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# Consumer intertemporal preferences

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Consumers' intertemporal preferences have been studied across multiple theoretical and applied areas. This article outlines research showing that the context in which intertemporal preferences are expressed matters, as well as research exploring the mechanisms that account for these effects. These processes range from emotion-based to various cognitive-based accounts, and focus on the outcomes relevant to the choice, the future self, the perception of resources, and the perception of the time horizon relevant to the choice. The various mechanisms surveyed all tend to result in a heightened motivation for an immediate outcome, compared to a distant one. Understanding these mechanisms can yield better designed behavioral interventions that could increase farsighted consumer decision making and improve consumers' long-term well-being.

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Intertemporal choices range from the very simple to the complex, but all hinge on a tradeoff between a sooner outcome with lower value (e.g. \$10 tomorrow) and a later outcome with higher value (\$20 in a year). A wide range of consumer decisions share this basic temporal structure, such as whether to have a cookie for dessert or opt for the healthier but less tasty option; whether to purchase the more costly and efficient appliance or car that provides savings in the future; whether to spend money and time now to refinance a mortgage to a lower future interest rate, or even whether to impose a carbon tax now for future environmental benefit.

The literature on intertemporal preferences, across multiple academic disciplines, including economics, psychology, business, and public policy has grown extensively over the last 25 years. The amount of new research on

intertemporal choice is due to both the complexity of the psychological processes and the wide range of potential applications. Prior reviews have discussed how the time discounting literature in economics and psychology developed [1<sup>\*\*</sup>], models of intertemporal choice [2], and the psychological foundations of intertemporal decisions and their behavioral implications [3<sup>\*\*</sup>].

In this short review article we will therefore only provide an introduction to this vast literature, focusing on what motivates consumer patience or impatience. The main goal of the current article is primarily to introduce the reader to the psychological foundation of intertemporal decisions, and will be structured as follows: (a) a brief discussion of early work, mostly examining empirical regularities, followed by (b) a discussion key psychological processes that underlie these decisions.

## The nature of intertemporal preferences

In intertemporal decisions, people discount the value of an option, based on the delay to receive the option. The amount by which an option's value declines when it is delayed is captured by a discount rate. Early research on the behavioral aspects of intertemporal preferences has documented numerous 'anomalies', or violations of a normative standard — the discounted utility model [4]. In particular, the normative model assumes that the discount rate in intertemporal decisions is constant and does not depend on the source of utility (e.g. whether the now vs. later decision is about time, money, or food), since it is the utility that is being discounted. A great deal of evidence has been amassed showing that these assumptions are commonly violated [1<sup>\*\*</sup>,3<sup>\*\*</sup>].

The first notable empirical finding is impatience — individuals tend to forego larger future rewards in order to receive smaller rewards sooner, a behavior that has often been referred to as high rate of discounting. Researchers have also documented a great deal of heterogeneity across people and situations in their degree of patience. It is often unclear what constitutes a non-normatively high rate of discounting, and the prevailing monetary market rates are often used as a basis of comparison. However, other normative factors such as risk, low liquidity and short-term opportunity costs may also contribute to high discount rates.

Researchers have also documented that intertemporal preferences are highly context dependent. For example, the empirical discount rate is higher for short delays than longer delays, higher for smaller amounts than larger amounts, higher for gains than for losses [5], higher when

delaying a current amount than when expediting a future amount [6,7], higher when expressed in terms of delays rather than dates (e.g. on March 1st vs. in 6 months) [8,9], and is often different for different resources (e.g. higher for future time than future money [10<sup>••</sup>]).

The empirical regularity that has received the most attention is the sensitivity of discount rates for a given delay to when that delay will occur. A large literature has demonstrated higher (annualized) discounting for delays of immediate outcomes than for the same delay of a future outcome. That is, while people often require more to delay for one year than one month, the annualized (or per day) rate will typically be higher for shorter than longer periods. For example, Thaler [5] found median discounting over a set of values to be 345% over a one-month delay, 120% over a one-year delay, and only 19% over a 10-year delay. The implication of this sensitivity of discounting to time horizons is that preferences are time inconsistent, which would then result in preference reversals [11<sup>•</sup>]. For instance, a person who prefers \$1 today over \$2 in a week might nevertheless prefer \$2 in a year and one week over \$1 in a year. This tendency for higher discounting of present delays is often referred to as ‘hyperbolic discounting,’ ‘declining impatience,’ or ‘present bias’.

