Slow Down!

Insensitivity to Rate of Consumption Leads to Avoidable Satiation

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Consumers often choose how quickly to consume things they enjoy. The research presented here demonstrates that they tend to consume too rapidly, growing tired of initially well-liked stimuli such as a favorite snack (experiments 1 and 4) or an enjoyable video game (experiments 2 and 3) more quickly than they would if they slowed consumption. The results also demonstrate that such overly-rapid consumption results from a failure to appreciate that longer breaks between consumption episodes slow satiation. The results present a paradox: Participants who choose their own rate of consumption experience less pleasure than those who have a slower rate of consumption chosen for them.

Individuals often face decisions about how rapidly to consume things they enjoy. A person might decide how rapidly to consume a delicious dessert, how often to listen to a favorite song, or how frequently to play an enjoyable video game. To be sure, physiology, time, and other external factors occasionally constrain one's ability to realize one's desired consumption schedule. But even within such constraints, people generally have some ability to select their own rate of consumption. Do people choose schedules of consumption that maximize the enjoyment derived from such consumption episodes? From the perspective of optimal decision making, the answer is straightforward. People ought to choose the consumption schedule that maximizes their total enjoyment over time (perhaps with some allowance for time discounting). However, contrary to this assumption, we propose and demonstrate that people are naturally prone to consume things that they enjoy too rapidly for their own good, growing tired of initially well-liked stimuli more quickly than they would if they slowed consumption.

THE EXPERIENCE AND REDUCTION OF SATIATION

The notion that people satiate – that is, grow tired of repeatedly experienced stimuli -- is uncontroversial (Coombs and Avrunin 1977). People tire of repeatedly eating the same food (Rolls, van Duijvenvoorde, and Rolls 1984), listening to the same song (Ratner, Kahn, and Kahneman 1999), and even socializing with the same close friend (Galak, Redden, and Kruger 2009). Generally speaking, enjoyable experiences become less so with repeated or prolonged exposure. Using standard terminology, we refer to the decrement in enjoyment resulting from repeated or prolonged exposure to a stimulus as satiation (Loewenstein and Angner 2003). Others have applied different terminology to explain the process such as adaptation (Frederick

and Loewenstein 1999; Helson 1964; Nelson and Meyvis 2008) and habituation (Harris 1943; Thompson and Spencer 1966), but the basic pattern of results is the same: repeated or prolonged exposure to a stimulus leads to decreases in enjoyment (though see Zajonc 1968 for an exception).

To the extent that a stimulus is subject to satiation, recent literature has demonstrated that disruptions to consumption, which have the effect of slowing consumption, tend to slow satiation. These disruptions can come in the form of a simple delay (McSweeney and Swindell 1999) or in the form of a distraction (Epstein et al. 1993). Generally, though, the longer the delay, the slower is the rate of satiation (Thompson and Spencer 1966). The most compelling demonstration of this deceleration of satiation comes from recent research on the enjoyment of continuous pleasant experiences such as music, massage, and television programs (Nelson and Meyvis 2008; Nelson, Meyvis and Galak, 2009). These researchers find that disrupting such experiences, in some cases even with not-so-pleasant interludes (such as television advertisements), results in a more enjoyable overall experience.

Though informative, these findings neither to the choices that consumers make regarding consumption schedules (e.g. listening to a song repeatedly or eating multiple chocolate candies), nor the consequences of those choices. These issues are the main focus of the current research. We build upon previous research by examining consumers' intuitions about the impact of consumption timing on hedonic experiences, the consequences of those intuitions for choices they make about their own rate of consumption, and finally the consequences of the rate of consumption they choose on their enjoyment of consumption experiences.

CONSUMPTION TIMING

Perhaps more surprising than the intuitive idea that spreading consumption over time reduces satiation, we ask whether consumers will take satiation into account sufficiently when faced with a decision about the pace of consumption. That is, given that a slower pace of consumption reduces satiation, will consumers set their rate of consumption to maximize enjoyment? There are three primary reasons why consumers may not set their rate of consumption in this way, and may specifically choose inter-consumption intervals that are too short: 1) a failure of self-control, 2) incorrect beliefs about the benefits of longer inter-consumption intervals – that is, of a slower rate of consumption, and 3) misapplied *correct* beliefs about the benefits of longer inter-consumption intervals.

With respect to self-control failures, there is an extensive literature documenting the difficulty people have in delaying immediate gratification for the benefit of greater, prolonged gratification in the future (Ainslie 1975; Baumeister, Heatherton, and Tice 1994; Read, Loewenstein, and Kalyanaraman 1999), as well as the consequences of self-control failures, such as drug use, obesity, low rates of saving and high rates of debt, and failure to practice safe sex (Loewenstein, Read, and Baumeister 2003; Madden and Bickel 2009). In part this decision is driven by a tradeoff between two forces: desire and willpower (Hoch and Loewenstein 1991). The former moves the consumer to indulge now, while the latter moves the consumer to delay gratification for a greater payoff in the future. Indeed, it is exactly this type of tradeoff that has become prevalent in the inter-temporal choice literature (Loewenstein and Thaler 1989; Loewenstein and Elster 1992; Thaler and Shefrin 1981). Consistent with the vast evidence

documenting failures of self-control, any observed excess in the rate of consumption could arise because the consumer's desire to consume immediately overpowers the willpower necessary to slow consumption (Hoch and Loewenstein 1991).

Alternatively, rather than reflecting an insufficient exertion of self-control, excessively rapid consumption could arise from an inaccurate understanding, and specifically an underestimate, of the impact of speed of consumption on satiation. Indeed, there is no shortage of examples of consumers having faulty lay theories (Lichtenstein and Burton 1989; Luchs et al. 2010; Raghunathan, Naylor, and Hoyer 2006). Particularly relevant to the present work, past research on hedonic forecasting (Gilbert et al. 1998; Kahneman and Snell 1992) could help to explain why people tend to under-appreciate the extent of satiation. Research in this literature finds that, whether winning (or losing) an important athletic competition (Wilson et al. 2000), getting a desired (or undesired) result on an HIV test (Sieff, Dawes, and Loewenstein 1999), or being awarded (or denied) tenure (Gilbert et al. 1998), people tend to underestimate the extent to which time ameliorates the initial impact of hedonic experiences. This is one reason people tend to choose more variety when choosing for future consumption than when choosing in the moment, a phenomenon known as the diversification bias" (Galak, Kruger, and Loewenstein 2011; Read et al. 2001; Read and Loewenstein 1995; Simonson 1990). When shopping for a week's supply of yogurt, for example, people tend to choose a variety of flavors, but when choosing for the moment they are more likely to stick with their favorite. This occurs in part because people assume that they will become sick of their favorite, which, although true if the yogurts were consumed in rapid sequence, is unlikely when they are consumed only once every day or so. People seem to under-appreciate the degree to which an inter-consumption delay will reset their initial preference to its pre-adaptation level and, in doing so, reduce satiation (Galak et

al. 2011; Read and Loewenstein 1995; Read et al. 2001). In sum, whereas research has demonstrated that long inter-consumption intervals lead to slower rates of satiation (Thompson and Spencer 1966), it may be that consumers, in general, lack this appreciation.

A similar self-prediction error has been shown in research examining the consequences of introducing breaks into pleasurable experiences (Nelson and Meyvis 2008; Nelsonet al. 2009). Though the mere presence of a break (e.g., a television commercial) in a positive experience,(e.g., a television show) helps reset satiation, consumers fail to appreciate this, and fail to introduce breaks in consumption even when they would benefit from doing so. Nelson and Meyvis (2008) document this effect and propose that it occurs for two reasons. First, and consistent with the literature described above, consumers may fail to accurately predict the impact of breaks on satiation. Second, consumers may apply a heuristic that "stopping a good experience is bad" (Nelson and Meyvis 2008, 655). In other words, consumers apply an incorrect belief that positive experiences should be experienced continuously and apply this belief, to their detriment, when faced with a decision about whether or not to include a break in a positive experience. More generally, in the case of simple breaks, consumers may hold an incorrect belief, rather than a correct one that they fail to apply. With respect to rate of consumption, it may also be the case that consumers lack the knowledge that longer inter-consumption intervals lead to slower rates of satiation.

Even if consumers are aware, in the abstract, that longer inter-consumption intervals lead to slower satiation, they may fail to apply that general knowledge to specific decisions about inter-consumption timing (Wang, Novemsky, and Dhar 2009). When asked, in general, whether enjoyment would decrease, increase, or stay the same for a variety of consumer products, participants in one experiment universally believed that enjoyment would decrease with time

(Wang et al. 2009, Pilot Study). However, when a separate group of participants was asked to specifically predict their level of happiness with one of the same consumer products over the course of either one day or one week, they did not anticipate a significant drop in enjoyment over time, even though satiation did occur for another group of participants who actually interacted with the product over the same time period (Wang et al. 2009). This is similar to the distinction made by Kahneman and Tversky (1979) regarding "inside" and "outside" perspectives. With respect to rate of consumption, consumers may be aware, in general, that longer inter-consumption intervals result in diminished satiation, but fail to apply that general knowledge when faced with a specific decision about how to space consumption. When asked to think about the benefits of longer inter-consumption intervals in an abstract manner, people may take an "outside" perspective and consider similar situations in which longer intervals were beneficial. However, when actually tasked with making the decision about how quickly to consume a stimulus, they take an "inside" perspective and think only of the situation at hand, failing to realize that other instances where they spaced consumption made their experience more enjoyable.

A priori, it is impossible to know if the reason that consumers consume too quickly is because they lack the willpower to do otherwise, hold incorrect beliefs about the benefits of spaced consumption, or fail to apply correct beliefs about spaced consumption to the situation at hand. There is experimental evidence supporting each of these mechanisms. For example, past research has shown that people underappreciated the impact of satiation (Gilbert et al. 1998; Nelson and Meyvis 2008; Nelsonet al. 2009). At the same time past research has documented situations in which consumers appreciate the impact of satiation but fail to act on that appreciation when it comes to consumer products (Wang et al. 2009). In the setting examined in

our experiments, however, examining these competing hypotheses empirically, we find that consumers consume too quickly because they fail to appreciate that longer inter-consumption intervals slow satiation. It would be unreasonable to assume, however, that these other mechanisms are not important, or even that they don't contribute to the phenomenon of excessively rapid consumption; in real world settings any or all of these mechanisms might play a role.

