



## Research report

## Does liking or wanting determine repeat consumption delay? ☆

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## ABSTRACT

Does liking or wanting predict the delay between consumption episodes? Although these psychological processes are correlated, we find that memory for liking, rather than wanting, determines the number of days that pass until the consumption of a food is repeated. Experiment 1 found that liking (but not wanting) for a food at the end of a consumption experience predicted how many days passed until participants wanted to consume it again. Experiment 2 showed that mitigating the decrease in liking resulting from the repeated consumption of a food eliminates its effect on delay. Together, these findings suggest that end liking has a greater influence on when people will consume a food again in the future.

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## Introduction

Eating is not an isolated incident. People eat a variety of foods, but the consumption of most foods is repeated. People eat the same meals each month at their favorite restaurants. The same breakfasts (e.g., toast or cereal) and beverages (e.g., coffee or soda) are often consumed several times in a single week. In this paper, we examine how changes in the response to a food that occur as a result of its consumption influence the number of days that pass until its consumption is repeated. Specifically, we focus on the influence of two important changes that occur while eating: the reduction in the extent to which one enjoys or likes eating the food and the reduction in the extent to which one wants to eat more of it. The purpose of this investigation is to determine which process (i.e., liking vs. wanting) plays a greater role in determining the delay until one consumes that food again.

## Liking vs. wanting

Although extant research has shown that how much one likes and wants a stimulus are related psychological constructs (Berridge, 1996; Berridge & Robinson, 2003), diverse physiological studies support the notion that these constructs are distinguishable

(e.g., Berridge & Zajonc, 1991; Dai, Brendl, & Ariely, 2010; Havermans, 2012). While liking and wanting both decrease with repeated consumption in a single episode (Rolls, Rolls, Rowe, & Sweeney, 1981), liking and wanting do not always increase or decrease in conjunction. For example, difficulty acquiring a desired stimulus (e.g., a person or consumer good) results in increased wanting but decreased liking for that stimulus (Dai, Dong, & Jia, 2013; Litt, Khan, & Shiv, 2010). Additionally, intense wanting for addictive substances is not necessarily coupled with enjoyment of their consumption (Kelley & Berridge, 2002). Moreover, liking and wanting appear to have distinct neural substrates, such that liking is encoded by sensory and valuation regions such as the ventromedial prefrontal cortex whereas wanting is encoded by efferent regions such as the nucleus accumbens (Knutson, Fong, Adams, Varner, & Hommer, 2001).

Liking, or palatability, refers to one's hedonic responses to a food and is a triggered affective state that requires no motivation for further reward (Berridge, 2009). It is most commonly operationalized as the change in affect that is observed using a technique to analyze taste reactivity patterns in rats (Grill & Norgren, 1978). Such patterns are thought to provide a relatively accurate indication of liking because they can be decoupled from the desire to eat (which is typically associated with wanting; Berridge, Venier, & Robinson, 1989), and because they can be isolated from the sensory properties of taste (Berridge, 2000). In humans, however, liking is commonly operationalized as subjective ratings of palatability (Finlayson, King, & Blundell, 2007b).

Wanting, on the other hand, refers to one's motivation and appetitive drive to consume a food and can be triggered simply

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by imagining the sight, smell, and taste of a food (Berridge, 2009; Kavanagh, Andrade, & May, 2005). When wanting is high, it makes the desired food more attractive and attention grabbing. Increased wanting causes rats and pigeons to mistakenly perceive auto-shaped cue light as the desired food because they attempt to eat it (Flagel, Akil, & Robinson, 2008; Jenkins & Moore, 1973). In humans, increased wanting can trigger thoughts of eating (Berridge, 2009).

#### Effects on repeat consumption delay

Liking and wanting are thus distinct psychological processes that both contribute to in vivo food intake, but we argue that episodic memory for liking is a greater driver of the delay until one repeats a consumption episode. This hypothesis is based on research suggesting that changes in liking are more stable than changes in wanting (Berridge & Robinson, 1998, 2003). Past studies demonstrate that novel tastes can make wanting return to initial levels almost immediately (Epstein, Caggiula, Rodefer, Wisniewski, & Mitchell, 1993). Conversely, the passage of time is needed in order for liking to be restored to initial levels (Galak, Kruger, & Loewenstein, 2011). Furthermore, food aversion effects are found when people have an extremely unpleasant (i.e., negative liking) experience with a food, but are not typically found when people eat until they are overfull (i.e., negative wanting; Logue, 1985). We thus suggest that liking is more likely than wanting to influence decisions about when to repeat the consumption of a food.

