

Impatience and savoring versus dread: Asymmetries in anticipation explain consumer time preferences for positive versus negative events

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Abstract

For positive experiences (e.g., when to eat a snack) consumers generally prefer to have them immediately, and for negative experiences (e.g., when to pay a bill) consumers often prefer to delay. Yet, across three studies (plus twelve supplemental studies) we find that anticipatory feelings push in the opposite direction, and do so differently for positive versus negative events, leading to different time preferences: the desire for immediate positives is stronger than the desire to delay negatives. For negative events, anticipatory utility is strongly negative, reducing the desire to delay bad things (i.e., consumers want to “get it over with” to minimize the psychological discomfort), but for positive events, overall anticipatory utility is weakly positive, and therefore does little to reduce consumers’ desire to expedite good things. This anticipatory asymmetry happens because when consumers think about a future *positive* event, they both enjoy imagining it (savoring) while simultaneously disliking the feeling of waiting for it (impatience), but when consumers think about a *negative* event, they both dislike imagining it (dread) and dislike the feeling of waiting for it. We demonstrate the managerial implications of these findings in a pair of field studies using online advertisements for retirement planning.

Keywords: intertemporal choice, delay discounting, framing, affect

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Consumers constantly make choices about what to do or have now, and what to put off until later. For example, when to have a nice dinner out? When to schedule a dentist appointment? One of the biggest intertemporal choices concern retirement: how much income should consumers put away now to enjoy larger benefits in retirement? Often, consumers are short-sighted, “temporally discounting” the future and overly-prioritizing immediate needs and wants (Frederick & Loewenstein, 2008; Frederick, Loewenstein, & O'Donoghue, 2002; Lynch & Zauberman, 2006). In other words, consumers often want to have good things now, and to put bad things off until later, even at a cost to their long-term wellbeing. How can marketers counteract this tendency, and motivate consumers to care more about the future? For example, how can marketers more effectively advertise retirement planning and investment services?

The prototypical retirement advertisement features an older couple on a tropical beach enjoying a sunset. This type of advertisement attempts to use pleasurable anticipation to motivate consumers to set aside immediate income for future benefits. However, retirement budgets can alternatively be framed in terms of expenses: perhaps consumers who are worried about retirement expenses would be motivated to take care of those expenses today. Which messaging strategy is likely to be more effective to motivate consumers? Savoring of future retirement benefits, or dread of future retirement expenses? In this paper, we argue for the latter. We propose that the overall anticipatory utility for negative events is stronger than the anticipatory utility for equivalent positive events, and that this asymmetry in anticipation translates into differences in consumer time preferences and choices.

In this introduction, we first review the literature on consumer time preferences for positive versus negative events. Next, we introduce two major process theories of intertemporal choice for positive versus negative events: *anticipation asymmetry* and *subjective magnitude*. Subsequently, we detail our hypotheses and reasoning for each theory. We close the introduction with an overview of our empirical studies and findings.

Intertemporal choice for positive versus negative events

From a rational economic perspective, consumers should have equivalent temporal preferences for positive and negative events; they should generally prefer to have good things now, and put bad things off until later. Put another way, temporal “discount rates” should be the same for positives and negatives. Indeed, many factors have symmetric impacts on positives and negatives. For example, the uncertainty that a future event will happen provides as strong a reason to postpone something negative as to accelerate something positive. Similarly, the interest lost by delaying a \$100 reward for a year is equivalent to the interest gained by delaying a \$100 loss, and the more that a consumer is connected to their future self, the more they should care about both obtaining future rewards and avoiding future problems (Zhang & Aggarwal, 2015). Thus, consumers want to have good things now, and bad things later.

Despite these rational reasons for symmetry, lab studies of intertemporal choice typically find that the desire to have good things immediately is much stronger than the desire to postpone negative outcomes (Hardisty & Weber, 2009; Mischel, Grusec, & Masters, 1969; Thaler, 1981). Put another way, discount rates for positive events are much higher than discount rates for negative events. For example, one study found annualized discount rates for gains in the range of 30%, and discount rates for losses in the range of 6%, for both financial and environmental outcomes (Hardisty & Weber, 2009). This difference in time preferences for positives versus

negatives has been called the “sign effect”. Though the sign effect is quite robust, the reasons for it are not well understood. Perhaps as a result, the dominant formal models of intertemporal choice do not address differences in discounting between positives and negatives (though see Loewenstein & Prelec, 1992; Scholten & Read, 2010). This is a major oversight, given that identical outcomes can be framed as positive or negative events merely by changing the reference point (e.g., energy savings vs energy costs, or time gained vs lost).

Two theories explaining the sign effect

In the present research, we test two different explanations for the sign effect: *anticipation asymmetry* and *subjective magnitude*. The first theory, anticipation asymmetry, is grounded in the idea that anticipation pushes against our natural tendency to want good things now and bad things later (Loewenstein, 1987). For example, research on dread (Berns et al., 2006; Harris, 2010; Story et al., 2013) has found that consumers’ natural tendency to delay bad things is mitigated somewhat by negative anticipation; people sometimes choose to “get it over with” to avoid worry. However, the opposite may not be true for positives. Thus, according to this theory, the desire to postpone negatives is weaker than the desire to accelerate positives because the overall anticipatory utility of negatives is stronger than the overall anticipatory utility of positives. In other words: while people have a natural impulse to postpone a negative experience (such as paying a bill), the desire to minimize dread pushes in the opposite direction, leading a moderate preference to delay negatives, yet the impulse to receive positive experiences (such as a package in the mail) as soon as possible is barely influenced by overall anticipatory feelings, resulting in a strong preference to receive the reward immediately.

The second theory, subjective magnitude (also sometimes called “loss aversion” or “negativity bias”) is elegant: we know that consumers weigh negative events roughly twice as

much as positive events (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Kahneman & Tversky, 1979; Rozin & Royzman, 2001), and that consumers are more “patient” for larger magnitude events (Kirby, 1997; Thaler, 1981), therefore consumers are more patient for negative events than positive events. (In the language of intertemporal choice: the combination of “loss aversion” and the “magnitude effect” logically yields the “sign effect.”)

Here, we define “subjective magnitude” as the predicted value of experiencing an event, which tends to be greater for negative events than positive events (Baumeister et al., 2001). Many researchers loosely use the phrase “loss aversion” to mean the same thing, but formally loss aversion is about the predicted experience of *losses* and *gains* (more narrowly) with respect to a reference point (Kahneman & Tversky, 1979). The sign effect in intertemporal choice is about *negative* and *positive* events (more broadly), hence we use the term “subjective magnitude”. To illustrate: eating a vomit-flavored jellybean is not a *loss* per se, so it would not be subject to loss aversion, strictly speaking. Rather, it is a *negative* experience that would be predicted to be quite intense, as compared with, say, eating a watermelon flavored jellybean. In other words, the prospect of eating the vomit-flavored jellybean might be larger in “subjective magnitude” than the prospect of eating the watermelon-flavored jellybean.

The elegance and simplicity of the subjective magnitude theory has led to its inclusion in several formal models of intertemporal choice (al-Nowaihi & Dhami, 2009; Baucells & Bellezza, 2016; Loewenstein & Prelec, 1992). However, intuitively it feels wrong: if a negative event is quite strong, wouldn’t consumers want to push it away into the future, thus leading to *higher* (rather than lower) discount rates for losses? Indeed, research on the magnitude effect with losses has found that larger losses are more likely to be postponed (Hardisty, Appelt, & Weber, 2013).