It would also be unreasonable to assume that consumers never appreciate the benefits of longer inter-consumption intervals when it comes to reducing satiation. Indeed, simple introspection tells us that there is a clear difference between consuming, say, a favorite song several times once per minute as compared to once per week. Our research suggests, however, that it is far less clear to people that listening to a favorite song once every minute will be quite different than listening to it once every, say, five minutes. That is, whereas consumers may be well aware that *much* slower consumption rates slow satiation, they appear to be much less aware that only modestly slower consumption rates can do the same.

Consumers' proclivity to consume too quickly can be seen as example of "melioration" described by Herrnstein and Prelec (1991). Melioration refers to the tendency, when choosing between alternatives, to ignore the effects of a current choice on the value of options one will face in the future. If consuming rapidly in the present diminishes enjoyment of future consumption, then melioration will lead consumers to consume more rapidly than they would if they took this "internality" (Herrnstein et al. 1993) into account.

To test whether consumers do, in fact, fail to appreciate the impact of consumption rates on satiation given short inter-consumption intervals, we conducted a pilot study in which we asked 100 participants from the Amazon Mechanical Turk online panel to imagine eight different

consumption scenarios and predict how their enjoyment of the described situation would evolve over time. Specifically, we asked participants to pick a favorite candy bar (e.g. Hershey Bar, 3 Musketeers) from a set of six popular candy bars, and to imagine that they would consume six bite sized versions of that candy bar with various inter-consumption intervals. For each inter-consumption interval, participants reported how they thought that their enjoyment of the candy bar would evolve over the six consumption instances, responding on a 5-point scale with labels (1) "I would enjoy them much less over time", (2) "I would enjoy them slightly less over time", (3), "I would enjoy them the same over time", (4) "I would enjoy them slightly more over time", and (5) "I would enjoy them much more over time." They did this for eight different inter-consumption intervals: back-to-back, 1 minute, 2 minutes, 5 minutes, 10 minutes, 60 minutes, 1 day, and 1 week. The order of presentation was randomized across participants, allowing us to assess participants' intuitions about the effects of these various inter-consumption intervals on enjoyment. As can be seen in table 1, for the shorter time periods (back-to-back, 1 minute, 2 minutes, 5 minutes, and 10 minutes) participants were, more or less, insensitive to the benefits of longer inter-consumption intervals. That is, they believe that they would experience the same level of satiation whether they ate the candy bar every minute or every 10 minutes, even though, we contend and will show, eating at the slower pace would lead to considerably less satiation. However, once the intervals became sufficiently long enough (60 minutes, 1 day, and 1 week), participants realized that satiation would be slowed down at least somewhat. That is, participants *did* appreciate that eating the candy bar every minute would lead to more satiation than eating it every day.

The results of the pilot study, when contrasted with conclusions from the experimental literature summarized above, suggest that consumers hold incorrect beliefs when the inter-

consumption interval is relatively short. A substantial body of research indicates that small changes in rate of consumption can have a substantial impact on enjoyment, even for short and rapid sequences of consumption, but individuals do not appear to be aware of this effect. In this paper, we examine the consequences of this lack of awareness, both for behavior (specifically, consumers' decisions about how rapidly to consumer) and hedonics.

We focus exclusively on consumption experiences with short inter-consumption intervals because this is where existing research, including the pilot study, suggests that consumers are especially likely to err. We show that for sequential experiences with short inter-consumption intervals, consumers do not appreciate the benefits of longer intervals and instead choose to consume too quickly, resulting in satiation that could be avoided. Many every-day consumption experiences involve relatively short inter-consumption intervals (e.g., eating, listening to music, watching television, playing video games, etc.) and yet there is little research examining how such experiences evolve over time as a function of their rate of consumption.

Before continuing, it is worth noting that not all consumers share the goal of maximizing enjoyment, and inter-consumption intervals can have consequences for other goals, such as dieting. Although other motives may well come into play in naturalistic situations, our focus on this paper is on various aspects of the impact of the inter-consumption interval on enjoyment.

Contributions

This paper contributes to the consumer behavior literature in a number of ways. We provide the first test of consumers' knowledge of the effects of inter-consumption intervals on satiation. Though, as aforementioned, there has been some research investigating consumers'

knowledge of the effects of *breaks* on satiation (Nelson and Meyvis 2008, Nelson et al. 2009), our research goes a step further and asks: given that breaks are present, do consumers appreciate that longer inter-consumption intervals decrease satiation and thus increase enjoyment, at least for relatively short time periods?

Additionally, we test three competing hypotheses that could explain *why* consumers choose inter-consumption intervals that are too short. Specifically, we test whether consumers choose to consume too quickly because of a failure to exert self-control, an inability to apply correct general beliefs about the benefits of longer of inter-consumption intervals, or lack correct beliefs about the ameliorating effects of time on satiation. Consistent with the pilot study described above, for relatively short inter-consumption intervals, we find that the primary reason is the final one: incorrect beliefs about the effects of inter-consumption intervals on satiation.

EXPERIMENT 1A AND 1B

Experiments 1A and 1B were designed as initial demonstrations of consumers' proclivity to consume too quickly. In both experiments, some participants were asked to choose a rate of consumption of a candy that would maximize their enjoyment, while others were assigned to consume at a pre-specified rate that maximized the inter-consumption interval given the constraints of the experiment's duration. We predicted that participants would choose an inter-consumption interval that was considerably shorter than what would be optimal given the goal of maximizing the enjoyment of the candy.

In experiment 1A, we forced participants to consume all of the candies and measured enjoyment. This allowed us to determine the effect of rate of consumption on enjoyment of the

candies. We predicted that, compared to participants whose rate of consumption was spaced out maximally, participants who chose their own rate of consumption would not only choose to consume too quickly, but also satiate more quickly and, as a result, enjoy the candies less. Additionally, we predicted that, for those participants who were given the choice to consume at their own rate of consumption, the longer an interval they set for themselves, the less they would satiate.

In experiment 1B, we allowed participants to choose *how many* candies to consume, enabling us to determine the effect of their choices of rate of consumption on the quantity of candies consumed. We predicted that, compared with participants whose rate of consumption was spaced out maximally, participants who choose their own rate of consumption would not only choose to consume too quickly, but would also satiate more quickly and, as a result, choose to consume fewer candies. We further predicted that for those participants who chose their own rate of consumption, those who chose a longer inter-consumption interval would satiate less and thus consume more chocolates.

Experiment 1A

Method. Forty-five students (31 females; average age = 19.9) enrolled in an introductory marketing course at a large US university completed the experiment in exchange for partial course credit. Participants were told that, because of time constraints, they would be participating in two experiments simultaneously: a "Video Study" and "Chocolate Taste Test." The "Video Study," which involved watching a 20 minute compilation of Bugs Bunny cartoons, served to keep participants occupied while they consumed the chocolates. All participants were informed

of the duration of the video and, thus, the allowable consumption time. Additionally, participants were correctly informed that, regardless of when they finished consuming the candies they would still be required to watch the entire video. This was done to ensure that participants did not choose to consume quickly to complete their participation requirement sooner.

Participants were then randomly assigned to one of two conditions. Participants in the *forced rate* condition were told that the computer would prompt them when they should eat each of six Hershey's Kisses, which occurred at the maximum possible uniform inter-consumption interval of 200 seconds. Participants in the *self-paced* condition determined their own inter-consumption interval of the six candies on a sliding scale from 10 to 200 seconds with the instruction to "maximize your overall enjoyment of the Hershey's Kisses." As a first pass at minimizing the effects of self-control failures on the decision of how quickly to consume, this decision occurred before the experiment took place and thus before the act of consumption or presentation of tempting stimuli.

Participants rated their enjoyment of the chocolates in two ways: on-line, following each consumption period on a scale from 1 (*I hated them*) to 9 (*I loved them*), and retrospectively, at the end of the entire experience (on the same 9-point scale). Following this we asked participants two additional questions: "How happy are you with the rate at which you ate the Hershey's Kisses?" on a scale from 1 (*Not at all happy)* to 9 (*Very happy)* and "How enjoyable were the videos" on a scale from 1 (*Not at all enjoyable*) to 9 (*Very enjoyable*). These last two questions served to identify whether our manipulation affected more than just the enjoyment associated with the focal stimulus.

Results and Discussion. Participants consumed the chocolates faster in the *self-paced* condition than in the *forced rate* condition – in fact over *twice* as fast (93.1 vs. 200.0 seconds, respectively). Thus, although participants did space consumption out over time, they did not do so as much as they could have.

Nor did they appear to space consumption as much as they should have. Turning first to the single overall measure of enjoyment taken at the end of the experiment, participants in the *forced rate* condition enjoyed the candies more than participants in the *self-paced* condition (M = 6.96 vs. M = 5.77; $t(43) = 2.79$, $p < .01$, $d = .85$). Additionally, we observed a positive correlation between consumption time and enjoyment in the *self-paced* condition. That is, the longer the inter-consumption interval set by participants, the more they enjoyed the chocolates (r = .41, p = .056). This was true despite the fact that, all else equal, one might expect a negative correlation between the inter-consumption interval and enjoyment in light of the fact that individuals especially fond of chocolate might be more likely to eat them rapidly.

