Chapter 11

Time Perception and Retirement Saving: Lessons from Behavioral Decision Research

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Individuals often make financial decisions that are not in their long-term best interest. One highly consequential example is undersaving for retirement: people often delay initiating or increasing saving programs that they themselves believe would be beneficial. Indeed, undersaving due to delay in initiating saving or low contribution rates might only further increase in its magnitude as a result of the recent financial crisis, which decreased the value of saving accounts as well as the availability of perceived and actual 'slack' in households' income.

Work in behavioral decision research and behavioral economics has aimed at identifying the reasons for often poor financial decision-making, including low retirement saving rates, and what can be done through policy and by individuals themselves, to facilitate better long-term decisions (based on individuals' own stated preferences, as well as commonly accepted levels of what will be required at retirement). In this chapter, we do not provide a broad review or replicate material covered in other chapters, but rather we focus on the findings and implications of behavioral research, examining the underlying psychological processes for retirement saving (see also Lynch and Zauberman, 2006). In particular, we focus on two key cognitive mechanisms relevant to this problem. The first relates to how people represent outcomes (costs and benefits) in the near and distant future, building on resource slack theory (Zauberman and Lynch, 2005) and related research on mental representation (Trope and Liberman, 2003; Malkoc and Zauberman, 2006). The second focuses on a perceived time-based discounting model (e.g., Kim and Zauberman, 2009; Zauberman et al., 2009) and examines how people perceive the time horizon itself (i.e., anticipated duration) between the present and a future target date. In the following sections, we discuss key implications of these behavioral tendencies for (*a*) why people delay setting up and raising retirement contributions; and (*b*) possible strategies that might be used to overcome the tendency for delay.

Intertemporal choice research and retirement saving

The study of *intertemporal choice*, decisions that involve a tradeoff between costs and benefits at different points in time, examines behavioral regularities in how people actually make such decisions compared to normative discounting models, drawing from psychology, behavioral decision research, and behavioral economics. This extensive literature is relevant to public policy issues where individuals seem to heavily discount future consequences, and thus highly relevant for the study of retirement saving decisions.

In studying intertemporal preferences, researchers often measure individuals' discount rates for delayed future outcomes. For instance, participants in laboratory and field experiments are presented with a choice between smaller but immediate rewards and larger but delayed rewards, and they report the dollar amount making them indifferent between the immediate and delayed rewards. If someone is indifferent between $100 today and $110 in one year, for this person, the value of $100 in one year is discounted only by 10 percent for the one-year delay. But if another person is indifferent between $100 and $1,000 in one year, the person discounts the value of the same delayed $100 by 900 percent. The higher the measured level of discounting is, the greater that person discounts outcomes in the future (e.g., benefits from retirement saving). Thus, this basic measure of delay discounting has been heavily used and validated as a measure of impatience and impulsivity (e.g., Green et al., 1994).

This simple notion of temporal discounting is relevant to the issue of low saving rates in two general ways. First, *individual differences* in measured discount rates might reflect stable differences across individuals in their propensity to save for retirement. Consistent with real-world observations, many studies of delay-discounting tasks have reported wide individual difference in observed discount rates (e.g., Green et al., 1994; Kirby, 1997; Kirby et al., 2002; Frederick, 2005; Shamosh et al., 2008). For example, in a study by Kim and Zauberman (2009), some participants revealed no discounting, while some others revealed almost 400 percent discount rate for the same $75 monetary reward delayed by three months. While discount rates in these studies are measured for relatively short-term delays compared to the prolonged periods involved for retirement saving (e.g., twenty years), the implication for such decisions is straightforward. Individuals with high discount rates are less likely to save for their retirement, because any delayed pleasures that they may derive from their saving will be heavily discounted. That is, the more than $100 one can spend in the future by saving $100 today looks much less attractive than $100 one can spend right now. Of course, for this perspective to be at all relevant, these individual discounting propensities need to be stable over time and across

domain problems (e.g., retirement saving, healthy eating, etc.), and both of these aspects are controversial. Moreover, an individual difference approach, although it might point to a need for regulation, offers little in the way of behaviorally influencing individuals' decisions.