In this paper, we present three studies (plus an additional twelve studies reported in the Methodological Details Appendix) that support the anticipation asymmetry explanation of the sign effect, and fail to support the subjective magnitude explanation. In the sections below, we lay out the reasoning behind our theory and hypotheses.

Anticipation utility of positive versus negative events

The language for discussing the feelings that accompany waiting is impoverished and often ambiguous. We will use the term *overall anticipatory utility* to indicate the overall level of pleasure (and/or pain) experienced while thinking about a future event. Anticipatory utility comes in many varieties (Baucells & Bellezza, 2016; Baumeister, Vohs, Nathan DeWall, & Zhang, 2007; Bilgin & LeBoeuf, 2010). *Positive* anticipation of future positive events (e.g., the pleasurable imagination of a future vacation) has sometimes been called *savoring* (Chun, Diehl, & MacInnis, 2017; Loewenstein, 1987). In contrast, *negative* anticipation utility for a positive event is properly called *impatience*, a negative feeling of waiting (e.g., waiting for a package from Amazon.com to arrive in the mail). This highlights an ambiguity in previous literature: “impatience” has been used to describe both 1) the negative anticipatory *feeling* of waiting for a positive event (DeVoe & House, 2012), and also 2) the *choice* of a smaller, sooner gain over a larger, later gain, or the choice of a larger, later loss over a smaller, sooner loss (Bartels & Urminsky, 2011; Shaddy & Lee, 2020; Yoon, 2020), regardless of the underlying process. In this paper, whenever we use the term “impatience”, we are always referring to the former usage: the psychological state of the consumer. Turning to the anticipation of negative events, the term *dread* has been used to refer to the negative experience of imaging a future negative event (e.g., thinking about a future visit to the dentist, Harris, 2010; Story et al., 2013). Finally, as for the *positive* anticipation of *negative* future events, we suspect that deriving pleasure from

anticipating future negative events is extremely rare, and, correspondingly, know of no term for it in the literature. One possibility would be *relief* that a problem does not have to be dealt with until later (Sweeny & Vohs, 2012). Conversely, the negative feeling of waiting for a negative event (Hardisty et al., 2013) might also be called impatience. Taken together, these language conventions suggest that when people anticipate future positive events, they experience both positive and negative feelings (savoring and impatience), leading to weak overall anticipatory utility, but when people contemplate future negative events, they only experience negative feelings (dread and impatience), leading to strongly negative anticipatory utility.

Comparisons of anticipatory feelings and time preferences for positive and negative events are rare (though see Elster & Loewenstein, 1992; Molouki, Hardisty, & Caruso, 2019). Indeed, to our knowledge, the only previously conducted empirical comparisons are work by Loewenstein (1987) which compared movie star kisses with electric shocks and work by Lovallo and Kahneman (2000) which compared time preferences for learning the outcome of different uncertain financial prospects. Neither of these papers attempted to measure anticipatory utility directly, but rather inferred it from other responses; for example, Loewenstein (1987) measured willingness-to-pay and reported that delaying a kiss from a movie star three days increased its value, while delaying an electric shock increased its disvalue. He attributed this to the pleasures (and pains) of anticipation. However, this 3-day kiss result was not a statistically significant increase (in the original paper), and we ran replication studies that similarly found no increase (see the Methodological Details Appendix). A subsequent paper by Lovallo and Kahneman (2000) measured willingness to delay the resolution of uncertain gambles involving positives and negatives. They found that people were generally more willing to delay gambles that were more attractive, and inferred that this is driven by greater anticipatory utility for the more attractive

gambles. However, similar to the Loewenstein (1987) results, the desire to delay positives was weak (and was never statistically greater than zero). In contrast, the desire to resolve (uncertain) negatives sooner was quite strong. Likewise, several other studies have documented the power of dread (Harris, 2010; Story et al., 2013; Yates & Watts, 1975). Thus, these previous studies on time preferences suggest that overall anticipatory utility of positive events may be weaker or less reliable than negative anticipatory utility of negative events. Formally, we hypothesize:

H1: Overall anticipatory utility for negative events is stronger than overall anticipatory utility for positive events.

By “stronger”, we mean larger in absolute value. For example, if overall anticipatory utility of a future positive event is weakly positive, and overall anticipatory utility of a negative event is strongly negative, we say that the negative is “stronger” than the positive.

Why might overall anticipatory utility be stronger for negatives than for positives?

Previous consumer research on the anticipation of positives has found that the overall anticipatory utility of positives is comprised of two key components: the *positive* utility of anticipating a pleasant consumption experience, which we call savoring, and the *negative* utility of the wait itself (Nowlis, Mandel, & McCabe, 2004), which we call impatience. This observation matches introspection: when we think about a package arriving in the mail, we both enjoy and simultaneously dislike anticipating it. We enjoy the feeling of savoring future events and dislike the impatience of waiting, resulting in an overall anticipation utility that is near zero or weakly positive.

For negative events, we dislike the feelings of anticipating the future event (dread) *and* also dislike the feeling of waiting for it (in some ways, we also feel “impatient” for negative events, hating the waiting). Thus, these two components combine to create strongly negative

overall anticipatory utility. In this way, anticipation of negatives is both quantitatively stronger overall than anticipation of positives, and qualitatively different (with both positive and negative anticipatory feelings for future positive events, and two negative anticipatory feelings for future negative events). In summary, the overall difference in anticipatory utility of positive versus negative events is explained by the following:

H2: While anticipation of positive events involves positive feelings of savoring *but* also negative feelings about waiting, anticipation of negative events involves negative feelings of dread *and* negative feelings about waiting.

Anticipatory (dis)utility is not the only possible account of the results reported in previous studies of savoring and dread: for example, someone might want to delay a kiss from a movie star because he wants to brush his teeth and get a haircut, and not because he wants to expand the period of pleasurable anticipation. Therefore, it is preferable to measure anticipation utility (and its impact on time preferences) directly, and the efficacy of this method is supported by neuroimaging data. Berns and colleagues (2006) assessed the dread for electric shocks using both self-report and fMRI of brain activation during the period preceding them. As expected, those with stronger preferences for immediate shocks exhibited more activity in posterior elements of the cortical pain matrix, and self-reported greater “anticipatory anxiety”. More recently, Harris (2010) found that this operationalization of dread helps explain temporal preferences of various types of aversive experiences. These results demonstrate the validity of self-report measures of anticipatory utility, but are silent on comparisons of positive and negative events. Indeed, demonstrations of *positive* anticipatory utility of positive events are rare, and we are not aware of any previously conducted studies that directly study the effects of anticipation

on time preferences for positive versus negative events. This is a gap we address in the current research. Based on the literature and logic described above, we hypothesize:

H3: Overall anticipatory utility mediates the effect of sign on consumer time preferences.

Finally, we examine a common alternative explanation of the sign effect: differences the subjective magnitude of positive events versus negative events. Although the logic of the subjective magnitude account for the sign effect (described above) is elegant, empirical support has been lacking. Research on the magnitude effect has found that it is eliminated or reversed for negatives (Hardisty et al., 2013; Mitchell & Wilson, 2010), undercutting a key link in the logic of the subjective magnitude theory; if larger negatives are discounted *more* than smaller negatives, there is no reason why subjective magnitude should explain the sign effect (if anything, the opposite should be true).