Turning next to the on-line measures of enjoyment, which we analyzed with a 2 (rate: *self-paced*, *forced rate*) x 6 (Iteration) mixed-model ANOVA, three effects are evident. First, consistent with prior research (Coombs and Avrunin 1977), there was a main effect of iteration, such that enjoyment tended to decrease with repetition ($F(5, 215) = 19.92$, $p < .001$, $\eta_p^2 = .32$). Second, there was a main effect of rate, such that, on average, participants enjoyed the chocolates more in the *forced rate* condition than in the *self-paced* condition (M = 6.96 vs. M = 5.77; $F(1, 43) = 4.87$, $p < .05$, $\eta_p^2 = .10$). Finally, and most important, we observed a significant 2-way interaction ($F(5, 215) = 6.31$, $p < .001$, $\eta_p^2 = .13$) and a linear component of *iteration* by *rate* interaction ($F(1,43) = 13.19$, $p < .001$, $\eta_p^2 = .13$). To unpack these results, we computed the slope of enjoyment over time for each participant. As predicted, and as can be seen in figure 1,

although participants in the *forced rate* condition experienced some satiation (*average-β* = -.16; one-sample t-test against 0: $t(22) = -2.88$, $p < .01$), participants in the self-paced condition experienced considerably more satiation (*average-β* = -.55; one-sample t-test against 0: $t(21) = -5.73$, $p < .001$; paired-sample t-test: $t(43) = 3.63$, $p < .001$).

Finally, we found that participants were as happy with the rate at which they consumed and enjoyed the videos regardless of whether they chose their own rate of consumption or had their rate of consumption chosen for them, ps > .15.

These results provide a first, affirmative, test of the prediction that consumers choose to consume too quickly. Specifically, when given free rein over how quickly to consume, participants consumed too quickly, and did so to their own detriment. As previously mentioned, one reason for the decision to consume too quickly may be self-control failure (Hoch and Loewenstein 1991). Indeed, that is precisely why we asked participants to choose their inter-consumption interval prior to being exposed to the stimulus: to avoid the visceral nature of the temptation placed in front of them. However, it is possible that even though participants were not exposed to the stimulus at the time of their decision, they anticipated a failure to regulate their self-control and thus chose accordingly (Herman and Polivy 2004; Raghubir and Srivastava 2009).

To address this possibility, we recruited 42 new participants (33 females) who completed a partial replication of this study. All participants set their own consumption schedule as in the self-paced condition of the main study, except that we manipulated whether or not they were told that the study would actually take place or was merely hypothetical (and that no chocolates would actually be consumed). If the choice of consumption schedule in the experiment just reported was due to a failure of self-control, one would expect participants to consume more

rapidly if they thought they were actually going to eat the chocolates than if they did not. This was not the case, *M*s = 107.55 vs. 102.55 seconds, respectively ($t(40) < 1$, *ns*).

Admittedly, it is still possible that self-control failures could arise in hypothetical decisions (Wilcox, Block, and Eisenstein 2011). Among their other purposes, therefore, experiments 2, 3 and 4 were designed to more directly rule out such concerns by measuring chronic self-control tendencies and showing that they are uncorrelated with the decisions that participants made regarding inter-consumption intervals.

Experiment 1B

Experiment 1B was a conceptual replication of the previous experiment with one critical difference: Instead of examining the role of overly fast consumption on enjoyment, we examined its role on an indirect indicator of enjoyment that is arguably a more important behavior from a marketing perspective: the amount consumers chose to consume. It stands to reason that if people fail to foresee the benefit that slowing consumption will have on their enjoyment of the stimuli, they may also fail to foresee the benefit of slowing consumption on their choice to repeat the experience. Specifically, if participants' enjoyment decreases more quickly when they are free to choose their own rate of consumption, then we should expect them to elect to consume less of a stimulus than those participants whose consumption speed is chosen for them to be slower and thus whose enjoyment does not decrease as rapidly.

Method. One hundred participants (55 women; average age = 19.3) enrolled in an introductory marketing course at a large US university completed the experiment in exchange for

partial course credit. The procedure was identical to that of experiment 1 except that participants were informed (after they made their inter-consumption interval decision for participants in the *self-paced* condition) that they could decide how many chocolates to consume. They were told that each time they were prompted, they would first indicate if they wished to eat the chocolate or stop consuming chocolates for the remainder of the study. They were also informed that, regardless of how many chocolates they chose to eat, they would watch the remainder of the video. As in experiment 1A, this was done to ensure that participants would not have any incentive to stop eating chocolates in the false hopes of finishing the experiment early. Once participants received these instructions, they consumed the chocolates with either the inter-consumption interval that they set for themselves or with the maximal uniform inter-consumption interval (200 sec.) If participants indicated that they did not wish to continue eating the chocolates, they were instructed to place the remainder of the chocolates to the side of their desk and to continue watching the video.

Results and Discussion. Consistent with the previous experiment, participants in the *self-paced* condition chose to consume the chocolates approximately twice as quickly as those in the *forced rate* condition (110 vs. 200 sec.). Once again, this was true despite the fact that all participants were told the duration of the film. Thus, as in the previous experiment, although participants in the *self-paced* condition did space consumption, they did not do so as much as they could have.

Next we turn to the primary measure of interest: the number of chocolates consumed. If, as experiment 1A demonstrates, enjoyment decreases more rapidly in the *self*-paced condition than in the *forced rate* condition due to faster consumption, then we would expect participants in the former condition to stop consuming sooner than those in the latter condition. Indeed, this is

exactly what we observed. Participants who consumed at their own pace ate fewer chocolates than participants whose rate of consumption was chosen for them. This is true whether we consider the median (3 vs. 4; *Mann-Whitney U* = 986.50, $Z = 1.99$, $p < .05$) or the mean (3.46 vs. 4.24; $t(99) = 2.17$, $p < .05$, $d = .42$) number of chocolates consumed. Also, consistent with experiment 1A, we observed that for participants in the *self-paced* condition, the greater they set their inter-consumption interval to be, the more chocolates they consumed ($r = .46$, $p < .001$).

As in the previous experiment, we collected measures of enjoyment both in-experience and retrospectively. Consistent with the previous experiment and our hypothesis, we observed that participants in the *self-paced* condition retrospectively enjoyed the chocolates less than participants in the *forced rate* condition ($M = 6.08$ vs. 6.90; $t(99) = 2.22$, $p < .05$, $d = .43$). This was true despite the fact that, unlike in the previous experiment, participants in the self-paced condition were not only free to select the optimal rate of consumption, but the optimal quantity as well. However, this result should be interpreted with caution, in light of the fact that participants in the *self-paced* condition also ate fewer chocolates. As such, this result could either be attributed to a decrease in enjoyment, consumption of fewer chocolates, or both. We suspect that it is both. Finally, a similar analysis on the slopes of the in-experience measures of enjoyment revealed that, though only trending, consistent with the previous experiment, enjoyment decreased faster when participants chose their own consumption speed ($M_{\beta\ Self\text{-}Paced} = -.38$, $M_{\beta\ Forced\ Rate} = -0.09$; $t(83) = 1.64$, $p = .11$, $d = .36$). However, unlike in the previous experiment, these results should be interpreted with caution due to differences in the number of chocolates consumed by participants in the two conditions.

Finally, we again found that participants were as happy with the rate at which they consumed and enjoyed the videos regardless of whether they chose their own rate of consumption or had their rate of consumption chosen for them, *p*s > .15.

EXPERIMENT 2

Having demonstrated that consumers choose to consume too quickly, we next attempt to explain why they do so. As discussed in the introduction, there are three primary reasons why consumers may choose to consume too quickly. First, they may simply lack the self-control to do otherwise. Though we begin to rule out this explanation in experiments 1A and 1B, this explanation is still plausible. Accordingly, in the present experiment (and in the subsequent two experiments) we include a measure of trait self-control (Tangney, Baumeister, and Boone 2004). If self-control failure is what causes consumers to choose to consume too quickly, then we would expect consumers who are particularly good (bad) at exerting self control to choose to consume more slowly (quickly). That is, we would expect a positive correlation between trait self-control and the inter-consumption interval chosen, and, in the absence of such a correlation, self-control failure becomes a less likely mechanism to explain the effect.

Second, it still may be the case that participants are well aware of the benefits of spaced consumption in general, but simply fail to apply this general knowledge to specific decisions (Wang et al. 2009). If this is the case then making salient the fact that the inter-consumption interval in a specific context has an impact on satiation should remind consumers of these general benefits and allow them to apply that knowledge to the situation at hand. Accordingly, in

this experiment we asked some participants to predict their enjoyment of the upcoming stimuli if they were to consume them very quickly, at a moderate pace, or at a slow pace before they made the decision regarding how quickly to consume. This procedure allowed us to both directly assess the intuitions that consumers had about the effect of spacing on satiation and enjoyment and, indirectly, assess the effect of highlighting the relationship between the inter-consumption intervals and enjoyment on their subsequent decision about the inter-consumption interval. If consumers simply fail to apply a general belief about the benefits of longer inter-consumption intervals on satiation, then we should, first, observe that they hold this belief when asked to predict the enjoyment associated with various rates of consumption, and second, observe that merely asking them to make these predictions should lead them to choose to consume more slowly. Failure to observe such a pattern should strengthen the conclusion from the prior studies that consumers consume too quickly due to lack of general knowledge about the effects of spacing on satiation and enjoyment.

In addition to enhancing our understanding of the underlying psychological mechanism(s) driving consumers' consumption timing decisions, the current experiment differs from the previous experiments in three substantive ways. First, we extend our findings to a non-food hedonic stimulus: video games. Specifically, we designed a simple but enjoyable video game that participants played across a number of rounds. The decision they made was about the inter-exposure interval between these rounds. Second, one problem with the previous experiments was that the candies were consumed while a potentially distracting video was being played in the background. This was done intentionally, to fix the total length of the experiment, but it is possible that the video distracted participants from the candies, altering the rate at which people consumed (Epstein et al. 1993) or satiated. Accordingly, in this experiment, instead of

playing the video game while watching a video, participants completed a simple filler task between rounds of the video game, thus avoiding any possible distractions. Finally, an interesting question is whether consumers can learn about the benefits of spaced consumption when they either make a "bad" decision or when a "good" decision is made for them. To test this question, we contacted participants several days after they completed the experiment and asked them to imagine that they were about to complete the same experiment again and to pick an inter-consumption interval that would maximize their enjoyment of the video game. If participants learned from their past experience, we would expect to see longer inter-consumption intervals, resulting in a slower rate of consumption.