The second, and more central to our discussion, way in which intertemporal research might shed light on retirement saving decisions is that such decisions are *highly sensitive to changes in the decision context*. For example, the degree of discounting has been shown to vary depending on whether it is a gain or a loss, whether the amount is small or large, and whether the task is to delay a current amount or to expedite a future amount (for a review, see Frederick et al., 2002). But possibly most relevant for our discussion is the finding that peoples' tendency to discount delayed outcomes at different rates depends on when delay happens. Extensive empirical evidence shows that, in general, people discount delayed outcomes more heavily when the delay happens relatively soon (e.g., delaying consumption from today to tomorrow) than relatively far in the future (e.g., delaying consumption from 100 days later to 101 days later). That is, although the same outcome is delayed by the same time interval (e.g., one day), an outcome delayed one day from today is discounted at a higher discount rate than an outcome delayed one day from 100 days hence. This phenomenon, often labeled as *hyperbolic discounting*, is relevant to the undersaving problem by addressing why people plan to save in the future but do not do so when it comes to the time to save their income. Although, from today's perspective, saving a certain portion of your future income (or giving up a certain amount of future pleasure) seems reasonable, when that time approaches and individuals actually need to save, the cost of saving (or giving up a current pleasure) seems much larger than when it was originally envisioned because delaying immediate consumption is discounted more heavily than delaying consumptions in the future.

Behavioral determinants of temporal discounting

In order to be able to draw lessons from intertemporal choice research, one must isolate the relevant behavioral mechanism. Understanding the underlying processes that give rise to these behaviors can provide a more solid ground to build policy and interventions. Seeking to identify the psychological process, researchers initially focused on affective and visceral influences on myopic decisions. For instance, Loewenstein (1996) argued that some rewards are discounted more heavily than others, when those rewards satisfy visceral responses such as hunger, thirst, or sexual arousal. Once such states are activated, immediate consumption that satisfies one's immediate appetitive responses (or cravings) gets disproportionately higher

weight compared to all other delayed consumptions that do not, thus resulting in a hyperbola-like discounting for delayed consumption (Loewenstein, 1996). Multiple examples documented in the literature illustrate these effects. In one study, participants who would not envision themselves engaged in morally questionable sexual behavior, reported intention to do so when they were sexually aroused (Ariely and Loewenstein, 2006). Similarly, in the context of food consumption, participants chose more vices (e.g., chocolate cake) than virtues (e.g., fruit salad) when they lacked cognitive resources and when rewarding stimuli were more vivid (e.g., when faced with the actual presence of dessert vs a picture of it; Shiv and Fedorikhin, 1999). These results are in line with 'hot/cool' systems of delay of gratification (e.g., Metcalfe and Mischel, 1999), as well as with empirical demonstrations that substance abusers show high discount rates for delayed addictive substances as well as money (Kirby et al., 1999; Baker et al., 2003). Collectively, these results all point to the idea that, when visceral states are activated, people tend to ignore delayed future consequences.

While these affective/visceral processes are no doubt relevant to many real-life decisions such as smoking, impulse buying, or overeating, they may be less directly applicable to more calculated decisions, such as saving for retirement or taking out loans. We present later a more cognitive 'cold' set of processes that have received relatively less attention but that we believe might be helpful in the context of such individual decisions. Specifically, we propose two distinct cognitive processes explaining myopic financial decision-making, one centering on the *perception of delayed outcomes* per se (e.g., perception of slack or different mental representation of outcomes), and the other centering on the *perception of temporal distance to the outcomes* (e.g., perception of duration until the receipt of delayed outcomes).

Accounts based on time-dependent perceptions of outcome

Next, we focus on how perceptions of outcomes and resource slack in the near and distant future impact observed discount rates.