Thus, we hypothesize that the subjective magnitude theory does *not* explain the sign effect. (Likewise, neither does loss aversion, a special case of subjective magnitude theory.)

H4: When controlling for the subjective magnitude of positives versus negatives, the anticipation asymmetry (H1) remains strong.

All together, these hypotheses and findings shed light on the psychological processes underlying the sign effect, and also hold important implications for managers, as we demonstrate in a pair of field studies.

Overview of Studies

Studies 1a and 1b employ real retirement planning advertisements and manipulate the presence (vs absence) of anticipatory messages, demonstrating their impact above and beyond mere positive versus negative framing. Study 2 employs a hypothetical scenario and demonstrates that financial negatives induce stronger anticipatory utility in consumers than

matched financial positives. Study 2 also demonstrates that this asymmetry in anticipatory utility mediates the aforementioned sign effect in consumer choice. Study 3 examines real hedonic experiences (positive and negative flavored jellybeans) in the lab, and finds that these asymmetries in anticipation and time preference persist even when the positive and negative events are matched in subjective value (in other words, even when experimentally controlling for negativity bias). Furthermore, Study 3 decomposes the measurement of overall anticipatory utility into separate questions about positive and negative feelings of anticipation and feelings of waiting. Thus, the measures of anticipation used in Study 3 are more nuanced than those used in Study 2. Study 3 finds that for future *positive* experiences, consumers enjoy feelings of anticipation and simultaneously dislike the feeling of waiting for them, while for negative experiences, consumers dislike both the feelings of anticipation and the feelings of waiting. Put together, these feelings predict time preferences and explain the sign effect. Additional Studies A1-A12 (reported in the Methodological Details Appendix) replicate the above findings with different methods and in different contexts.

Study 1: Anticipatory asymmetries influence consumer choice

Study overview

Retirement planning is an increasingly critical issue for consumers, especially with the advent of defined contribution plans and FinTech apps and websites. Advertisements for financial planning tools can focus on retirement benefits or expenses, and may or may not emphasize anticipation. Intuitively, the prototypical retirement planning advertisement might encourage consumers to enjoy looking forward to retirement benefits by showing an older couple on a tropical beach, for example. We systematically test whether it is indeed an effective advertising

strategy to focus on the anticipation of future benefits, or whether it might be more effective to focus on the (negative) anticipation of future expenses. Furthermore, we test the impact of emphasizing *anticipation* in the message, above and beyond mere positive versus negative framing of the issue. Based on our theory that overall anticipatory utility for positive events is weakly positive but overall anticipatory utility for negative events is strongly negative, we hypothesize that for retirement benefits, emphasizing anticipation will not substantially increase clicks on an advertisement, but for retirement expenses, emphasizing anticipation will increase clicks.

Using Facebook Ad Manager's Split Test capability (described below), we compared the effectiveness of four advertisements for a retirement calculator (provided by Vancity, a major Canadian credit union) in a 2 (sign: positive vs negative) x 2 (anticipation message: present vs absent) between-subjects design, with click-through-rate (CTR) as the dependent variable. We hypothesized that consumers would be more likely to click on the retirement planning advertisement if it focused on retirement expenses rather than retirement benefits, and that this difference (between negative and positive retirement finance frames) would be stronger when anticipation was emphasized.

Materials and methods

Facebook Ad Manager (which places advertisements on Facebook, Instagram, Messenger, and other places) has a Split Test feature, which enables marketers to compare the effectiveness of different messages (i.e., different "Creative") while holding all other factors (such as audience, placement and delivery settings) constant. Thus, this feature enables marketers to conduct experiments, or as Facebook.com calls them, "A/B Tests".

We created advertisements through Facebook Ads Manager with the following settings: split test on creative, 5-day test, age 19-64, location Canada (as the linked credit union was Canadian), language English, all devices, bid cap \$1, optimization: link clicks, bid strategy: lowest cost. These settings hold all elements constant except for the contents of the advertisement.

For statistical analyses, we used the number of people reached by each advertisement as the N . Therefore, if a person saw the same advertisement once or more than once, we treated these the same: as a single observation. We measured the number of clicks on each ad, and used the click-through-rate (CTR) as the key DV. We also examined the cost per click for each ad, which was determined by Facebook based on the effectiveness of each ad. The complete text of all experimental materials for all studies (including screenshots of all advertisements in Studies 1a and 1b) can be found in the Methodological Details Appendix.

In Study 1a, we budgeted \$10 per ad per day for five days (i.e., \$200 total budget for the study), and 28,146 consumers viewed one of the four ads: positive-control, positive-anticipation, negative-control, or negative anticipation (described below). All four advertisements had the following elements in common: an image of money, the name of our university research lab (as the ad sponsor), the name of the credit union, the words “Free retirement calculator” in bold and “[bank name]’s Retirement Planner Ca...” underneath, and a button that said “LEARN MORE”. At the top of the ad, the positive-control and positive-anticipation advertisements said “Start building your retirement benefits today!”, while the negative-control and negative-anticipation advertisements said “Start taking care of your retirement expenses today!”. The positive-anticipation advertisement added the text “Looking forward to your retirement benefits?” in large

font in the middle of the ad, while the negative-anticipation advertisement added the text “Worried about your retirement expenses?” in large font in the middle of the ad.

For Study 1b, we created another set of four advertisements on Facebook, using the same design and settings as Study 1a, but with a larger ad budget (\$25 per ad per day for 7 days). 90,076 consumers viewed one of the ads. All four advertisements had the following elements in common: an image of money, the name of our university research lab (as the ad sponsor), the name of the credit union, the words “Start planning your retirement today!” at the top of the ad, the words “Free retirement calculator” in bold and “[bank name]’s Retirement Planner Ca...” underneath, and a button that said “LEARN MORE”. The four ads varied in the large text presented on top of the image of money. The positive-control message read “Planning your retirement benefits?”, the negative-control message read “Planning your retirement expenses?”, the positive-anticipation message read “Savoring your retirement benefits?”, and the negative-anticipation message read “Dreading your retirement expenses?”.