Method

Part 1 .One hundred and twelve participants (61 females; average age = 26.7) from the online panel, Amazon Mechanical Turk, completed the study in exchange for $0.50. Due to a problem with the computer program, data for three participants were not recorded, leaving us with 109 usable participants. Participants were informed that the main portion of the study would take exactly 12 minutes to complete. They were then told that during that period of time they would play six rounds (45 seconds each) of a simple video game that involved moving a ball (using the arrow keys on their keyboard) around a constrained playing area to collect coins. For every coin they collected, participants received one point. If participants touched the walls of the playing space, the ball was placed back at the starting location and they lost a point. This game was pretested to ensure that it was considered fun for participants. In between rounds (and for any remaining time left after completing all 6 rounds, but prior to the completion of 12 minutes),

participants were informed that they would complete a simple clicking task in which they would click a button as it appeared (the button appeared every 8 seconds in the same location on the screen).

Next, approximately half of the participants were randomly assigned to the *interval salient* condition. They were asked to make three predictions: how much they would enjoy the upcoming game (1 = Not at all Enjoyable, 9 = Very Enjoyable) if it were played with no inter-exposure interval, 45 second intervals, and 90 second intervals (the maximum possible). They made these predictions on separate screens and with visual aids to help them understand what the experience they were making a prediction about would be like. The other participants were randomly assigned to the *interval not salient* condition, and made no such predictions.

Orthogonal to the *interval salience* manipulation, participants were randomly assigned to either the *forced rate* or the *self-paced* conditions. Much like in experiments 1A and 1B, participants in the *self-paced* condition were asked to "indicate how much time you would like to have in between each round of the game, keeping in mind that your goal is to maximize your enjoyment of the game" on a slider scale anchored with 10 seconds and 90 seconds (the maximum possible inter-round interval). Participants in the *forced rate* condition made no such choice and their inter-round interval was set to 90 seconds.

Participants then went on to experience the next 12 minutes as either they elected to (*self-paced* condition) or we selected for them (*forced rate* condition). For example, if a participant in the *self-paced* condition chose an inter-exposure interval of 30 seconds, he or she would play round 1 of the game for 45 seconds, complete the simple clicking task for 30 seconds, complete round 2 of the game again for 45 seconds, again complete the simple clicking task for 30 seconds, and so on. Because, for this hypothetical participant, there is time remaining after the

completion of the sixth round (720 seconds – 6 rounds at 45 seconds – 5 inter-round intervals at 30 seconds = 300 seconds), the participant would then complete the clicking task for the remainder of the time. Following each round of play, participants indicated how much they enjoyed playing that particular round (1 = I Hated It, 9 = I Loved It). Following the entire 12 minute experience, participants indicated how much they enjoyed playing the game in general on the same 9-point scale. Finally, as with the previous experiments, participants answered two additional questions: "How happy are you with the timing (as in, the time between rounds) with which you played the video game?" on a scale anchored with 1 (*Not at all happy*) and 9 (*Very Happy*) and "Overall, how much did you enjoy the simple clicking task?" on a scale anchored with 1 (*I hated it*) and 9 (*I loved it*). Participants were not informed that there would be a follow-up survey.

Part 2. Approximately three days after completing Part 1, participants received an email asking them to complete a short follow up study in exchange for $0.15. During the study, participants were reminded of the 12 minute experience that they previously had (but not the inter-round interval) and asked to imagine that they would again have the same type of experience (45 second rounds of the game with the clicking task in between rounds). In the same way that participants in the self-paced condition during Part 1 picked their presumed optimal inter-round interval, *all* participants in Part 2 did the same for this upcoming hypothetical 12 minute experience. Finally participants completed a short form version of the self-control scale created by Tangney et al. (2004). The scale asked participants to indicate the extent to which they agreed or disagreed with 13 different statements including: "I refuse things that are bad for

me," "I am good at restraining temptation," "I wish I had more self discipline" (reverse coded), and "Pleasure and fun sometimes keep me from getting work done" (reverse coded).

Results

Part 1. We first see if participants appreciate the benefits of longer inter-round intervals. A one-way within subjects ANOVA on the predictions made by the participants in the *interval salient* condition yielded a marginal main effect ($F(2, 102) = 2.60$, $p = .08$, $\eta_p^2 = .05$) suggesting that participants did have some intuition about the influence of longer inter-round intervals. However, those intuitions were exactly opposite of what past research and experiments 1A and 1B suggest are actually true. Specifically, participants predicted that enjoyment of the game would *decrease* with longer inter-round intervals ($M_{Back\text{-}to\text{-}Back} = 4.46$, $M_{45\ second\ interval} = 4.59$, $M_{90\ second\ interval} = 3.89$; only the comparison between the 45 second and the 90 second interval was statistically significant, $t(51) = 2.82$, $p < .01$; $d = .79$). These results suggest that consumers not only lack a general appreciation for the benefits of spaced consumption, but may even have the opposite, and incorrect, intuitions.

Next, we turn to the inter-exposure intervals set by participants in the *self-paced* conditions. We find that making the inter-exposure intervals salient had no effect on the chosen rate of exposure ($M_{Salient} = 26.2$, $M_{Not\ Salient} = 30.75$; $t(37) = .60$, *ns*), again suggesting that even when the relevance of the inter-exposure interval was made salient, participants did not choose a slower pace of consumption. We do, however, again observe that the average inter-round interval

was considerably shorter than the interval set for participants in the *forced rate* condition (29.0 vs. 90.0 seconds).

We now turn to the enjoyment ratings of the game itself. A 2 (interval salience: *salient, not salient*) x 2 (rate: *self-paced, forced rate*) ANOVA on retrospective enjoyment revealed only a main effect of rate ($F(1, 105) = 5.52$, $p < .05$, $\eta_p^2 = .05$) such that those participants who chose their own rate of exposure enjoyed the experience less than those whose rate was set by us (*Ms* = 4.18 vs. 5.29). This same pattern was observed in the in-experience ratings of enjoyment. A 2 (interval salience: *salient, not salient*; between) x 2 (rate: *self-paced, forced rate*; between) x 6 (round; within) mixed ANOVA on in-experience ratings of enjoyment revealed a main effect of *round* ($F(5, 525) = 2.26$, $p < .05$, $\eta_p^2 = .02$) such that enjoyment decreased with time, a marginal main effect of *rate* ($F(1, 525) = 3.41$, $p = .07$, $\eta_p^2 = .03$) such that, overall, participants enjoyed the experience less when they chose their own rate of exposure as compared to when we picked it for them (Ms = 4.25 vs. 4.91), and, most importantly, a 2-way interaction between *rate* and *round* ($F(5, 525) = 4.58$, $p < .001$, $\eta_p^2 = .04$) and a linear component of *round* by *rate* interaction ($F(1,105) = 22.30$, $p < .01$, $\eta_p^2 = .08$). We find no other effects (all *F*s < 1). As can be seen in figure 2, whereas enjoyment remained more or less constant for participants whose rate of exposure was determined by us, it decreased for those who set their own rate. We confirm that the enjoyment ratings of those in the self paced condition decreased by computing slopes for each participant. We then conduct a 2 (interval salience: *salient, not salient*) x 2 (rate: *self-paced, forced rate*) ANOVA on these slopes and find only a main effect of rate ($F(1, 105) = 8.75$, $p < 0.001$, $\eta_p^2 = .08$), such that enjoyment for participants in the self paced condition decreased considerably faster than for those in the forced rate condition (*Ms* = -.20 vs .03). Indeed, participants in the *forced rate* condition experienced no satiation (*average-β* = .03; one-sample t-

test against 0: $t(69) = .07$, *ns*) while those in the self-paced condition did (*average-β* = -.20; one-sample t-test against 0: $t(39) = -4.18$, $p < .01$). Importantly, we again observe that for participants in the *self paced* condition, those who chose a longer interval time also enjoyed the experience more ($r = .56$, $p < .001$).

Finally, though there were no effects of either manipulation on enjoyment of the concurrent task ($p > .15$), there was an effect of *rate* on how happy participants were with the rate of consumption such that participants who chose their own rate of consumption were happier with the rate itself ($M = 5.50$) than participants whose rate was chosen for them ($M = 3.13$, $F(1, 105) = 25.36$, $p < .001$). We return to this difference in experiment 4.

Part 2. Of the 109 participants who completed Part 1, 58 completed Part 2. On average, participants completed Part 2 five days following Part 1 (Minimum = 3 days, Maximum = 7 days). Importantly, those participants in the self-paced condition who chose to complete Part 2 did not choose a different inter-exposure rate during Part 1 as compared to those participants who did not choose to complete Part 2 ($t < 1$).

Did participants learn that longer inter-exposure rates led to higher levels of enjoyment? They did not. Overall, participants chose an inter-exposure rate that was faster than even the one chosen by participants in the self-paced condition during Part 1 (*M*s = 18.9 vs. 29.0; one-sample t-test against 29; $t(58) = -6.76$, $p < .001$, $d = 1.78$). Interestingly, this was true regardless of whether participants had chosen their own rate of consumption during Part 1 ($M_{Part\ 2} = 18.3$) or had their rate chosen for them by us ($M_{Part\ 2} = 19.53$; $t < 1$, *ns*). It appears that participants who chose their rate of exposure in Part 1 did not appreciate that the reason for their decreasing enjoyment over time was due to the rate of consumption, and participants whose rate was determined by us did not appreciate that the reason that their enjoyment did *not* decrease over

time was due to the longer inter-exposure interval imposed in the condition they were assigned to.

Finally, one possible explanation for why participants in the self-paced condition chose such a short inter-consumption interval during Part 1 is that they lacked the self-control to select a longer one. If this were the case then we would expect that participants who have a particularly low ability to regulate self control would choose to consume the fastest. A correlation between the trait self-control measure collected during Part 2 and the chosen inter-exposure interval by the participants in the self-paced condition in Part 1 revealed that this was not the case (r = -.02, *ns*).

