people who feel highly connected to their later selves. Perceived connectedness, in turn, can be influenced by exposure to information regarding the variability of identity-comprising characteristics over time, by the ease with which reasons for expecting stability over time can be generated, and it was found that both manipulated and non-manipulated perceptions of connectedness exert an influence on intertemporal choice, even when connectedness is not brought to mind in the testing session. Moreover, in the last

study, connectedness was shown to be a unique, and in fact, the strongest and only reliable predictor of discounting compared to other temporal perception effects.

Taken together, these results shed light on a heretofore under-represented explanation of discounting, and one that is quite well-grounded theoretically (Parfit 1984): A powerful determinant of people's future-oriented preferences, plans, and behavior is the person they expect to be when outcomes are realized. When this later person is more closely connected to the current self in terms of important psychological properties, such as beliefs, values, and goals, the decision maker acts more patiently—that is, in a manner that reflects greater consideration of the later self's welfare.

To our knowledge, the current studies are the first to manipulate perceived connectedness to a later self and the first to assess the descriptive adequacy of this determinant of discounting against the adequacy of other determinants. It is important to note, however, that intertemporal choice and even the narrower domain of temporal discounting are likely to be multiply-determined (Berns, Laibson, and Loewenstein 2007). There have been some attempts to extend descriptive models such as hyperbolic (Ainslie 1975) and beta-delta discounting (Laibson 1997) to propose more fully integrative and interpretable models (Loewenstein and Prelec 1992; Killeen 2009), but because none of these models accommodate how inferences about continuity of self over time affect preference, none explicitly account for the effects we have demonstrated.

A model designed to capture our effects would need to incorporate a parameter which represents the degree of connectedness, such as the proportion of the defining characteristics of the current self's psychological make-up believed to persist in the future self at future points in time. This parameter would act as a constant by which discounted utility is scaled, representing the partiality towards more connected selves which we hypothesize and provide evidence for. Note that because perceived connectedness is reduced for an individual over time and over some major life-

changing events (Study 2), and individual differences in perceived connectedness exist (Study 4), such an approach would capture how perceived connectedness underlies both high and non-constant discount rates.

Our approach is distinct from other explanations of impatient choices. In our view, a person values future outcomes in proportion to how much she believes that the current self's important psychological characteristics will persist in the future self. In contrast, both the view of intertemporal choice as involving a "want" self and a "should" self (e.g. Milkman et al. forthcoming) and the temptation-based view of self-control (Hoch and Loewenstein 1991; Loewenstein 1996) describe the self as primarily divided by competing motivations rather than changes over time. Similarly, planner-doer models (O'Donoghue & Rabin 1999; Thaler and Shefrin 1981), posit selves with different roles, but the planner's attempts to constrain the doer arise from the difference in how they evaluate aggregate utility in the future, rather than the planner not valuing utility consumer by the doer or subsequent later selves. Furthermore, in Study 4, we also distinguished connectedness from a variety of other psychological factors which have been posited to affect the valuation of delayed outcomes.

The key distinction between these various views and our framework is between a failure to accurately evaluate and implement choices versus, in our view, simply allocating less to a future self that is seen, to varying degrees, as a continuation of the current self. By our account, allocating less utility to a less connected later self is not necessarily a mistake. Although ours are descriptive claims, we note that impatient behavior predicated on perceived lack of connectedness can be considered conditionally normative, depending on the accuracy of one's beliefs about connectedness with the later self (Parfit 1984). In the standard view, when people choose to maximize short-term goals at the expense of long-term goals, such behavior is generally branded a

“failure” of self-control. However, based on people’s regrets and pre-commitment choices, there is also evidence for hyperopia (Kivetz and Keinan 2006; Keinan and Kivetz 2008), the opposite self-control problem, in which people recognize the likelihood that in the future they may regret consistently choosing not to indulge. Thus, in viewing intertemporal dilemmas as an allocation problem between the current and future selves, the current self may well err by under-allocating to the future self (acting more impatiently than can be rationalized by diminution in connectedness) but, may in fact also err on the other side, by *over-allocating* to the future self.