Results

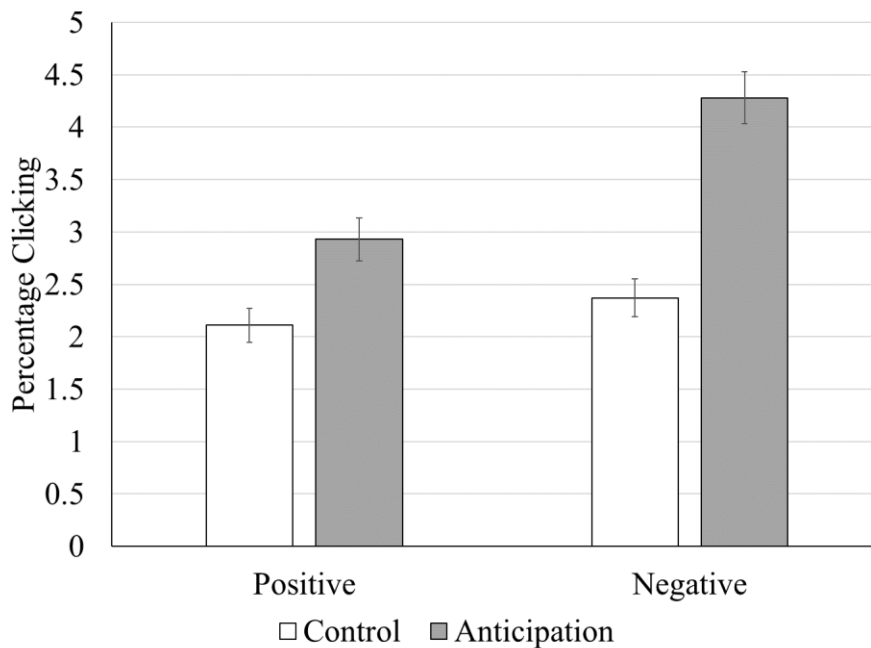
Study 1a

As shown in Figure 1a, the negative-anticipation advertisement performed the best. The click-through rate on the negative-anticipation advertisement was 4.28% ($n=6,640$), significantly higher than the positive-anticipation advertisement (CTR=2.93%, $n=6,790$), the negative-control advertisement (CTR=2.37%, $n=7,052$), and the positive-control advertisement (CTR=2.11%, $n=7,664$). A 2x2 logistic regression with contrast coding found a main effect of sign (positive vs negative), $b=-0.13$, $SE=0.04$, Wald $\chi^2(1)=12.13$, $p<.001$, a main effect of anticipation message (present vs absent), $b=0.24$, $SE=0.04$, Wald $\chi^2(1)=42.03$, $p<.001$, and a marginally significant

sign X anticipation interaction, $b=-0.07$, $SE=0.04$, Wald $\chi^2(1)=3.57$, $p=.06$. Follow-up pairwise comparisons revealed that the negative anticipation ad outperformed the positive anticipation ad, $b=-0.20$, $SE=0.05$, Wald $\chi^2(1)=17.35$, $p<.001$, as well as the other two ads, both $p<.001$. In contrast, when anticipation was not emphasized, there was no difference between the positive ad and the negative ad, $b=-0.06$, $SE=0.06$, Wald $\chi^2(1)=1.09$, $p=.30$.

Turning to cost-per-click, the negative anticipation ad (CPC=\$0.18) outperformed the positive anticipation ad (CPC=\$0.25), as well as the generic negative ad (CPC=\$0.30) and the generic positive ad (CPC=\$0.31).

Figure 1a. *Percentage clicking on each of the four advertisements in Study 1a. Error bars indicate +/- one standard error.*



Study 1b

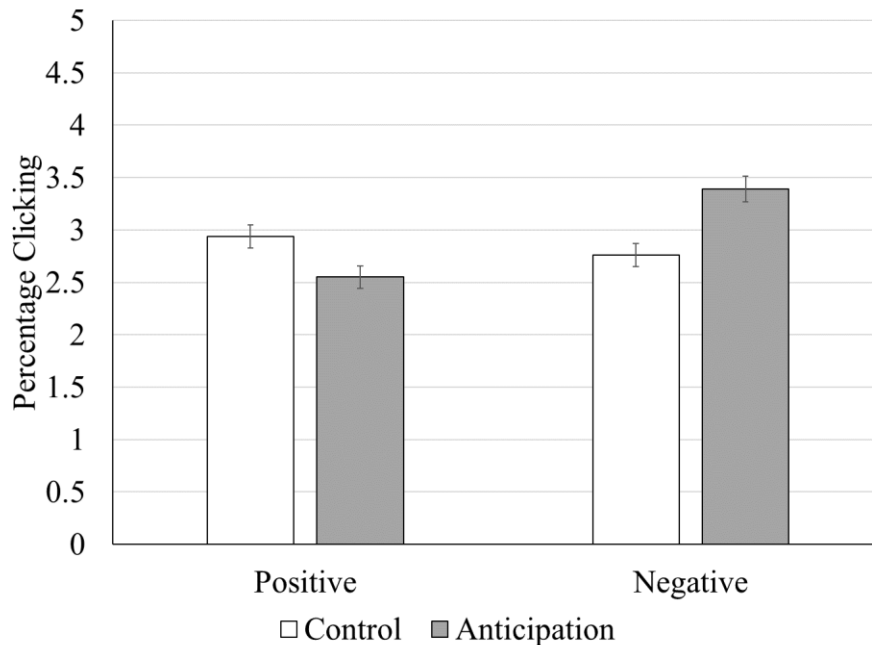
As shown in Figure 1b, the negative-anticipation advertisement performed the best. The click-through rate on the negatively framed, anticipation focused advertisement (CTR=3.39%, $n=21,840$) was the highest, outperforming the positively framed, anticipation focused

advertisement (CTR=2.55%, $n=22,576$), the negatively frame advertisement without the anticipation message (CTR=2.76%, $n=22,732$), and the positively framed advertisement without anticipation message (CTR=2.94%, $n=22,928$). A 2x2 logistic regression with contrast coding found a main effect of sign, $b=-0.06$, $SE=0.02$, Wald $\chi^2(1)=8.43$, $p<.01$, no main effect of anticipation message (vs control message), $b=0.02$, $SE=0.02$, Wald $\chi^2(1)=0.72$, $p=.40$, and a significant sign X anticipation interaction, $b=-0.09$, $SE=0.02$, Wald $\chi^2(1)=20.35$, $p<.001$. The interaction indicates that while the anticipation message improved CTR for the negatively-framed ad, it actually made the CTR worse for the positively-framed ad.

Follow-up pairwise comparisons revealed that the negative anticipation ad outperformed the positive anticipation ad, $b=0.15$, $SE=0.03$, Wald $\chi^2(1)=27.45$, $p<.001$, as well as the other two ads, both $p<.01$. In contrast, when anticipation was not emphasized, there was no difference between the positively framed ad and the negatively framed ad, $b=0.03$, $SE=0.03$, Wald $\chi^2(1)=1.29$, $p=.26$.

Turning to cost-per-click, the negative anticipation ad (CPC=\$0.24) outperformed the positive anticipation ad (CPC=\$0.30), as well as the generic negative ad (CPC=\$0.30) and the generic positive ad (CPC=\$0.26).

Figure 1b. *Percentage clicking on each of the four advertisements in Study 1b. Error bars indicate +/- one standard error.*



Discussion

In a pair of field studies measuring consumer interest in a retirement calculator, we found that an advertisement emphasizing the anticipation of future expenses was the most effective, outperforming all other advertisements. These studies provide causal evidence for the influence of anticipation utility, as well as the differential impact of anticipation utility when considering a negatively frame vs positively framed future event (retirement).

While these studies have excellent external validity and are useful to marketing managers, they do not control for subjective magnitude (i.e., a general negativity bias). In other words, it is possible that the negative anticipation advertisements were successful merely because they were more strongly negative (i.e., negative frame plus negative anticipation), rather than anything unique about the anticipation of future negative events. We address this in Study 2, by comparing costs and benefits of different magnitudes, and in Study 3, by individually titrating

the subjective value of positive versus negative experiences for each participant (so that the positive experiences are equal or more intense than the negative experiences).