### Psychological determinants of intertemporal choice

The early work documenting empirical regularities and violations of normativity provided an important step in our understanding of how people make intertemporal tradeoffs, but the psychological factors underlying time preferences were not of primary interest. More recently, research has shifted toward a more systematic study of the psychological determinants of intertemporal preferences.

It is important to note upfront that intertemporal preferences are complex and no single psychological mechanism could possibly explain all situations. Still, understanding the psychological underpinnings may result in a better understanding of intertemporal preferences and behavioral interventions that would influence preferences.

**Emotional accounts.** George Ainslie [11<sup>•</sup>] noted the central role of impulsivity in intertemporal decisions. Loewenstein [12] argued that visceral factors, especially drive states (e.g. hunger), have a significant influence on intertemporal decisions, in particular because people often do not anticipate the influence of these factors on their decisions. Stimuli that are associated with such factors and can thus satisfy the particular state of deprivation (such as water when thirsty, etc.) are most likely to display impulsive preferences that are difficult to anticipate. In line with this affect based mechanism, Shiv and Fedorikhin [13] present evidence that the preference for an

affect-rich chocolate cake (with immediate benefits of taste) versus a more affect-poor fruit salad (with long-term benefits of health) increases when cognitive resources are low (e.g. under cognitive load), reducing people’s ability to override impulsive tendencies. However, there is also evidence that the discounting of visceral rewards over short experienced delays, where impulsivity is likely to play the largest role, represents a different type of discounting, distinct from prospective discounting of future monetary rewards [14]. Differences in emotional states may also directly impact discounting, such as sad people being more impatient [15].

**Goal proximity.** Intertemporal choices may also represent a conflict between competing goals. Consistent with this possibility, Urminsky and Kivetz [16] document a ‘mere token’ effect, in which providing perceived progress on the immediacy goal (i.e. adding a small immediate amount to both the sooner-smaller and later-larger options) increases the later-goal motivation (choices of the later-larger option), particularly when choice conflict is high. More broadly, the preference for immediacy in time discounting parallels the goal gradient in motivation, in which nearer outcomes are more motivating [17,18<sup>••</sup>]. While some goal gradient results could be explained by discount rates, Urminsky and Goswami [19] independently manipulate goal completion and reward timing, and find evidence that goal gradient effects may contribute to elicited time discounting.

**Connectedness.** Intertemporal choices involve a tradeoff between costs and benefits to the present and future self. Parfit [20] argued that people who see their present and future selves as the same person should normatively weight delayed outcomes more highly than if they see the future self as fundamentally different, almost like another person. Recent empirical research suggests that the degree of psychological ‘connectedness’ people have with their future self (i.e. the perceived stability of their identity [21]) relates to their motivation to forego immediate consumption and benefit the future self [22<sup>•</sup>,23<sup>••</sup>]. Neural-activation approximations of connectedness correlate with discount rates [24], and people who have been made to feel more connected to their future selves exhibit lower discount rates [23<sup>••</sup>].

Differences in perceived connectedness over time can also help explain hyperbolic discounting [22<sup>•</sup>], as both patience and connectedness to the future self decline more over time from the present than from a future starting point.

**Mental representation.** The way in which options are mentally represented seems to play a key role in intertemporal choices. Construal Level Theory [25] argues that evaluations of the near future are more concrete, whereas the evaluations of future outcomes are more

abstract. The level of representation can then affect intertemporal preferences, as abstract mental construal leads to greater ability to compare non-alignable differences [26], to more self-control [27] and less present-bias [10<sup>••</sup>,28]. Malkoc and Zauberan [10<sup>••</sup>] also demonstrated that the greater concreteness of outcomes in the near future, compared to the distant future, contributes to higher discounting in delay versus expedite decisions. When considering whether to delay a DVD available today, the reduction in enjoyment from watching it later is more vivid than the gain in enjoyment when considering whether to expedite the receipt of a DVD originally expected next month [28]. These differences in representations are malleable, and mentally simulating future outcomes moderates the standard temporal construal effects by changing the weight of the different attributes [29].