EXPERIMENT 3

The results of the previous experiments demonstrate that consumers consume too quickly because they do not appreciate the benefits of spaced consumption. However, in all of these experiments, there was a confound between control and rate of consumption. That is, participants in the *self-paced* conditions not only consumed quickly, but *chose* to do so. Therefore, it is unclear if the reason for decreased enjoyment was due to the rate itself or the act of choosing that rate. This experiment was designed to rule out the possibility that it was the mere act of choosing a rate of consumption that led to accelerated satiation. Specifically, in this experiment we employed a pseudo-yoked design in which, for some participants, the rate at which they consumed was determined by random sampling from the rates chosen by participants in experiment 2. In this way, we can compare the enjoyment of the video game independently as a function of choice and as a function of the rate of consumption. If we find that the participants

whose rate is yoked to the rates chosen by participants in the previous experiment experience the same decrement in enjoyment as those who choose the rate themselves, then this alternative explanation becomes suspect.

Method

Eighty six participants (41 females: average age = 27.4) from the online panel, Amazon Mechanical Turk, completed the study in exchange for in $0.50. A problem with the computer program caused data for 2 participants to not be recorded, leaving useable data from 84 participants. The procedure for this experiment was nearly identical to that of experiment 2, with three notable differences. First, we did not manipulate the salience of the inter-exposure interval, so no participants indicated their expected enjoyment of the 12 minute experience. Second, in addition to the *forced rate* and *self-paced* conditions, we now included a new condition (*yoked-rate*) in which we yoked the inter-exposure intervals chosen by participants from experiment 2 with the inter-exposure intervals in this experiment. That is, if a participant was in the *yoked* condition, he or she had the exact same experience as a participant in the *forced rate* condition except that the inter-exposure interval was not maximized (90 seconds) but was rather determined by selecting, at random, without-replacement, an inter-exposure interval time selected by a participant in the *self-paced* condition in experiment 2. In this way, we were able to ensure that the distribution of inter-exposure intervals for participants in this *yoked-rate* condition perfectly matched the distribution we had previously observed. Third, using the same self-control scale used in experiment 2, we now collected measures of self-control immediately after the experiment concluded, allowing us to assess the relationship between trait self-control

and the chosen inter-exposure interval for all participants. Other than these differences, the procedure was identical to that of experiment 2.

Results

We first confirm that the participants in the *self-paced* condition chose a similar inter-exposure rate to those in the *yoked-rate* condition. They did ($M_{self\text{-}paced}$ = 31.26 seconds; $M_{yoked\text{-}rate}$ = 31.73 seconds; $t(39) = .06$, *ns*). Again, these inter-exposure intervals were considerably shorter than those that we chose for participants in the *forced rate* condition (90 seconds). As mentioned earlier, one possible explanation for why participants in the self-paced condition chose such a short inter-consumption interval is that they lacked the self-control to select a longer one. If this were the case then we would expect that participants who had a particularly high failure to regulate self control would choose to consume the fastest. A correlation between the trait self-control measure and the chosen inter-exposure interval by the participants in the self-paced condition revealed that this was, again, not the case ($r = .35$, *ns*), although this could have resulted from the small sample.

We now turn to the enjoyment ratings of the game itself. A one-way (rate: *forced rate, self paced, yoked-rate*) ANOVA on retrospective enjoyment revealed a main effect ($F(2, 81) = 6.01$, $p < .01$, $\eta_p^2 = .13$) such that participants in the *forced rate* condition ($M = 5.02$) enjoyed the experience more than participants in either the *self-paced* condition ($M = 3.53$; $F(1, 81) = 7.40$, $p < .01$, $\eta_p^2 = .08$) or the *yoked-rate* condition ($M = 3.50$; $F(1, 81) = 8.46$, $p < .01$, $\eta_p^2 = .10$).

As was true in experiment 2, a similar, though less statistically powerful, pattern was observed for the in-experience ratings of enjoyment. A 3 (rate: *self paced, forced rate, yoked-*

rate; between) x 6 (round; within) mixed ANOVA on in-experience ratings of enjoyment revealed a main effect of *round* ($F(5, 405) = 4.51$, $p < .01$, $\eta_p^2 = .06$) such that enjoyment decreased with time, and, importantly, a 2-way interaction trending towards significance between *rate* and *round* ($F(5, 405) = 1.43$, $p = .16$, $\eta_p^2 = .03$) and a linear component of *round* by *rate* interaction ($F(1,81) = 5.07$, $p < .05$, $\eta_p^2 = .06$). As can be seen in figure 3, whereas enjoyment remained more or less constant for participants whose rate of exposure was fixed at a slow rate, it decreased for those with more rapid rates, whether set by them or by us. We confirm that the enjoyment ratings of those in the two more rapid paced conditions decreased by computing slopes for each participant. We then conduct a one-way ANOVA (rate: *self paced, forced rate, yoked-rate*) on these slopes and observed a main effect ($F(2, 81) = 3.12$, $p < .05$), $\eta_p^2 = .07$, such that enjoyment for participants in the *forced rate* condition decreased more slowly ($M_{slope} = -.01$) than for those in either the *self-paced* condition ($M_{slope} = -.19$; $F(1, 81) = 3.07$, $p = .08$, $\eta_p^2 = .04$) or the *yoked-rate* condition ($M_{slope} = -.23$; $F(1, 81) = 5.07$, $p < .05$, $\eta_p^2 = .06$). Indeed, participants in the *forced rate* condition experienced no satiation (*average-β* = -.01; one-sample t-test against 0: $t(42) = -.20$, *ns*) while those in the *self-paced* condition (*average-β* = -.19; one-sample t-test against 0: $t(18) = -2.34$, $p < .05$, $d = 1.10$) and the yoked condition (*average-β* = -.23; one-sample t-test against 0: $t(21) = -2.86$, $p < .01$, $d = 1.25$) did.

These results suggest that the act of *choosing* the rate of consumption is not what drives the decrease in enjoyment, but rather the rate itself. Importantly, consistent with the previous experiments, for both participants in the *self-paced* ($r = .59$, $p < .01$) and the *yoked-rate* ($r = .66$, $p < .001$) condition, those who experienced a longer interval time, also enjoyed the experience more.

Finally, though there were again no effects of the manipulation on enjoyment of the concurrent task ($p > .15$), there was an effect of *rate* on how happy participants were with the rate of consumption. Participants who chose their own rate of consumption were happier with the rate itself ($M = 5.05$) than participants whose rate was chosen for them ($M = 2.95$, $F(1, 81) = 10.66$, $p < .01$) or, marginally, whose rate was yoked with the rate of participants from the previous experiment ($F(1, 81) = 3.29$, $p = .07$). We again return to this difference in the next experiment..

EXPERIMENT 4

In all of our previous experiments, the outcome of interest was the enjoyment of the stimulus itself. Though this is the most relevant variable in the study of satiation, other dimensions of enjoyment may have varied across the different conditions in our previous experiments: enjoyment of the concurrent experience and enjoyment associated with being able to make a choice (Langer and Rodin, 1976). Though, as we already reported, enjoyment of the concurrent experiences did not vary with respect to the rate of consumption, the enjoyment associated with the mere act of choosing the rate of consumption did. Specifically, though only directional in experiments 1A ($M_{Self\ Paced} = 6.18$, $M_{Forced\ Rate} = 5.17$) and 1B ($M_{Self\ Paced} = 6.08$, $M_{Forced\ Rate} = 5.45$), the difference was statistically significant in experiments 2 ($M_{Self\ Paced} = 5.51$, $M_{Forced\ Rate} = 3.14$) and 3 ($M_{Self\ Paced} = 5.05$, $M_{Forced\ Rate} = 2.95$, $M_{Yoked\ Rate} = 3.73$). When combined in a meta-analytic manner (Rosnow and Rosenthal 2007) we observed a reliable effect ($Z = 4.9$, $p < .001$) suggesting that the enjoyment associated with the act of choosing a rate of consumption

is affected by our manipulation. Moreover, these results suggest that the benefits of spaced consumption may be at least somewhat offset by the loss of enjoyment associated with the mere act of making a decision about the rate of consumption. That is, whereas enjoyment of the focal stimulus is lower when participants are free to choose their own rate of consumption, enjoyment associated with the act of choosing is higher. Of course, the relative strengths of these inputs on overall enjoyment are unknown. Thus, even though participants may have reported enjoying the act of choosing more in, say, the *self-paced* condition of experiment 3, this increase in overall enjoyment may not have offset the overall decrease in enjoyment associated with consuming too quickly.

Accordingly, the present experiment sought to identify an optimal context for consumers deciding on a rate of consumption, in which they can experience the benefits of a slower rate and the benefits associated with making a decision about consumption timing. We accomplish this by adding a condition in which we allow participants to choose a rate of consumption, but within a very constrained range of options that force them to choose a relatively slow rate. In this way, they will have made a choice (though one that is not all that substantive), and will still consume slowly. We predict that this new condition will not only yield more enjoyment of the target stimulus as compared to when consumers are free to choose any rate they like, but will also lead to more enjoyment of the overall experience than when consumers are merely forced to experience a slow rate of consumption.

Method

Ninety six participants (38 female, 57 male, 1 unknown; average age = 28.5) were recruited off the street in Pittsburgh and asked to participate in a Food Tasting Study involving M&Ms in exchange for $5. Eleven participants (distributed approximately evenly across conditions) refused to eat all of the M&Ms and were thus excluded from further analyses, resulting in usable data from 85 participants.

Participants were informed that they would be involved in a "10 minute experience" during which they would eat six sets of five M&Ms. They were further informed that, in-between consuming the sets of M&Ms, they would complete a simple clicking task (the same one used in experiments 2 and 3), and that if they finished eating all of the M&Ms before the 10 minutes were up, they would be required to complete the simple clicking task for the remainder of the time. Next, participants were randomly assigned to one of three conditions. Participants in the *free choice (*analogous to previous *self-paced* conditions) and *constrained choice* conditions were asked to choose an inter-consumption interval that would maximize their enjoyment of the M&Ms. Participants in the *free choice* condition made this choice on a scale ranging from 10 seconds to 100 seconds, and participants in the *constrained choice* condition made this choice on a scale ranging from 80 seconds to 100 seconds, thus forcing them to choose an inter-consumption interval that was relatively long. Participants in the *forced rate* condition made no such choice and their inter-consumption rate was fixed at the maximum possible time of 100 seconds (allowing, given 10 minutes of total time, on average, about 17 seconds to consume each set of M&Ms, an amount of time pre-determined to be sufficient to consume the M&Ms).