Another important caveat to Studies 1a and 1b concerns the way in which Facebook structures the Split Test and optimizes advertisements; Facebook first splits the potential audience into an appropriate number of groups (for example, if comparing two advertisements, Facebook splits the audience into two groups), and then deploys one advertisement to each group. Through proprietary (black box) algorithms, Facebook optimizes each ad within each group, targeting it to those users who are most likely to click. Therefore, a Facebook Split Test of “advertisement A” versus “advertisement B” is really a test of “advertisement A plus optimization” versus “advertisement B plus optimization”. Therefore, if a particular advertisement performs better on the split test, it is unclear whether the advertisement performed better overall, or whether it optimized better (perhaps a particular consumer segment was identified that responded particularly well to the advertisement). Furthermore, the advertisements are “live” posts on Facebook.com and other platforms, which introduces endogeneity issues: users can “like”, comment, and share the advertisements as they are running, effectively changing the stimuli during the experiment. Therefore, while Facebook experiments offer superlative external validity (measuring naturalistic consumer behavior), the endogeneity issues mean that they should be combined with clean experimental methods (i.e., Studies 2 and 3) to establish causal mechanisms.

Study 2: Anticipation asymmetries explain the sign effect in consumer choice

Study Overview

In this study, participants imagined shopping for a pair of eye glasses, and deciding between two different pairs. One pair included a future rebate or an equivalent delayed payment plan, as a between-subjects manipulation. We hypothesized that the delayed payment would be more impactful than the delayed rebate (replicating previous work on the sign effect). We also hypothesized that people would feel worse about anticipating paying the future bill than they would feel good about anticipating receiving the future rebate check, and that this would mediate the impact of sign on choices. Finally, we hypothesized that these results would hold when controlling for the magnitude of gains and losses (i.e., when controlling for loss aversion and negativity bias) by comparing the small magnitude (\$15) payment with the larger magnitude (\$30) rebate.

Material and methods

The complete experimental materials of all studies are provided in the Methodological Details Appendix. Participants first completed a basic attention check (similar to Oppenheimer, Meyvis, & Davidenko, 2009), and were only permitted to take the survey if they passed the attention check. Next, all participants read the following scenario:

Imagine that you need to buy a new pair of glasses, and you have narrowed your choice down to two pairs, from two different brands. They are virtually identical in appearance and quality, but they offer different pricing plans.

Participants were randomly assigned to one of four conditions in a 2 (sign: positive vs negative) x 2 (magnitude: small vs large) between-subjects design. Participants in the large, positive condition next made the following choice:

Brand A costs \$122. Brand B includes a rebate. It costs \$142 now, but you would receive a \$30 rebate in the mail after one month. Which would you choose?

- *Brand A: pay \$122 now*
- *Brand B: pay \$142 now, and receive \$30 in one month*

Participants in the small magnitude condition saw the same scenario, but with all dollar amounts halved. Participants in the negative condition saw a normatively equivalent scenario, with \$30 in one month (or \$15 in one month in the small magnitude condition) subtracted from both options. Note, therefore, that the choice between Brand A and Brand B is normatively equivalent in the positive and negative conditions for a rational decision maker, because the same dollar amount is subtracted from both options in the positive condition to create the negative version. Thus, those in the large, negative condition faced the following choice:

Brand A includes a payment plan. It costs \$122 now, and you would pay an additional bill of \$30 after one month. Brand B costs \$142. Which would you choose?

- *Brand A: pay \$122 now, and pay \$30 in one month*
- *Brand B: pay \$142 now*

Next, all participants rated their feelings about the future rebate or bill included in Brand A or Brand B (as appropriate to their experimental condition) on several dimensions. First, they rated the experience utility of the future event, with the questions “Imagine [receiving a check for \$30] [paying a bill of \$30] in one month. Would experiencing this event be pleasurable or displeasurable?” (answering “Pleasurable experience” or “Displeasurable experience”) and “Imagine receiving a check for \$30 [paying a bill of \$30] in one month. How strongly would experiencing this event affect your feelings at that time?” (answering on a sliding scale labeled with 0=“Not at all”, 50=“Strongly” and 100=“Extremely”). The wording and scale design (unipolar scale rather than bipolar) follow the recommended practice for comparing gains and losses (McGraw, Larsen, Kahneman, & Schkade, 2010). Next, participants rated the anticipation

utility, with the parallel questions “Imagine expecting to receive a check for \$30 [pay a bill of \$30] in one month. If this event were one month away, would the **anticipation** be psychologically pleasurable or displeasurable? In other words, how would you feel **while waiting** for it?” (answering “Like the feeling of waiting” or “Dislike the feeling of waiting”) and “Imagine expecting to receive a check for \$30 [pay a bill of \$30] in one month. How strongly would **anticipating** this event affect your feelings **while waiting** for the event?” (0=“Not at all”, 50=“Strongly” and 100=“Extremely”). Finally, participants completed demographics.

Results

Choices

In both the “positive” condition and the “negative” condition, Brand A was better in the short run, but pricier in the long run, while Brand B was more expensive up front, but cheaper in the long run. Therefore, Brand A can be considered the “high discount rate” (or “shortsighted”) choice. In other words, without the sign effect, we would expect consumers to choose Brand A equally often in the positive condition and the negative condition. In fact, however, participants chose this “high discount rate” option more often in the large positive (56%) and small positive (42%) conditions than in the large negative (10%) and small negative (8%) conditions, replicating the sign effect. A logistic regression with sign and magnitude predicting choice confirmed a main effect of sign, $b=2.11$, $SE=0.59$, Wald $\chi^2(1)=12.69$, $p<.001$, no effect of magnitude, $b=0.25$, $SE=0.70$, Wald $\chi^2(1)=0.12$, $p=.73$, and no interaction, $b=0.31$, $SE=0.81$, Wald $\chi^2(1)=0.14$, $p=.71$.

Anticipatory utility

We computed an overall anticipatory utility score for each participant by coding their “like” or “dislike” of the anticipation as +1 or -1, and then multiplying by the continuous 0-100

measure, yielding an overall score of -100 to +100. Anticipation of the future \$15 bill ($M=-22.14$, $SD=42.77$, $SE=6.11$) and \$30 bill ($M=-18.59$, $SD=41.10$, $SE=5.87$) was decidedly negative, yet anticipation of the future \$15 check ($M=4.10$, $SD=49.17$, $SE=6.82$) and \$30 check ($M=-10.92$, $SD=53.23$, $SE=7.53$) was near zero. To statistically compare the strength of anticipation of the positive events (the checks) versus the negative events (the bills), we reverse scored the negative events, and compared the means with a 2x2 ANOVA. This confirmed a main effect of sign, $F(1,196)=12.85$, $p<.001$, $\eta_p^2=.06$, no significant effect of magnitude, $F(1,196)=1.96$, $p=.16$, $\eta_p^2=.01$, and no interaction, $F(1,196)=0.75$, $p=.39$, $\eta_p^2=.00$. In summary, overall anticipatory utility for the (negative) future payments was stronger than overall anticipatory utility for the (positive) future rebates.

Mediation

In a logistic regression with sign (future bill vs future rebate) and anticipatory utility (reverse scored for negatives) predicting choice, anticipatory utility was a significant predictor ($b=-0.02$, $SE=0.004$, Wald $\chi^2=17.49$, $p<.001$), and the effect of sign was reduced but still significant ($b=2.05$, $SE=0.42$, Wald $\chi^2=23.91$, $p<.001$). An indirect effect analysis with 5000 bootstrap samples (Shrout & Bolger, 2002) found that the effect of sign on choices was (partially) mediated by anticipation utility ($b=.38$, $SE=.14$, $CI_{95} [.17, .74]$). In other words, the mediation analysis suggests that participants chose the “shortsighted” Brand A more often in the rebate condition than in the payment condition because participants dreaded the payment more than they enjoyed anticipating the rebate.