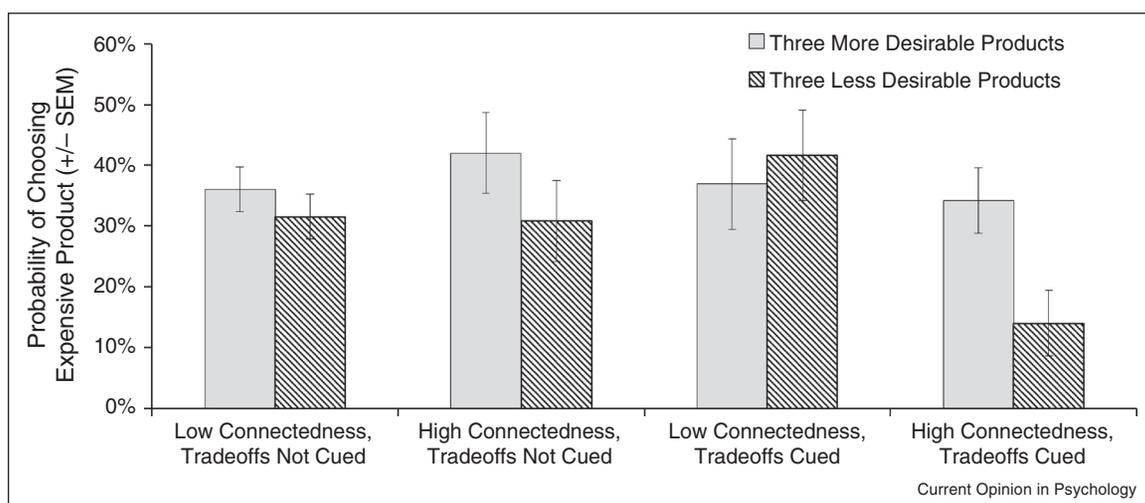
**Opportunity costs.** In those intertemporal decisions where the tradeoff is implicit (e.g. whether or not to purchase, which trades-off spending money now vs. saving for the future), people may also have an incomplete representation, and fail to appreciate the more remote future consequences of their choices, contributing to present bias. Recent research has shown that people often fail to take into account unspecified opportunity costs of their decisions [30,31], and both connectedness to the future self and discount rates better predict consumer spending choices when opportunity costs are made salient [32<sup>•</sup>], see Figure 1. Zauberan [33] shows that the failure to consider future switching costs is also associated with consumer lock-in. That is, a consumer buys boots at Zappos.com, without realizing that the next time they buy a pair it will be easier to go back there, compared to

the competition. This future effort is being discounted, making them subsequently more likely to go back to Zappos.com than they had initially anticipated.

**Resource slack.** More broadly, Slack Theory [10<sup>••</sup>] argues that the perceived level of available resources, or ‘slack’, influences intertemporal preference. Slack is ‘the perceived surplus of a given resource available to complete a focal task without causing failure to achieve goals associated with competing uses of the same resource’ [10<sup>••</sup>]. For example, Zauberan and Lynch [10<sup>••</sup>] show that intertemporal preferences, including overall discount rates, the extent of hyperbolic discounting, and differences in discounting between resources (i.e. time and money) can be explained by differences in perceived slack over time. They show that because people generally believe that they will have more slack in the future (e.g. I expect to be much less busy in 3 months than I am now), and because the perceived increase in slack is greater for time than for money (how much more free time I will have in 3 months shows more growth than how much more money I expect to have in 3 months), people also tend to discount time more than money. This theory also predicts that people will show negative time discounting, preferring to complete a task or take on an expense now rather than later, when they expect less slack in the future than the present.