Next, participants were presented with a container that was divided into six equal compartments containing five M&Ms each. The compartments were labeled one through six and participants were instructed to only eat the M&Ms when the compartment number was indicated

by the program. Participants then ate the sets of M&Ms, one at a time, at either the chosen inter-consumption interval (*free choice* and *constrained choice* conditions) or at the pre-determined inter-consumption interval (100 seconds; *forced rate* condition). Following each set of M&Ms, participants indicated how much they enjoyed eating them (1 = I Hated Them, 9 = I Loved Them). Once the 10 minute period had concluded, participants indicated how much they enjoyed eating all of the M&Ms (1 = I Hated Them, 9 = I Loved Them), how happy they were with the rate at which they consumed the M&Ms (1 = Not at All Happy, 9 = Very Happy), how much they enjoyed the entire 10 minute experience (1 = I Hated It, 9 = I Loved It) and completed the same trait self-control scale used in experiments 2 and 3. Finally, as in experiment 2, participants were asked to imagine that they would re-experience the same experiment again and asked to pick an inter-consumption interval that would maximize their enjoyment on the same scale used by participants in the *free choice* condition (10 seconds to 100 seconds).

Results

We first examine the inter-consumption interval chosen by participants in the two *choice* conditions. Not surprisingly, participants in the *free choice* ($M = 44.83$) condition chose to consume faster than participants in the *constrained choice* ($M = 85.00$) condition ($t(54) = 7.22$, $p < .001$, $d = 1.96$). However, of note, participants in the *free choice* condition chose to consume more than twice as fast as those in the *forced rate* condition, while those in the *constrained choice* condition chose to consume (because they were constrained to do so) only slightly faster than those in the *forced rate* condition. Again, one possible explanation for why participants chose such a short inter-consumption interval in the *free choice* condition is that they lacked the

self-control to select a longer one. If this were the case then we would expect that participants who have a particularly low ability to regulate self control would choose to consume the fastest. A correlation between the trait self-control measure and the chosen inter-exposure interval by the participants in the choice conditions revealed that this was not the case (r = -.03, *ns*).

Next, we turn to the retrospective measures of enjoyment of the M&Ms. A one-way ANOVA (rate: *free choice, constrained choice, forced rate*) on this measure of enjoyment revealed a main effect ($F(2, 82) = 3.31$, $p < .05$, $\eta_p^2 = .08$). Planned comparisons revealed that participants in the *free choice* condition ($M = 5.41$) enjoyed the M&Ms marginally less than either those in the constrained choice condition ($M = 6.3$; $F(1, 82) = 3.19$, $p = .08$, $\eta_p^2 = .04$) or those in the *forced rate* condition ($M = 6.72$; $F(1, 82) = 6.20$, $p < .05$, $\eta_p^2 = .07$). This same pattern of results was observed in the in-experience measures of enjoyment of the M&Ms. A 3 (rate: *free choice, constrained choice, forced rate;* between subjects) x 6 (iteration; within subjects) mixed ANOVA revealed only a 2-way interaction ($F(10, 410) = 2.38$, $p < .01$, $\eta_p^2 = .06$) and a linear component of *round* by *rate* interaction ($F(2,82) = 7.59$, $p < .05$, $\eta_p^2 = .10$).As can be seen in figure 4, whereas enjoyment of the M&Ms stayed relatively flat for participants in the *forced rate* and *constrained choice* conditions, it decreased significantly for those in the *free choice* condition. We confirmed that the enjoyment ratings of the M&Ms of those in the *free choice* condition decreased relative to those in the other two conditions by computing slopes for each participant. We then conducted a one-way ANOVA (rate: *free choice, constrained choice, forced rate*) on these slopes and found a significant main effect ($F(2, 82) = 4.68$, $p < 0.05$, $\eta_p^2 = .10$), such that enjoyment for participants in the *free choice* ($M = -.18$) condition decreased considerably faster than for those in either the *constrained choice* condition ($M = .06$; $F(1, 82) = 9.04$, $p < .01$, $\eta_p^2 = .10$) or the *forced rate* condition ($M = -.03$; $F(1, 82) = 3.89$, $p = .05$, $\eta_p^2 =$

.05). Of note, there was no difference in the slope of enjoyment across the *constrained choice* and the *forced rate* conditions ($F(1, 82) = 1.14$, *ns*). Indeed, participants in the *forced rate* condition (*average-β* = -.03; one-sample t-test against 0: $t(28) = -.45$, *ns*) and participants in the *constrained choice* condition (*average-β* = .06; one-sample t-test against 0: $t(26) = 1.12$, *ns*) experienced no satiation while those in the *free choice-paced* condition (*average-β* = -.18; one-sample t-test against 0: $t(29) = -3.10$, $p < .01$, $d = 1.15$) did.

As with all the previous experiments, we also observe a strong positive correlation between the inter-consumption interval and retrospective enjoyment ($r = .68$, $p < .01$) for participants in the *free choice* condition suggesting that the longer the interval that participants chose, the more they enjoyed the candies. However, we observed no such correlation for participants in the *constrained choice* condition ($r = .19$, *ns*). This is likely due to the fact that the range of possible inter-consumption intervals was limited.

In addition to the primary dependent measures related to enjoyment of the M&Ms, we also included a measure asking participants to indicate how happy they were with the rate at which they consumed the candies. We observed that despite the fact that participants in the *constrained choice* and *forced rate* conditions enjoyed the M&Ms the most, a one way ANOVA ($F(2, 82) = 3.32$, $p < .05$, $\eta_p^2 = .08$) revealed that, compared to participants in the *forced rate* condition ($M = 4.72$), participants in the *free choice* ($M = 6.00$; $F(1, 82) = 5.86$, $p < .05$, $\eta_p^2 = .07$) and *constrained choice* ($M = 5.78$; $F(1, 82) = 3.85$, $p = .05$, $\eta_p^2 = .05$) conditions were happier with the rate at which they consumed. This suggests that there may be more than one input to overall enjoyment of an experience. In this case, at least two components are salient: the enjoyment of the M&Ms and the enjoyment associated with choosing a rate to consume at. If so, then we would expect that enjoyment of the entire 10 minute experience may be highest when

participants not only have a longer inter-consumption interval, resulting in greater enjoyment of the M&Ms, but also when they are allowed to choose that interval themselves. Accordingly, a one-way ANOVA on participants' enjoyment of the entire 10 minute experience ($F(2, 82) = 4.73$, $p < .05$, $\eta_p^2 = .10$) revealed that participants in the free choice condition ($M = 4.76$; those whose enjoyment of the M&Ms was lowest) still enjoyed the overall experience the least as compared to participants in either the constrained choice ($M = 6.37$; $F(1, 82) = 9.46$, $p < .01$, $\eta_p^2 = .10$) or, directionally, the forced rate ($M = 5.55$; $F(1, 82) = 2.38$, $p = .13$, $\eta_p^2 = .03$) conditions. However, though only directional, it appears that participants in the constrained choice condition (those who both chose an inter-consumption interval and, due to the constraint, enjoyed the M&Ms for a longer period of time) enjoyed the overall experience more than participants in the forced rate condition ($F(1, 82) = 2.44$, $p = .12$, $\eta_p^2 = .03$); those who did not have the benefit of actually making a choice). This result suggests that the best consumption experience is one in which consumers not only experience a longer inter-consumption interval, but choose that interval themselves.

However, as has been observed in all of the previous experiments, when consumers are given relatively free rein over what inter-consumption interval to set, they choose to consume too quickly. Similar to experiment 2, we can now ask if consumers are able to learn from the mistakes of their bad choices or from the benefits of the choices imposed on them by us. To test this question, we conducted a similar one-way ANOVA on the new interval that participants said they would set if they were to re-experience the experiment again, and found no effects of any kind ($Fs < 1$). Regardless of the experience that participants just had, they all indicated that they would consume roughly at the same rate in the future ($M = 44.32$ seconds). This suggests that participants in the *free choice* condition who consumed too quickly believed that consuming

more slowly would not be beneficial and participants in the *constrained choice* and *forced rate* conditions did not appreciate that the longer inter-consumption interval was the reason for their prolonged enjoyment of the M&Ms. Indeed, it seems that the lesson learned from experiment 2 applies here as well: even when the inter-consumption interval is made salient for consumers, they do not appreciate that longer intervals lead to greater enjoyment.

GENERAL DISCUSSION

The consequences of overly fast consumption can be seen all around us. The music lover sets a favorite album on "repeat" only to find it less and less enjoyable each time it plays (or who suddenly gets sick of it). The chocolate aficionado eats one too many chocolates and discovers that the richness of the cocoa begins to lose some of its appeal. Perhaps even the inseparable lovers who insist on sharing every moment together may wonder later whether a little absence might have made their hearts grow fonder.

The present research documents and identifies one important mechanism that contributes to this phenomenon. Across four experiments, participants consumed a well-liked food or played an enjoyable video game either at their own pace or at a longer pace dictated by the experimenter. In all cases, although participants left to their own devices did tend to space consumption, they did so less than their online and retrospective evaluations suggested was optimal, at least from a hedonic perspective. Specifically, in experiments 1A and 1B, participants who chose their own consumption schedule enjoyed the stimulus less (1A) and, because of this, ate fewer chocolates (1B) than those who had a longer inter-consumption interval chosen for

them. In experiment 2, participants chose to play rounds of an enjoyable video game too quickly, resulting in more satiation than when their rate of consumption was slowed down by us. Moreover, this was true regardless of whether participants were first asked to predict what effect various inter-consumption intervals would have on their enjoyment of the video game, suggesting that consumers' beliefs about the effects of inter-consumption intervals on satiation are faulty. Next, in experiment 3, we show that the effect of faster consumption on satiation is driven by the rate itself and not by the act of *choosing* that rate. Finally, in experiment 4, we show that enjoyment of the overall consumption experience, at least in our experiments, is driven not only by the enjoyment of the focal stimulus, but also by the act of making a decision about consumption. Specifically, when participants are given the ability to choose a rate of consumption, and that decision is constrained to force them to consume slowly, they enjoy the overall experience more than participants who either choose their rate of consumption in an unconstrained manner, or those whose rate of consumption is chosen for them.