Resource slack theory

Zauberman and Lynch (2005) proposed the concept of perceived 'resource slack' to explain why different resources might be discounted at different rates. They defined resource slack as 'the perceived surplus of a given resource available to complete a focal task', and tested slack theory in the domains of time and money. They found that, on average, people

expect to have more time in the future, but this optimistic expectation was less pronounced for money, and as a result, people discount time investments more than money investments. Importantly, this greater discounting of time than money was observed only when people expected time (versus money) slack to grow more in the future. When people expected the opposite, however, they discounted future money more than future time. For example, when people expected a future raise, the perceived value of money was further discounted, resulting in a decrease in their saving. Note that this could be completely normative, but only when people's expectations are not biased, a condition that is often violated.

Beyond just different discount rates for time and money, resource slack theory also explains hyperbolic discounting and differential hyperbolic discounting for time versus money. Specifically, if individuals expect money at time t to be less than that at $t + n$, and the difference is greater when t is very near than when it is temporally more distant, they will discount delayed money at a different rate because of the differences in slack gain. This is especially true when people anticipate a raise in the future. Even though they plan to start saving a portion of their raise in the future, as the timing of the raise comes closer, any delayed consumption looks painful to them, and thus they will not be as likely to execute on their promise unless there is binding precommitment, which we will discuss further later.

Construal level theory

Construal level theory (Trope and Liberman, 2003; Liberman et al., 2007) provides a different cognitive account for how the representation of near and distant events can affect intertemporal preferences. Construal level theory argues that individuals represent events in the distant future at a relatively high level and events in the near future at a relatively low level. That is, for near events, people consider concretely the feasibility and the constraints of events, but for events in the distant future, they think more in terms of abstract thoughts and focus on the desirability of the same outcomes. For example, when asked to select assignments to be completed in the near-term, participants chose the less interesting assignment (a low desirability with high feasibility option), but when asked to choose for distant future, participants elect the more interesting but more difficult assignment (a high desirability with low feasibility option).

Construal level theory provides a cognitive reason for why people would discount hyperbolically. The pleasure in the future that one can receive by saving today is construed in a high level, but the duration over which one needs to forgo the pleasure by saving and the pleasure itself is construed in

a lower level. Therefore, when deciding whether to spend now, or save and delay the spending, the delay gets more weight, leading the individual to seek immediate pleasure rather than save. However, when considering saving in the future, the amount of pleasure gets more weight than the pain from delaying it; thus the individual is willing to save his/her income occurring in the future. As a direct test of this explanation for hyperbolic discounting, in line with construal level theory, Malkoc and Zauberman (2006) manipulated participants' level of construal such that abstract construal of delayed consumption became more concrete, which attenuated the degree of hyperbolic discounting, supporting the role of construal in myopic decisions.

Implications for saving

Hyperbolic, or inconsistent, discounters experience intertemporal conflicts between when they plan to save in the future and when that day approaches, and they actually have to follow up on their decisions. When individuals plan to save, the delayed benefits from saving (vs the opportunity costs of not spending) are discounted relatively little, so future saving looks attractive. But when the future becomes the present, and people must decide to save now, the cost of saving (or the pain from giving up consumption) now seems much larger than it seemed from a distance. For this reason, many behavioral economists have suggested precommitment as a remedy to this conflict between the current and future selves. That is, by getting people today to precommit to a desirable action in the future, they then prevent themselves from yielding to the temptation of spending, even when the desirable action is no longer perceived as desirable, but instead perceived as a cost.

Several findings from behavioral decision research account for the effectiveness of such precommitment devices in increasing saving rate. Construal level theory predicts that when people make saving decisions in the present, short-term costs and constraints loom large, but when they are given an option to precommit to save their future raise for retirement saving, the consequence is temporally distant, and as a result, benefits of saving gets more weight than its costs. The perspective of resource slack theory also predicts the success of such precommitment device. People commonly expect that their expenses always just match or fall below their financial resources, and if they are too cash-constrained today, it is quite likely that they are just as cash-constrained in the future (as they adjust for their new income levels). But because people feel that they will have more financial slack after getting a raise, they are willing to precommit to save in the future. Resource slack theory further predicts that participants in a

precommitment program would stick with the plan rather than opt out. The cost of opting out seems very small when one precommits several months before a raise is realized, but switching costs turn to be much more binding when the time arrives to incur them (Zauberman, 2003; Zauberman and Lynch, 2005). That is, when their raise arrives, people may wish to opt out, but they procrastinate doing so because they have to find the time.