Alternative Explanations

Next, we tested for whether our observed results for sign, anticipation, and choice were merely due to differences in the subjective magnitude of positive versus negative outcomes (i.e.,

loss aversion), in two ways. The first way was to include experience utility (reverse scored for negatives) in the analyses above. In every case, the key tests remained significant, $p=.001$ or lower. This means that even when we included the self-reported magnitude of the future events in our analyses, we observed the same results for anticipation and time preference.

The second way we controlled for subject magnitude was to compare choices and anticipation the \$15 “negative” condition with the \$30 “positive” condition, thus building in a 2:1 magnitude ratio to correct for loss aversion. (A meta-analysis of loss aversion in consumer product choice estimated the ratio or “lambda” at 1.73 to 1, Neumann & Böckenholt, 2014, so our 2 to 1 ratio is an overcorrection.) Again, when making this comparison between the small loss (-\$15) condition and the large gain (+\$30) condition, all the key tests remained significant, $p=.002$ or lower.

While these controls for subjective magnitude are somewhat crude, we controlled for the subjective utility of positives versus negatives in a more precise and rigorous way in Study 3, below.

Discussion

Our results indicate that consumers do not have strong anticipatory utility when anticipating a future \$15 or \$30 rebate, but decidedly dislike anticipating a future \$15 or \$30 bill. Thus, they are more likely to choose the pricier glasses (Brand A) when this involves neglecting a future rebate (i.e., foregoing the rebate included in Brand B) than when it involves incurring a future bill. Taken together, our findings support the hypothesis that the sign effect in intertemporal choice is partly driven by differences in the overall anticipatory utility. Furthermore, we find that these asymmetries in choice and anticipation are not driven by differences in the subjective magnitude of positives and negatives.

A potential shortcoming of Study 2 is that it relies on self-reported ratings of subjective magnitude for hypothetical consumption. In Study 3, we experimentally control for subjective magnitude of positives versus negatives by individually matching the subjective magnitude of real positive versus negative events for each participant. A second shortcoming of Study 2 is that it only asks a single question to measure overall anticipatory utility, and so cannot test the “mixed” anticipation account that we proposed in the introduction. Therefore, in Study 3, we collected separate measures for 1) positive and negative feelings of anticipation and 2) positive and negative feelings about waiting (consistent with Nowlis et al., 2004), which we combine into an overall anticipatory utility score for each participant.

Study 3: Anticipating consumption of matched positive vs negative events

Study Overview

This study compared anticipation and time preferences for matched positive versus negative consumption experiences. Each participant first completed a “titration” procedure to identify a matched positive/negative jellybean pair for that participant, where the positive flavor was equal or stronger in intensity as compared with the negative flavor. Next, participants were randomly assigned to eat either the positive flavor or negative flavor. Participants rated their predicted pleasure and displeasure for eating the jellybean, their pleasurable and displeasurable feelings of anticipation for the jellybean, and their pleasurable and displeasurable feelings about waiting for the jellybean. Next, participants made a (real) decision about whether to eat the jellybean immediately or in 15 minutes. Participants subsequently completed other studies as filler, ate the jellybean at the chosen time, and finally answered demographic questions.

We hypothesized that 1) participants would choose to eat positive flavored jellybeans immediately more often than they would choose to postpone (equivalent) negative flavored jellybeans, 2) feelings of anticipation would be stronger for negative flavors than for positive flavors, 3) feelings about waiting would be negative for both positive and negative jellybean flavors, 4) overall anticipatory utility (defined as feelings of anticipation plus feelings about waiting) would be stronger for negative flavors than positive flavors, and 5) overall anticipatory utility would predict time preferences and mediate the effect of sign on time preferences.

Material and methods

171 undergraduates (56% female, mean age 20.02) at a large university were recruited for “Jellybean Tasting and Other Studies” in exchange for course credit. When participants entered the lab, they could see jellybeans on the table in clear plastic bags. The jellybeans were a selection of Jelly Belly specialty flavors.

On the consent form, participants read “This first study involves eating jelly beans, whose flavors may range from delicious to disgusting. As always, participation is voluntary. Are you willing to eat a jelly bean for this next study?” Three participants answered “no” and were exempted from the study, leaving 168 participants.

Titration. Next, each participant completed the titration procedure to identify a “matched” positive/negative jellybean flavor pair for that participant. A brief summary of the titration procedure: participants first ranked all 20 jellybean flavors, and then answered a series of questions about whether they would accept a 50/50 gamble to eat one of two flavors. The flavors in these gambles were adjusted until a positive/negative pair was identified where the positive flavor was equal or slightly better than the negative flavor.

The details of the titration procedure are as follows; participants first saw 20 jellybean flavors (listed in Table 1) listed in random order. For each flavor, participants indicated whether “tasting the flavor would be a positive experience or negative experience.” On the following page, they were asked to rank their preference for all 20 flavors, ordered from best to worst. Next, read the instruction “Consider the following pair: 50% chance to eat a [Chocolate Donut with Sprinkles] flavored jellybean and 50% chance to eat a [Vomit] flavored jellybean. Would you take this gamble?” The flavors in brackets varied from trial to trial, but always paired a positive flavor with a negative flavor. In the first question, the pair was the best positive flavor with the worst negative flavor. If participants said “yes” to this first pairing, the second question used a worse-ranked positive flavor, and if participants said “no” to this first pairing, the second question used a better-ranked negative flavor. This procedure continued, offering worse and worse positive flavors (or better and better negative flavors), until the participant changed their answer (from yes to no, or no to yes, as appropriate). Participants were assigned to the last gamble that they would accept. Therefore, for each participant, a roughly equivalent jellybean pair was identified, with a positive flavor that was as good or better than the corresponding negative flavor was bad. Thus, this procedure is a conservative control for differences in subjective magnitude.

In some cases, however, participants “maxed out” the scale and never crossed over from yes to no (or no to yes). 5% of participants maxed out the scale by responding “yes” to every pair, and 13% of participants maxed out the scale by responding “no” to every pair. When this happened, they were assigned their worst pair if they always said yes, or their best pair if they always said no, as appropriate. We include these participants in the analyses below, and the overall pattern and significance of results do not change if they are excluded.

Next, participants were randomly assigned to eat either the positive flavor or the negative flavor. The exact flavor was selected based on the results of the titration procedure (described above), such that each participant consumed the flavor closest to their indifference point, with the positive flavor being equal-to or stronger-than the negative flavor.

Table 1.

Jellybean flavors used in Study 3, the percentage of participants that classified each flavor as positive (vs negative), and the average preference ranking of each flavor (out of 20).