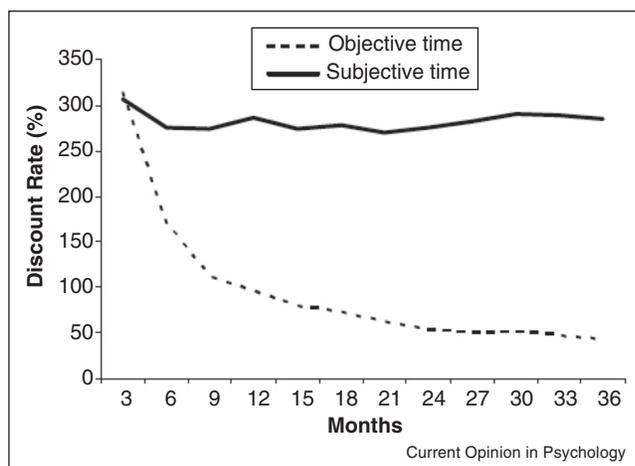
**Time perception.** While the cognitive mechanisms mentioned so far have centered on how people perceive the value of alternatives, recent work has started to explore the role of how the time horizon (delay) itself is perceived and considered. The role of time in intertemporal decisions could be conceptualized in terms of the weight

Figure 1



Joint effect of connectedness and opportunity cost salience (rank first = high; choose first = low) on price sensitivity (choosing the more expensive option). People are most likely to prioritize saving over spending when they are connected to the future self, thinking about tradeoffs, and making choices about less strongly desired products.

Figure 2



The rate of discounting calculated based on objective and subjective time. The figure shows classic hyperbolic discounting with respect to objective time, but a near-constant rate of discounting with respect to subjective time.

given to the time delay versus the value being delayed [34,35], as well as the way in which time is actually subjectively perceived [36<sup>••</sup>,37,38].

Zauberman *et al.* [36<sup>••</sup>] empirically demonstrated that people's perception of future time durations follows a standard nonlinear psychophysical function rather than a linear mapping to calendar time, which can account for observed hyperbolic discounting (see Figure 2). Furthermore, those individuals who perceived a given future duration as longer discounted outcomes over that duration more steeply, compared to those who perceived the delay as shorter [37].

Factors that change the perceived length of a given delay also have been found to change the level of discounting over the same duration. Zauberman *et al.* [36<sup>••</sup>] found that asking people to judge expected durations of various tasks (e.g. learning a new language, or painting a house), makes people more sensitive to time and more linear in their perceptions, and they therefore show less hyperbolic discounting. Kim *et al.* [37] applied the relationship between spatial distance and temporal distance, where people judge a given delay to be longer when it is associated with a longer spatial distance than a shorter one (e.g. a far-away vs. nearby location). They then showed that the subjectively longer time judgments are associated with more discounting. Following a similar logic, Kim and Zauberman [39] showed that because individuals perceive a given future time duration to be longer when they are exposed to sexual cues, they were more impatient for immediate monetary rewards when sexually aroused. In sum, these findings establish that the way people perceive future time itself is an important

factor in how they form their intertemporal preferences (for brain imaging evidence, see Cooper *et al.* [40]).

## Conclusions

Gaining a better understanding how people form intertemporal preferences has been of great interest across multiple theoretical and applied areas because of its direct relevance to a wide range of real-world behaviors. Prior research has found that intertemporal preferences relate to people's savings behaviors [41<sup>•</sup>,42], consumer self-control and purchase decisions [32<sup>•</sup>,43–45], employment decisions [46], educational investment [47,48], energy conservation [49], and health behaviors and outcomes [50–52] (see Urminsky and Zauberman [3<sup>••</sup>] for a full integrative review).

This article provided a brief overview of the underlying psychological mechanisms that drive intertemporal preferences. The mechanisms outlined range from emotion-based to cognitive, and relate to the decision context, mental representations, how people think about their future self and their goals, the perception of resources and outcomes, and the perception of the time horizon relevant to the choice.

While intertemporal preferences are inherently multiply determined, a great deal of progress has been made in recent years in understanding the processes involved in intertemporal decisions. What is common across the various factors influencing intertemporal preferences is that all these mechanisms influence the relative attractiveness of achieving a present goal compared to a later more distant one.

Further research is needed to better understand how these different mechanisms interact in shaping intertemporal preferences, as well as the mapping between time preferences and how people make relevant real-world decisions [53<sup>•</sup>]. While key pieces of the puzzle have been identified, much work remains to develop a comprehensive theory that will enable us to predict under what conditions people will be most likely to make farsighted choices, in their long-term self-interest. This will result in better-designed behavioral interventions that could improve consumer decision making and well-being.

## Conflict of interest statement

Nothing declared.

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