We further speculate that the end, rather than beginning, level of liking is a key predictor of future consumption delay. Consistent with research examining whether an individual chooses to repeat the consumption of a food and how much they choose to consume (Galak, Redden, & Kruger, 2009; Robinson, Blissett, & Higgs, 2011), the decision of when to repeat the consumption of a food should also be influenced by the recollection of the most recent episode. Although the beginning and end of an episode are both likely to be prevalent in memory, recency effects have been shown to more potently influence choices of which experiences to repeat in the future (e.g., Redelmeier & Kahneman, 1996). For example, research participants exhibited a preference to repeat a trial in which they submersed their hands in a 14 C ice water bath for 60 s that was then raised to 15 C for an additional 30 s rather than a trial in which they only submerge their hand in a 14 C for 60 s, presumably because the former had a better ending (Kahneman, Frederickson, Schreiber, & Redelmeier, 1993). Furthermore, research on food aversion suggests that disgust experienced after a meal (e.g., nausea or illness resulting from ingestion) has a stronger influence on attitudes toward that food than disgust experienced prior to consumption (e.g., expectations instilled by one's culture; Rozin & Fallon, 1987). In line with this work, we suggest that a recency effect for liking will be similarly influential in deciding when to repeat the consumption of food.

We report two experiments conducted to test our hypothesis. In Experiment 1, we manipulated liking and wanting for chocolate truffles in a field experiment and examined whether end liking or end wanting determined the number of days that passed until participants wanted to consume those truffles again. Experiment 2 provides additional evidence that end liking determines delay by disrupting the encoding of liking in order to attenuate the previously documented effects and negate the difference in delay between participants who eat a small or large portion. Together, the results suggest that recollection of one's end liking of a consumption experience, and not end wanting, determines the observed and desired delay until one consumes that food again.

## Experiment 1

### Methods

#### Participants

Eighty undergraduate students in two classes (40 students in each class) taught by the same professor at a university in Pittsburgh, PA were invited to participate in the experiment. The second class was taught immediately after the first. Both classes were held in the afternoon during normal business hours, at 1 pm and 2 pm. Of the 80 students that were invited, 43 agreed to participate (58% male,  $M_{\text{age}} = 20.12$ ). There were no significant differences in participation rate across classes,  $\chi^2 = .21$ ,  $p = .65$ .

#### Procedure and design

Participants were assigned to condition by class. Liking and wanting were manipulated by varying the portion size of the food that participants ate. Participants assigned to the small portion size condition ate one milk chocolate Lindor truffle (70 calories). Participants assigned to the large portion size condition ate four milk chocolate Lindor truffles (280 calories). A pre-test ( $N = 20$ ) revealed that four truffles are sufficient to produce changes in liking and wanting as four truffles was not significantly different from the mean number of truffles that participants ate when they were instructed to continue eating truffles until they no longer wanted to continue, ( $M = 4.1$ ,  $SD = 1.7$ ),  $t(19) < 1$ ,  $p = .79$ .

Before consuming the truffle(s), all participants rated their current state of hunger on a 7-point scale with endpoints, *Not at all* (1) and *Extremely* (7). Next, they were given the truffle(s) and rated the extent to which they liked eating each truffle and the extent to which they wanted to continue eating these truffles immediately after consuming each truffle on two 7-point scales with endpoints, *Not at all* (1) and *Extremely* (7). These explicit measures were used in order to tap into the explicit component of wanting as liking is most commonly an explicit measure (Finlayson et al., 2007b). This rating approach is justified as it has been shown that explicit wanting, which is truer to the colloquial understanding of the word, implies both cognitive and conscious involvement (Berridge, 2004).

Participants were then given a coupon that entitled them to a free bag of truffles that could be obtained from an administrative assistant at any time during normal business hours any day in the subsequent two weeks. A coupon code matched the responses of each participant to the delay until they redeemed their coupon. The administrative assistant noted the day upon which the coupon was redeemed. All participants (100%) redeemed their coupon to obtain their free bag of truffles.

## Results and discussion

### Liking and wanting

To rule out alternative explanations, we compared initial hunger, liking, and wanting ratings between the small and large portion conditions. No significant differences were found in hunger levels at the time the study was completed,  $t(41) = .38$ ,  $p = .71$ , initial liking ratings of the truffles,  $t(41) = .31$ ,  $p = .76$ , or initial ratings of wanting,  $t(41) = .97$ ,  $p = .34$ .

Analyses of the final ratings revealed a significant effect of condition,  $t(41) = 5.21$ ,  $p < .001$ , such that participants in the large portion condition reported significantly lower end liking ( $M = 4.80$ ,  $SD = 1.67$ ) than did participants in the small portion condition ( $M = 6.70$ ,  $SD = .47$ ). An independent samples  $t$ -test was also conducted on the end wanting rating, revealing a significant effect of condition,  $t(41) = 6.56$ ,  $p < .001$ , such that participants in the large portion condition reported significantly lower end wanting

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