Flavor	% Positive	Average Rank
Watermelon Jellybean	97%	4.54
Blueberry Jellybean	97%	4.6
Tutti-Fruitti (mixed fruit) Jellybean	95%	4.67
Green Apple Jellybean	95%	4.77
Lemon Jellybean	91%	5.39
Strawberry Iced Donut Jellybean	88%	5.91
Marshmallow Jellybean	83%	6.43
Chocolate Donut with Sprinkles Jellybean	83%	6.58
Candyfloss Jellybean	80%	7.35
Banana Jellybean	75%	7.4
Grass Jellybean	22%	12.45
Sausage Jellybean	13%	12.81
Black Pepper Jellybean	8%	12.9
Soap Jellybean	10%	13.56
Dirt Jellybean	1%	15.62
Earthworm Jellybean	2%	16.11
Booger Jellybean	2%	16.36
Earwax Jellybean	2%	16.83
Rotten Egg Jellybean	2%	17.21
Vomit Jellybean	2%	18.52

Predicted experience. On the next page, participants read “You have been assigned to eat the following flavor: [**Dirt**]. You will either eat the jellybean now, or wait 15 min before you eat the jellybean.” Next, participants answered two questions to measure their predicted pleasure and displeasure from eating the jellybean, with the questions “How **pleasurable or happy** do you think the **experience** of eating the [Dirt] jellybean will be?” and “How **displeasurable or unhappy** do you think the **experience** of eating the [Dirt] jellybean will be?” They answered each question by clicking on a line (of length 100) labeled with “not at all” on the left and “extremely pleasurable or happy experience” (or “extremely displeasurable or unhappy experience”) on the right.

Feelings about Anticipation and Waiting. Next, participants answered two questions to measure their anticipatory feelings, with the questions “How **pleasurable or happy** is the **anticipation** of the [Dirt] jellybean, that you feel right now?” and “How **displeasurable or unhappy** is the **anticipation** of the [Dirt] jellybean, that you feel right now?” They answered each question by clicking on a line (of length 100) labeled with “not at all” on the left and “extremely pleasurable or happy anticipation” (or “extremely displeasurable or unhappy anticipation”) on the right.

Next, participants answered two questions to measure their feelings related to waiting, with the questions “How **pleasurable or happy** is the **feeling of waiting** for the [Dirt] jellybean, that you feel right now?” and “How **displeasurable or unhappy** is the **feeling of waiting** for the [Dirt] jellybean, that you feel right now?” They answered each question by clicking on a line (of length 100) labeled with “not at all” on the left and “extremely pleasurable or happy feeling of waiting” (or “extremely displeasurable or unhappy feeling of waiting”) on the right.

Time Preference. Next, participants made a choice about when to eat the jellybean, with the question “In fact, you can choose when to eat the jellybean: either now, or in about 15 minutes. (The overall length of the study is fixed, so your choice will not influence the length of the study.) Which do you choose?” Participants chose between “Eat it now” and “Eat it in about 15 min.”

Other Measures. Next, participants either completed a filler task (of 15 min length) or ate the jellybean, depending on their choice. When they ate the jellybean, they rated the experience, with the questions “How **happy or pleasurable** was the **experience of eating** this jellybean?” and “How **unhappy or displeasurable** was the **experience of eating** this jellybean?” They answered each question by clicking on a line (of length 100) labeled with “not at all” on the left and “extremely like the experience of eating” (or “extremely dislike the experience of eating”) on the right. (These questions were not relevant to our hypotheses, so they will not be discussed any further.) Finally, participants indicated their gender, age, and ethnicity.

Results

Titration. Participants’ classifications of each flavor as positive versus negative are listed in Table 1, and largely met expectations, with each flavor classified as expected by at least 75% of participants. Likewise, the flavor rankings came out as expected, with the positive flavors ranked between 4.54 and 7.40 (out of 20), and the negative flavors ranked between 12.45 and 18.52 (out of 20).

Predicted experience. After the titration procedure, participants predicted their enjoyment of their assigned positive or negative flavor. As summarized in Table 2, participants believed that the experience of eating the positive flavor would be pleasurable (and not very displeasurable), and that the negative flavor would be displeasurable (and not very pleasurable). We subtracted

the displeasurable score from the pleasurable score for each flavor to create a single, overall predicted experience rating, and reverse scored the ratings of the negative flavor to enable direct comparisons of flavor intensity between positive and negative. This showed that the experience of eating the positive flavor (mean=65.10, $SD=25.49$), was predicted to be more intense than the negative flavor (mean=52.44, $SD=33.59$), $t(166)=2.75$, $p=.01$, $d=0.42$. Thus, the titration procedure identified positive flavors that were a bit stronger than the negative flavors. As such, the following analyses of anticipation and time preference conservatively control for any negativity bias in the predicted experience of eating the jellybeans.

Table 2.

Mean ratings (with SDs in parentheses) of predicted enjoyment, feelings about anticipation, feelings about waiting, and combined anticipatory utility (reverse scored for negative flavors) in Study 3.

	Positive Flavors		Negative Flavors	
	Positive	Negative	Positive	Negative
Predicted experience utility	73.88	8.79	16.92	69.36
	(17.93)	(14.52)	(16.22)	(23.11)
Feelings about anticipation	54.82	13.39	16.29	68.68
	(22.15)	(18.11)	(16.59)	(22.49)
Feelings about waiting	32.20	42.33	20.54	61.51
	(23.28)	(27.74)	(18.83)	(27.88)

Feelings about Anticipation and Waiting.

As summarized in Table 2, when considering a positive flavor, participants enjoyed the feeling of anticipation (i.e., savoring), but did not enjoy the feeling of waiting (i.e., impatience). When considering a negative flavor, participants enjoyed neither the anticipation (dread) nor the feeling of waiting (impatience).

We compared *feelings about anticipation* by subtracting negative anticipation feelings from positive anticipation feelings for each participant, and reverse scoring the negative flavor scores. This revealed that participants disliked anticipating the negative flavors, mean=52.39, $SD=32.36$, more strongly than they enjoyed anticipating the positive flavors, mean=41.43, $SD=27.99$, $t(166)=2.34$, $p=.02$, $d=0.36$.

Next, we compared *feelings about waiting* by subtracting negative feelings about waiting from positive feelings about waiting for each participant, and reverse scoring the negative flavor scores. This revealed that participants disliked the feeling of waiting for the negative flavors, mean=40.93, $SD=36.33$, more strongly than they disliked the feeling of waiting for the positive flavors, mean=-10.13, $SD=41.49$, $t(166)=8.49$, $p<.001$, $d=1.10$.

Finally, we computed an *overall measure of anticipatory utility* for each participant by summing the anticipatory feelings with the feelings of waiting, and reverse scoring the negative flavors. This showed that overall anticipatory utility was stronger (i.e., more strongly negative) for negative flavors, mean=93.37, $SD=62.22$, than for positive flavors, mean=31.30, $SD=52.08$, $t(166)=7.01$, $p<.001$, $d=0.95$.

Time Preference. Participants chose to have positive flavors immediately (55%) more often than they chose to delay negative flavors (24%), a significant difference with a proportion test, $z=4.33$, $p<.001$, replicating the sign effect.

Mediation. The measure of overall anticipatory utility was correlated with time preferences, $r = -.53$, $p < .001$, as expected. Likewise, in a logistic regression with sign (i.e., positive versus negative flavor) and overall anticipatory utility predicting time preferences, overall anticipatory utility remained significant, $b = -.022$, $SE = 0.004$, $p < .001$, while sign dropped to non-significance, $b = .200$, $SE = 0.202$, $p = .32$. An indirect effect analysis with 5000 bootstrap samples (Shrout & Bolger, 2002) found that the effect of sign on time preferences was mediated by overall anticipatory utility ($b = 0.11$, $SE = 0.02$, $CI_{95} [0.08, 0.16]$).