The fact that excessive consumption is partly attributable to under-appreciation of satiation does not mean that lack of self-control does not also often play a role. There is no shortage of studies that attest to the powerful influence of appetites on people's ability to restrain consumption (Wertenbroch 1998), and there is little doubt that excessive consumption resulting from lack of self-control also leads to overly fast satiation. However, our results also suggest that this phenomenon is more than a mere failure of self-control. Participants tended to select sub-optimally short inter-consumption intervals even though those choices were made prior to the act of consumption and before any tempting stimuli were presented (experiments 1, 2, 3, and 4) and when the consumption was merely hypothetical (1A, follow up study). Moreover, participants who lacked self-control, in general, chose to consume no faster than those whose ability to

regulate self-control was quite strong (experiment 2, 3 and 4), although these last findings should be treated with caution given the prevalence of null-findings with individual difference measures. That is, our lack of correlation could be attributed either to a true lack of relationship between trait self control and selected consumption rate or to less interesting reasons, such as a lack of statistical power or a failure to correctly measure self-control. That said, taken together, these results at least suggest that consumers did not choose to consume too quickly because of self-control or self-regulation failures alone (Baumeister, et al. 1994; Polivy and Herman 2002). If consumers understood that consuming too fast would decrease their pleasure, then they might try to regulate their rate of consumption, and self-control could become relevant. However, if they don't understand the pernicious effects of excessively rapid consumption, it is unlikely that they will take efforts to slow down. One additional observation related to self control and satiation is that it may be possible that satiation primarily occurs only in situations where self control is an issue. That is, to the extent that satiation requires a hedonic component (Frederick and Loewenstein 1999), when a stimulus lacks such a component, neither satiation nor self control failures are likely to exist. The corollary, then, must also be true: stimuli that have hedonic components not only engender satiation, but also self-control dilemmas. This makes it that much more interesting that, in the situations examined in our studies, we find little evidence that self-control played a role in the consistently observed pattern of excessively rapid consumption.

Nor could participants' choices be attributed to failures to apply generally correct beliefs about the benefits of longer inter-consumption intervals. When asked whether longer inter-consumption intervals would lead to slower satiation, participants reported believing the exact opposite: longer inter-consumption intervals would lead to *faster* satiation (study 2). Moreover,

though they were reminded to consider the inter-consumption interval in a consequential decision, they still failed to do so. Taken together, these results suggest that consumers lack the knowledge that longer inter-consumption intervals slow satiation. Though, as we discussed in the introduction, this lack of knowledge is likely limited to situations in which the inter-consumption interval is relatively short; certainly, consumers recognize that consuming two steaks in a row will lead to greater satiation than consuming the same two steaks on successive weekends.

Given the benefits of slowed-down consumption documented by the studies just presented, it is interesting to contemplate, and would be worth studying, what types of interventions would be likely to help consumers to slow their own consumption. Experiment 2 suggests that merely highlighting the fact that inter-consumption intervals are relevant is insufficient to clue consumers to the fact that slower consumption can lead to greater enjoyment. What, then, might? It is possible that specific and continuous feedback would help consumers choose to consume more slowly. For instance, if after satiating too rapidly due to excessively rapid consumption, consumers were explicitly told that they could have enjoyed the experience more had they slowed down, perhaps they would learn to slow their consumption in the future. Similarly, to the extent that consumers lack the correct lay beliefs about consumption timing in the first place, perhaps merely educating them to the benefits of spaced consumption would lead them to slow down. However, it is also possible that such insight would be insufficient; once consumers became aware of the benefits of slower consumption, it is quite possible that self-control problems would prevent many from realizing the potential gains of their new understanding.

In all of our experiments, the focal stimuli were, by design, enjoyable. An interesting line of questioning for future research involves consumers' decisions about consumption timing for

aversive stimuli. For instance, would consumers choose to consume these types of stimuli too slowly, and fail to benefit from the adaptation that occurs with rapid exposure to negative stimuli? Or, would consumers treat these stimuli just like they do positive stimuli and choose to consume quickly, thus sensitizing more rapidly?

One apparent limitation of our results is that, for most of our experiments, the average inter-consumption interval selected by participants in the self paced conditions was towards the middle of the scale used to elicit their responses. For instance, in experiment 1a, participants who could choose an inter-consumption interval from 10 to 200 seconds long and chose one that was, on average, 93.1 seconds long (middle = 95). If participants used a simple heuristic of picking responses towards the middle of the scale, then the chosen consumption times may be an artifact of our elicitation technique. This, however, was not the case. We examined the distribution of chosen inter-consumption intervals across all of our experiments and found no evidence of a mass of responses towards the middle of the response scales. Indeed, if anything, responses were fairly uniformly distributed across the full range of possible responses. Accordingly, there is no evidence that participants merely responded towards the middle of the scale when selecting an inter-consumption interval.

Our results are particularly relevant for marketing managers. To the degree that consumers are ill adept at optimizing their consumption schedules, firms can help them, and thus make their product more appealing. For example, a firm selling a product intended for repeated consumption could partition the individual components to reduce consumption speed (Cheema and Soman 2008). We argue that, to the extent that such partitioning is successful in reducing the speed of consumption, it is also likely to increase enjoyment of the overall consumption experience. For example, a cookie company could either package their product in a single

container holding, say, 20 cookies or in five individually wrapped containers of four. The latter may slow consumption and increase consumer enjoyment. Of course, this presents a potential problem when we consider unhealthy goods. If partitioning, or any other mechanism designed to slow consumption, is employed with, say, candies, as experiment 1B demonstrates, though enjoyment would likely be increased, so would consumption, with its associated negative consequences. Indeed, this may be exactly what is happening with the 100-calorie packs that have become popular in the United States (Horovitz, 2006; Myers 2006, Scott et al. 2008). Whereas businesses appear to be quite successfully selling smaller portion sizes of their products (Thompson 2006), these packages may have the perverse effect of causing people to eat *more*. Indeed, Scott and colleagues (2008) found just this. Though they argue that the reason for greater consumption is due to self-control failures, our research suggests that it may also be due to the fact that smaller packages slow consumption, which in turn results in slower satiation and greater overall consumption.

Finally, these findings raise the obvious question of why, given the ubiquitous nature of satiation, people do not learn that longer inter-consumption intervals would be optimal. In experiments 2 and 4, participants failed to update their beliefs about the benefits of longer inter-consumption intervals when tasked with making a similar decision about consumption timing. Those participants who chose to consume too quickly failed to realize that the decline in their enjoyment of the stimulus was a result of the speedy rate at which they consumed. And those participants whose rate was chosen for them to be slower failed to realize that the lack of decline in their enjoyment of the stimulus was a result of the slower rate at which they consumed. It seems, then, that regardless of whether participants were allowed to make their own mistakes, or had their mistakes remedied by us, they still chose to consume too quickly again in the future.

Though the exact reason for this failure to learn is not addressed by the current studies, we suspect that part of the explanation lies in the multi-determined nature of enjoyment. As we show in experiment 4, enjoyment of the focal stimulus is only one component of overall enjoyment. When consumers are tasked with evaluating why a particular experience was or was not enjoyable, their attributions can focus on any one or more of a number of different dimensions that led to that enjoyment, and the inter-consumption interval does not appear to be a particularly salient dimension for the average consumer. Indeed, at least for the range of time intervals examined in our studies, consumers may not even have the right directional intuitions.

Regardless of the cause, the present research suggests a clear prescription. When in the fortunate position of being able to choose how often to consume the things one enjoys, space out consumption. For marketers, the prescription is to give consumers choice, but limit choices to inter-consumption intervals that are sufficiently long as to enhance their enjoyment. As figures 1-4 suggest, not only will the consumption experience last longer, but it will be more enjoyable as well.

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Table 1

Pilot Study: Predicted Change in Enjoyment Over Time*

Inter-Consumption Interval	Average Response**	Significantly Different From Mid-point of Scale at .05 Level
Back-to-Back	2.56 $(0.13)_a$	Yes; Below
1 minute	2.63 $(0.11)_{ab}$	Yes; Below
2 minutes	2.68 $(0.10)_{ab}$	Yes; Below
5 minutes	2.62 $(0.10)_a$	Yes; Below
10 minutes	2.81 $(0.11)_b$	Yes; Below
60 minutes	3.02 $(0.10)_c$	No
1 day	3.16 $(0.11)_c$	No
1 week	3.36 $(0.13)_d$	Yes; Above

*1 = I will enjoy them much less over time, 2 = I will enjoy them slightly less over time, 3 = I will enjoy them the same over time, 4 = I will enjoy them slightly more over time, 5= I will enjoy them much more over time

**Values in parentheses represent standard errors. Values that do not share the same subscript are different from one another at the .05 level of significance.

FIGURE 1

Experiment 1A: Enjoyment of the Hershey Kisses over time by rate.