Thinking more broadly of the full range of responses to self-control dilemmas, it is noteworthy that they are generally characterized by anticipating an upcoming desire not in keeping with longer-term utility and then using some means to forestall acting on that desire (Hoch and Loewenstein 1991). Such methods, including counteractive self-control, rationing, pre-commitment and side bets, are a means to counter inconsistent preferences (i.e. non-constant discount rates), but will never be accessed in reaction to consistently high impatience (i.e. high discount rates). From this vantage point, our findings that manipulating connectedness directly impacts the patience exhibited in choices represents a completely different approach to resolving self-control dilemmas. Particularly in those contexts where people consistently fail to implement and maintain self-control techniques in advance of temptation (e.g., having a late night snack or three, or overspending or undersaving relative to budgetary allowances), simply engendering or maintaining a sense of connectedness to the future self can help resolve these dilemmas, yielding more far-sighted choices. Rather than employing guilt or complex incentive schemes pitting the interests of future and current selves against each other, simply fostering the sense that what matters most in defining us persists over time may represents a powerful means to help us persist in achieving important goals, including those that most help us maintain what defines us.

APPENDIX

MEASURES OF PROJECTION BIAS, FUTURE ANHEDONIA, AND TIME PERCEPTION IN STUDY 4 (LABELS DID NOT APPEAR FOR PARTICIPANTS)

Projection Bias:

Think about the person you expect to be in a year. How similar or different from your current preferences—your current likes and dislikes—do you think your future preferences will be one year from now (1 = same as now; 7 = completely different)

Future Anhedonia:

Suppose that you unexpectedly receive a \$20 check in the mail, either today or in a year. At the moment that you received it, would you be happier receiving it tomorrow, or would you be happier receiving it a year from now? (1 = much happier at the moment receiving it tomorrow; 7 = much happier at the moment receiving it in a year)

Time Perception:

How long do you consider the duration between today and 1 year from now? (Participants drew a line on a continuum with bookends labeled “very short” and “very long”).

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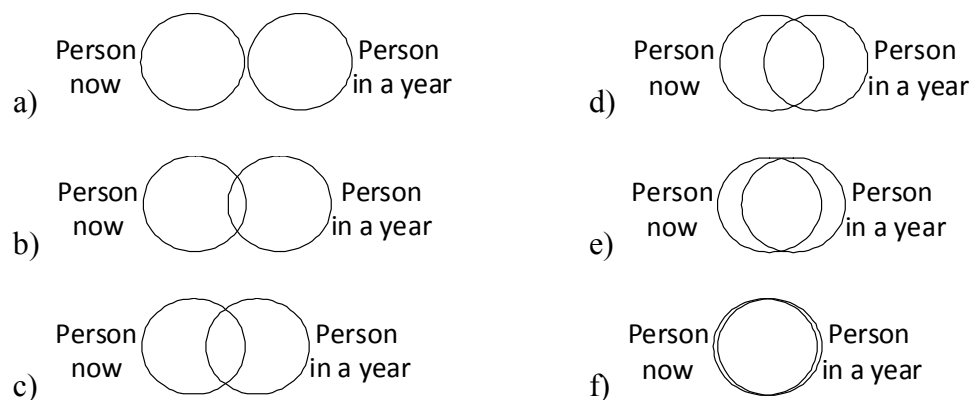
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FIGURE 1**MEASURE OF CONNECTEDNESS**

Note: Options (a) through (f) were presented to participants vertically.

TABLE 1:**EFFECT OF CONNECTEDNESS VS. ALTERNATIVE FACTORS ON DISCOUNTING**

Factor	<i>r</i>	<i>β</i>	S.E.
Connectedness	0.29**	0.78**	0.36
Projection Bias	-0.24*	-0.22	0.21
Future Anhedonia	0.13	0.22	0.19
Time Perception	-0.12	-0.01	0.01
Non-planning Impulsiveness	-0.13	-0.06	0.05
Reward Responsiveness	-0.17	-0.07	0.08
Constant	.	8.24***	2.66

*** $p < .01$, ** $p < .05$, * $p < .10$