Discussion

When participants considered a positively flavored jellybean, they somewhat enjoyed the feeling of anticipating it, but also did not like the feeling of waiting for it, and most often chose to consume it immediately. When participants considered a matched negatively flavored jellybean, they did not enjoy anticipating it nor the feeling of waiting for it, and most often chose to consume it immediately rather than delay it. Overall ratings of anticipatory utility (defined as feelings of anticipation plus feelings about waiting) predicted time preferences. Furthermore, the effect of sign on time preferences was mediated by overall anticipatory utility. In other words, whereas positive events evoked a mixed anticipatory experience (both “savoring” and “impatience”), negative events evoked mainly negative anticipatory feelings (“dread”), and this asymmetry in anticipation explained consumer time preferences for positive versus negative events.

These findings 1) replicate the Study 2 results, with real consumption experiences, 2) conclusively demonstrate that the effect of anticipatory utility on time preferences is not merely due to differences in subjective magnitude, and 3) provide more depth of understanding of the processes underlying time preferences for positive versus negative consumption experiences.

Summary of Additional Studies

We conducted twelve additional studies, A1-A12, as reported in the Methodological Details Appendix. Studies A1 and A2 conceptually replicated Loewenstein (1987) and found that people are *not* willing to pay more for a kiss from a movie star in three days than a kiss from a movie star today, consistent with our other findings on the generally weaker power of overall anticipatory utility for positive events. Studies A3 and A4 found that anticipation utility predicts consumer time preferences and mediates the effect of sign on time preferences, in both simple financial situations (Study A3) and product choice situations (Study A4). Studies A5 and A9 found that these asymmetries in anticipation and time preference broadly held (with some variations) across 20 different consumption events. Studies A6 and A8 control for subjective magnitude (i.e., negativity bias) in different ways and find that above findings still hold. Studies A7, A10, A11, and A12 show the same pattern of anticipation and time preference for real hedonic events (jellybeans, photos of puppies, and photos of cockroaches). Study A11 also shows that when making intertemporal choices on behalf of another person (and anticipation is therefore eliminated), the sign effect is eliminated, providing further evidence for the critical role of anticipation utility for driving the sign effect. Study A12 is exploratory and finds some evidence that differences in the anticipation of positive versus negative events are partly driven by difference in mental endowment (we quickly integrate future positives into our reference point and feel their absence as a loss, but we do not as readily integrate future negatives) and differences in implicit uncertainty (both future positives and future negatives are inherently uncertain, which is unpleasant, contributing to a preference for sooner positives and future negatives).

Conclusions

The present research demonstrates that the overall sum of anticipations of negative consumption events is negative and strong, in contrast to the overall sum of anticipations of positive consumption events, which is positive but less strong. In turn, this asymmetry in anticipation leads to an asymmetry in time preference: consumers want to expedite positive events more strongly than they want to delay negative events. This has important implications for marketing managers, as many consumer intertemporal choices (such as retirement planning) can be framed in positive or negative terms. A future “savings” versus a future “reduced cost” is merely a matter of framing.

Furthermore, these results (partly) explain the “sign effect” in intertemporal choice: consumers want to accelerate positives more strongly than they want to postpone negatives because the psychological cost of anticipating bad things outstrips the pleasure of anticipating good things. More precisely, anticipation of negatives is a mainly negative experience (combining dread and the negative feelings of waiting), whereas anticipation of positives is a mixed anticipatory experience combining (positive) savoring with (negative) feelings of impatience. This qualitative difference in anticipation is robust to differences in magnitude.

Note, therefore, that our studies do *not* support the subjective magnitude account of the sign effect (and by extension, do not support a loss aversion account of the sign effect): after controlling for subjective magnitude in Study 2 and Study 3, the sign effect was still strong. With that said, we do find that anticipation of negative things is stronger and more impactful than the anticipation of positive things, and as such our findings are compatible with an extended

negativity bias (Baumeister et al., 2001; Rozin & Royzman, 2001): essentially, the negativity bias is stronger for anticipation than for predicted subjective experience.

One caveat is that the sign effect is strong and robust, and likely therefore driven by multiple psychological processes. In this paper, we tested the anticipation asymmetry and subjective magnitude theories, but another theory, “asymmetric time perception”, offers a complementary explanation for the sign effect in consumer choice. According to this theory, future negative events “loom closer” than future positive events (Bilgin & LeBoeuf, 2010). Because subjective time perception is a critical component in discounting (Zauberman, Kim, Malkoc, & Bettman, 2009), this explains the sign effect. In other words: negative events feel closer to the present, and are therefore valued more, but positive events feel farther away, and are therefore valued less. Thus, differences in the subjective temporal distance of positive versus negative events may also explain differences in time preferences these events. Future research could compare the effect sizes, complementarities, and interactions between the anticipation utility and time perception accounts of the sign effect.

The research reported here, which established that the sign effect in consumer choice is driven by anticipatory asymmetries, is supported by work finding that the sign effect is eliminated in past discounting (Molouki et al., 2019). This supports our anticipatory utility account: just as anticipation is eliminated for past events, so too is the sign effect.

Implications

Taken together, our results help explain the paucity of consumer demand for delayed rewards including energy savings, rebates, and retirement benefits, and also show how managers can strategically use the anticipation asymmetry to increase future-oriented consumer decisions: by reframing future events as negatives and emphasizing that immediate action can help avoid

worry. For example, when consumers are considering an energy efficient upgrade, appeals to look forward to future energy savings are not as effective as promises of avoiding future costs (as demonstrated in Methodological Details Appendix Study A3). Similar principles can be applied to long-term investments (Study 1), health decisions, sustainability decisions, and other long-term choices.

There has been little inquiry into the role of individual variations in anticipation in producing variance in time preferences, and this could be a fruitful topic for future research. We predict, for example, that credit is more attractive to those who feel less dread at the thought of owing money. It is less clear whether the intensity of pleasurable anticipation would foster or corrode fiscal restraint, since people can look forward to near events (a new car) or distant ones (retirement).

Another caveat regarding the current research is that it assessed participants' *predictions of anticipation* utility (in Study 2), or current feelings of *anticipation while deciding* (in Study 3), but did not measure *actual anticipation while waiting*. We suspect that such simulations or current feelings while deciding may yield poor predictions of how much pleasurable anticipation will *actually* be experienced over time. Some types of events might be difficult to avoid attending to (e.g., breaking up with someone), while others that we might report intensely dreading (e.g., a visit to the dentist) may not remain top of mind, as attested to by missed appointments to things we would rather get over. In other words, the anticipation asymmetry we measure in the present research could be an affective forecasting error on the part of consumers.

Expectations and violations of expectations yield further complexities, for both positives and negatives (Benzion, Rapoport, & Yagil, 1989; Chan & Mukhopadhyay, 2010; Shelley, 1993). Each of us has enjoyed anticipating the arrival of something we expect in a week, yet

experienced impatience if it is delayed an additional week (even though we might well have enjoyed pleasurable anticipation for a full two weeks if that was our expectation). The hedonic dynamics of anticipation for positives versus negatives are beyond the scope of this paper, but remain a fruitful area of inquiry for future consumer research.

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