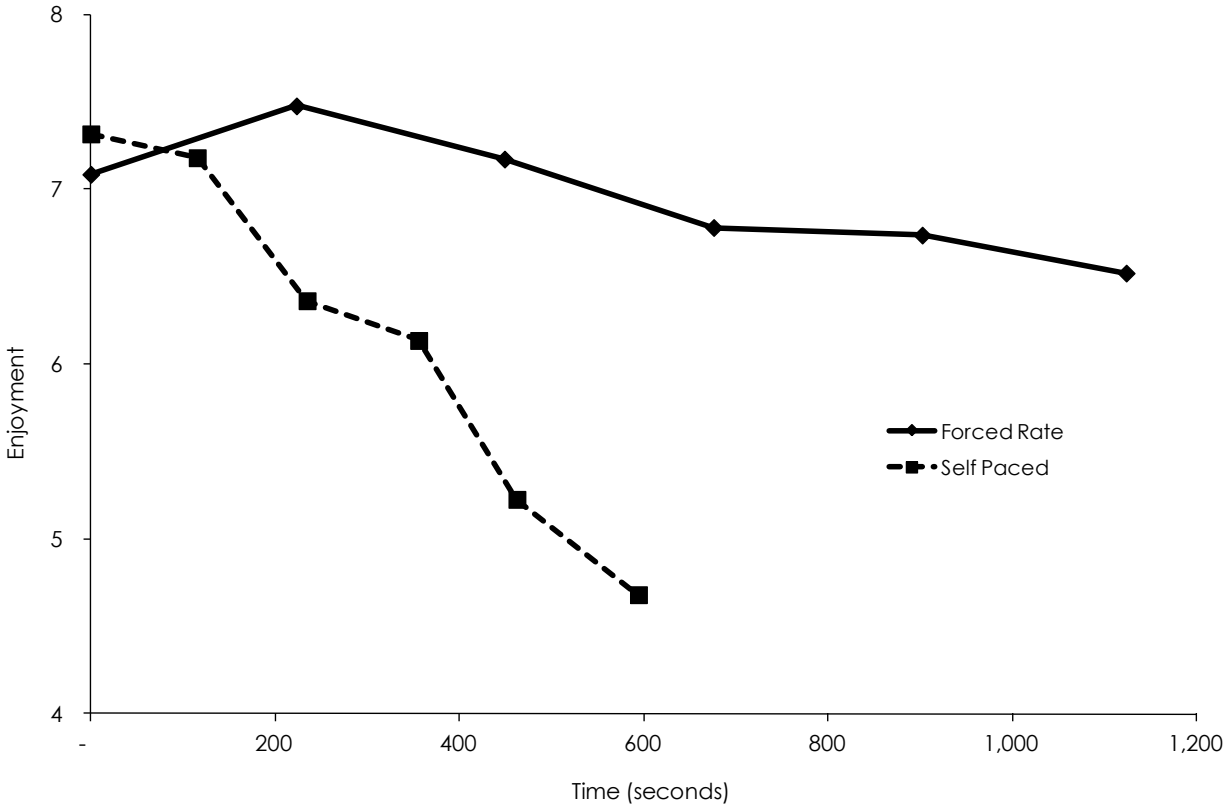

FIGURE 2

Experiment 2: Enjoyment of the video game over time by rate.

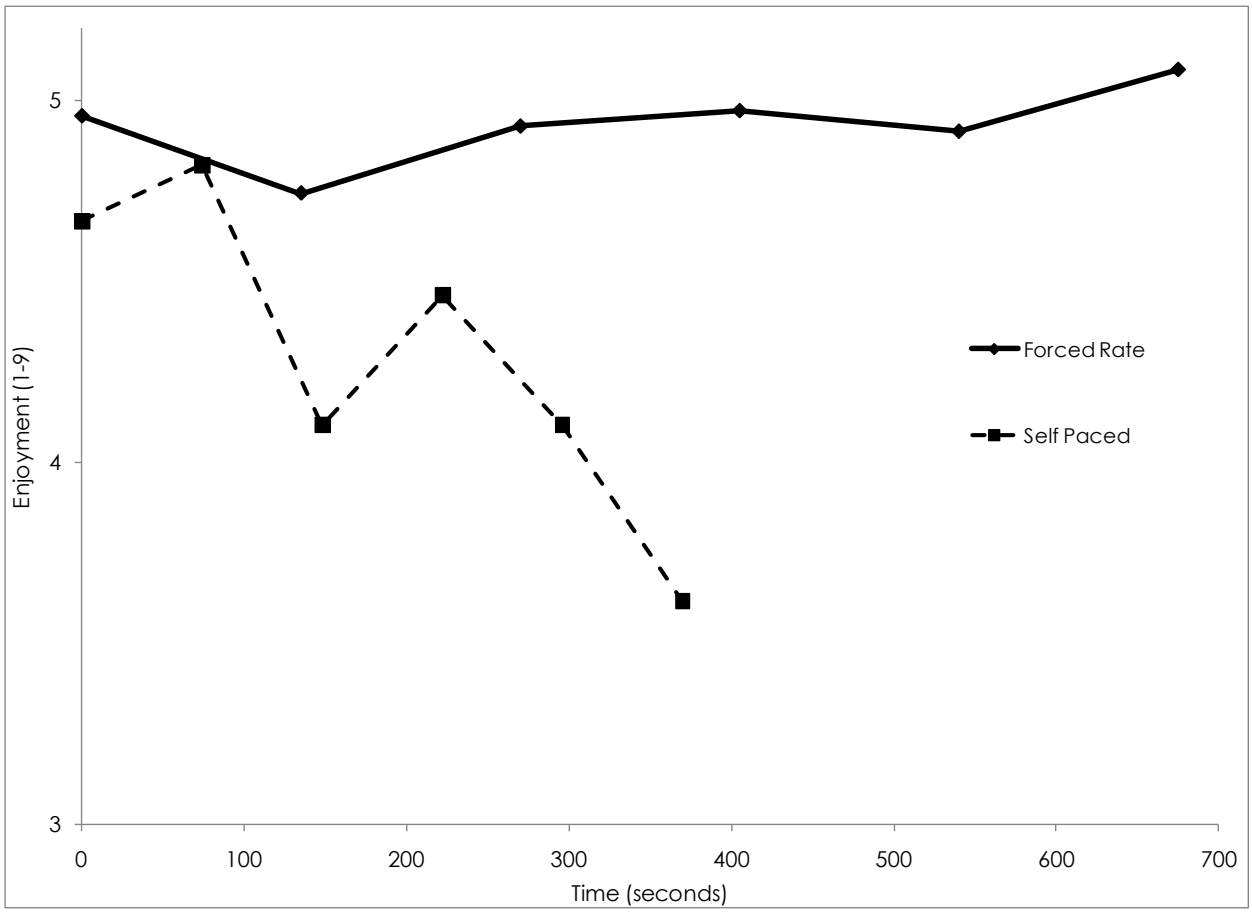

FIGURE 3:

Experiment 3: Enjoyment of the video game over time by rate.

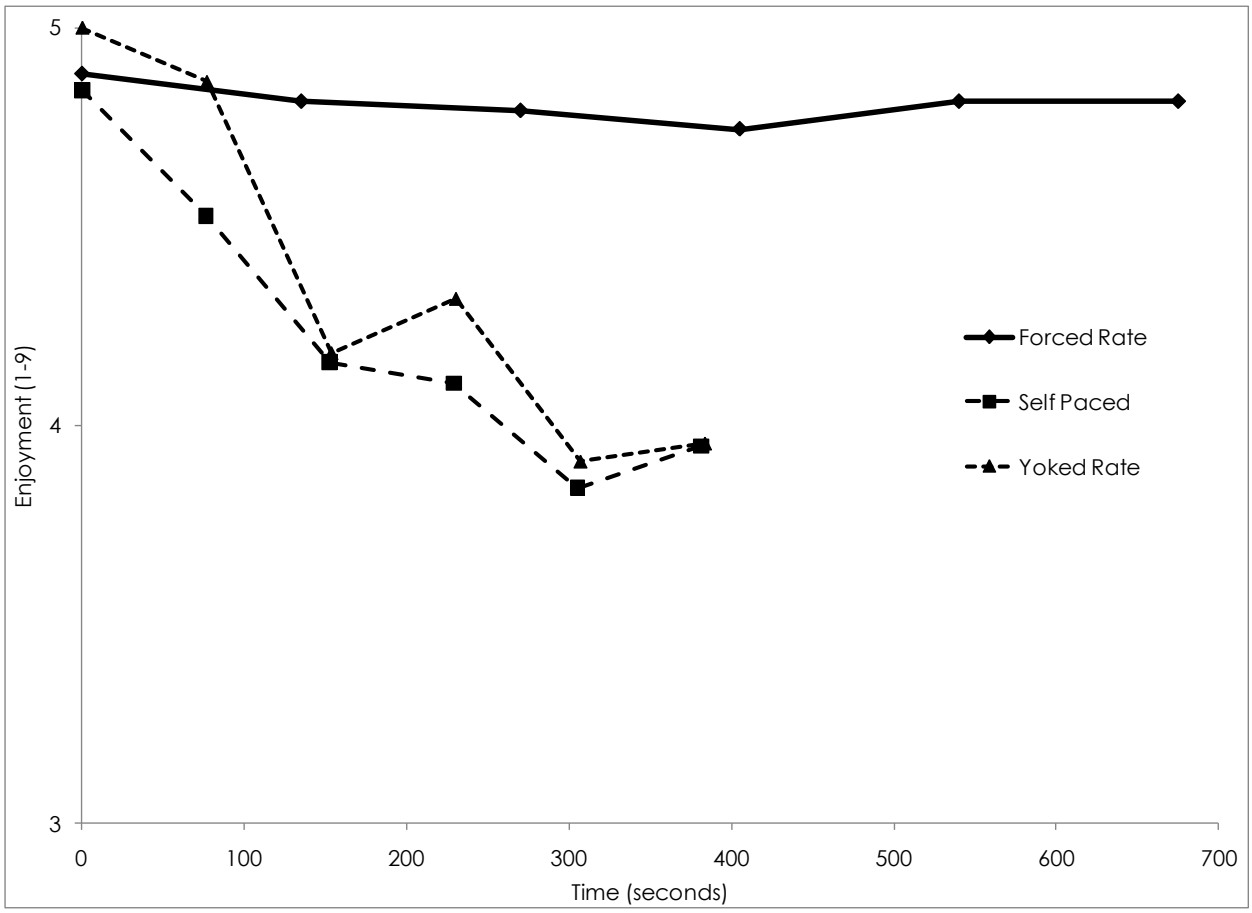

FIGURE 4

Experiment 4: Enjoyment of the M&Ms over time by inter-consumption interval condition.