Consistent with these predictions, the real-world application of a precommitment device, such as the trademarked plan 'Save More Tomorrow' by Thaler and Benartzi (2004), was shown to be very successful. In this plan, employees were provided with the option to precommit to save a portion of their future raises for retirement. This program resulted in a significant increase of employees' annual retirement saving rate from 3.5 percent to almost 14 percent in forty months (and they rarely opted out!).

Accounts based on perception of temporal distance

As discussed earlier, most studies of intertemporal decisions and related models have centered on changes in the perception of outcomes at different points in time. They tend to explain hyperbolic discounting by focusing on why individuals discount *the value of outcomes* per se at different rates. Recently, researchers have offered an alternative perspective, pointing to the importance of separating the effects of the perception of values from the effects of the *perception of delays* in temporal discounting (e.g., Read, 2001; Ebert and Prelec, 2007; Killeen, 2009; Kim and Zauberman, 2009; Zauberman et al., 2009). The argument is that when the two processes are separated, hyperbolic discounting can be simply explained by diminishing sensitivity to longer time horizons without making any assumption about the discounting of future outcomes per se. That is, if delays in the near future seem longer than delays in the far future, outcomes delayed in the near future will be discounted at a higher rate than outcomes delayed in the far future, resulting in hyperbolic discounting. To illustrate this point more concretely, Zauberman et al. (2009) present the following scenario: suppose an individual is indifferent among $100 today, $1,000 in one year, and $2,000 in three years. If his/her perception of time is unbiased (i.e., they perceive a three-year time horizon as three times longer than a one-year time horizon), the implied compound annual discount rate for this person is 230 percent for one year and 100 percent for three years, indicating present-biased preferences. This is the type of evidence most commonly reported for hyperbolic discounting (e.g., Thaler, 1981). Now, suppose that the above consumer has biased subjective time perceptions such that he/she perceives three years to be only 1.3 times longer than one

year (as opposed to three times longer). Keeping the discount rate constant and adjusting the time from three to 1.3 before computing the discount rate, a discount rate of 230 percent for both the one-year and three-year time horizons is obtained. In other words, the same set of preferences ($100 today = $1,000 in one year = $2,000 in three years) can be modeled as accurately by using a constant discount rate with respect to *subjective* time as by using declining discount rates with respect to *objective* time.

An empirical demonstration of this hypothesis was obtained by measuring participants' perception of various anticipatory time horizons (Kim and Zauberman, 2009; Zauberman et al., 2009). The authors found that nonlinear functions fit participants' subjective time estimates better than a linear function, confirming diminishing sensitivity to time. Furthermore, they found that annual compound discount rates calculated without considering participants' subjective time estimates were decreasing as a function of time (i.e., hyperbolic discounting), as commonly reported in past research. But when the subjective time estimates were accounted for, discount rates were no longer decreasing for most time horizons (i.e., rates were consistent with exponential discounting). These results imply that individuals who show diminishing sensitivity to time may behave *as if* they have decreasing discount rates, even if they have constant (i.e., exponential) discount rates over perceived time.

This perceived time-based account of discounting has important implications for undersaving in retirement. Even when people have the intent to save for retirement, if they subjectively perceive the retirement very far away from the present, then they are unlikely to start saving today. As a result, any remedies to correct their subjective time perceptions would help them to increase saving. In the following section, we discuss various strategies to alleviate undersaving.

Changing perceived time to retirement

If temporal discounting can be driven by how people perceive time, then interventions designed to change subjective perception of future time can be used as a strategy to increase saving rates. To illustrate the situational dependence of time perception, we present different factors and discuss their implications. Previous research shows that sexually arousing stimuli have been shown to induce steeping discounting of monetary rewards (Wilson and Daly, 2003; Van den Bergh et al., 2008). To test whether even the effects of visceral factors might affect discounting as driven by subjective time perception, Kim and Zauberman (2010) asked heterosexual male participants to rate the attractiveness of the female models taken from the Victoria's Secret online catalogue (vs neutral objects) and

measured their subjective time estimates for twelve anticipatory durations, ranging from one month to twenty-three months. They confirmed diminishing sensitivity to time horizons, regardless of whether participants rated models or neutral objects. Participants who were exposed to the sexually arousing images, however, perceived the same anticipatory durations to be longer compared to those who rated the neutral objects. They further showed that the impact of sexually arousing images on the changes in temporal discounting is due to the changes in time perception. That is, participants seeing the models revealed higher discount rates because they perceived the waiting time until the receipt of delayed rewards to be longer than those who rated neutral objects did.

While this finding that sexual cues influence temporal discounting by changing time perception is intriguing on its own and points to the important role of time perception in delay discounting, it is not directly applicable to the problem of undersaving for retirement. For financial decision-making for retirement, where spatial distance information often accompanies (i.e., people plan to move to a different place when they retire), more relevant context can be found in a recent study using space—time interdependence to influence discounting of monetary rewards. Specifically, Kim et al. (2010) investigated whether spatial distance to well-known retirement cities influences participants' subjective perception of time until their own retirement. They presented to participants a map of the United States where seven retirement cities were shown, and they were asked to memorize the locations of each city. About half of the participants were asked to imagine that they were going to live in Philadelphia until they retired and then would move to Gardnerville Ranchos (the long-distance condition), while the other half imagined moving to Cary (the short-distance condition) after they retired. When participants' subjective time estimates to their retirement were measured, those who imagined moving to Gardnerville Ranchos subjectively perceived the duration to retirement to be longer compared to those who imagined moving to Cary. These findings point to the important role of the context of the decisions, which can influence subjective perception of future time.

Research on how to shift decisions by changing time perception is only now emerging, and we can only speculate about its relevance for real money decisions. The potential implications, however, are intriguing. As the space manipulations earlier suggest, subtle changes in the message could alter how long or short a future event (retirement) might seem, thus changing the propensity to save. One possible extension is to draw on research on time perception of elapsed time that shows that manipulating 'markers' of time could shift how long or short a given duration seems (Zauberman et al., 2010). On the basis of this research, we would expect that when people think about many markers from now to retirement, they

will think about it as further away, compared to just thinking about the time until retirement.

Conclusion

This chapter provides a selective review of issues in intertemporal choice research and possible implications for retirement saving. We focus on two cognitive mechanisms explaining why the future is discounted: (*a*) changes in the perception of delayed outcomes due to changes in mental representations and perceived slack; and (*b*) changes in the perception of temporal distance to delayed outcomes.

Regarding the changes in the perception of delayed outcomes, we reviewed two theories of the cognitive underpinnings of discounting: resource slack theory and temporal construal theory. In both, the key implication for practitioners and policymakers trying to increase saving for retirement is to manipulate people's temporal perspective. If an action involves some mixture of costs and benefits, construal level theory suggests that costs will loom larger in the near term than in the more distant future. In the near term, the costs may outweigh the benefits, but when viewed from a greater temporal distance, the costs seem to fade away and the benefits remain. To induce a pattern of long-term desirable behavior, one must induce people to precommit to a decision at some point in the more distant future. If undersaving problems come from underweighting future costs, then the policy prescription is the opposite: induce people to make decisions about the future as if the consequences were coming into effect immediately. From the perspective of resource slack theory, people imagine having more money slack in the future than they actually earn, so they mispredict how much of their income they will save in the future.

The other perspective on temporal discounting focuses on changes in the perceived temporal distance to delayed outcomes. According to this perspective, factors leading people to perceive their retirement is far away are less likely to save today because delayed benefits from saving are discounted to the extent of how long or short they perceive the delay to be. Although we reviewed two of the most recent demonstration of these factors (arousal and spatial distance), there are likely other factors that potentially influence how long they perceive the time to retire. These factors can be utilized to increase saving rates in various educational and commercial settings.

In sum, we conclude that better understanding of how people perceive *delayed outcomes* and *temporal distance to the outcomes* is critical to understanding and suggesting prescriptions for problems of retirement undersaving. Future interventions and public policy analysis will benefit from paying

close attention to knowledge accumulated in this important area of behavioral research.

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