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Research report

"Yummy" *versus* "Yucky"! Explicit and implicit approach–avoidance motivations towards appealing and disgusting foods

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ABSTRACT

Wanting and rejecting food are natural reactions that we humans all experience, often unconsciously, on a daily basis. However, in the food domain, the focus to date has primarily been on the approach tendency, and researchers have tended not to study the two opposing tendencies in a balanced manner. Here, we develop a methodology with which to understand people's implicit and explicit reactions to both positive (appealing) and negative (disgusting) foods. It consists of a combination of direct and indirect computer-based tasks, as well as a validated food image stimulus set, specifically designed to investigate motivational approach and avoidance responses towards foods. Fifty non-dieting participants varying in terms of their hunger state (hungry vs. not hungry) reported their explicit evaluations of pleasantness, wanting, and disgust towards the idea of tasting each of the food images that were shown. Their motivational tendencies towards those food items were assessed indirectly using a joystick-based approach-avoidance procedure. For each of the food images that were presented, the participants had to move the joystick either towards or away from themselves (approach and avoidance movements, respectively) according to some unrelated instructions, while their reaction times were recorded. Our findings demonstrated the hypothesised approach–avoidance compatibility effect: a significant interaction of food valence and direction of movement. Furthermore, differences between the experimental groups were observed. The participants in the no-hunger group performed avoidance (vs. approach) movements significantly faster; and their approach movements towards positive (vs. negative) foods were significantly faster. As expected, the self-report measures revealed a strong effect of the food category on the three dependent variables and a strong main effect of the hunger state on wanting and to a lesser extent on pleasantness.

Introduction

It is popularly believed that eating is invariably under voluntary conscious control since the act itself requires the awareness of the consumer (Friedman, 2009). However, not all of the processes that control eating habits are necessarily explicit. In addition, the core processes of liking and wanting that underlie reward are distinct from the subjective report on, or the conscious awareness of, those processes (Berridge, 1996, 2009). That is, one may be aware of the act of eating while remaining unaware of the underlying processes that cause certain eating patterns (which can lead to "binge" or compulsive eating behaviours; see DSM V). Moreover, in considering just the psychological mechanisms that influence eating and reward, one could assume that both implicit and explicit processes likely intervene.

The strength of impulses towards food as well as the control of temptations, or the rejection of certain disliked foods, can be investigated by measuring approach and avoidance motivations. Humans spontaneously approach positively evaluated, attractive stimuli and avoid negatively appraised, aversive stimuli and events (e.g., Cacioppo, Priester, & Berntson, 1993). Thus, the immediate perception and evaluation of positive and negative stimuli are inherently linked and automatically activate motivational approach–avoidance orientations (e.g., Neumann, Förster, & Strack, 2003; Strack & Deutsch, 2004) and can also depend on other contextual factors as well, such as one's needs or goals (Fishbach & Shah, 2006). In the literature, approach and avoidance tendencies towards food stimuli, often represented through names or pictures, have been studied by means of direct and indirect procedures. Note that in the sensory and consumer research domains these tendencies are more commonly described as wanting and rejection, respectively (see, e.g., Köster, 2009).

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To measure these motivational responses indirectly, many researchers have followed the pioneering work of Solarz (1960), who made a link between evaluation and approach–avoidance motivation. In Solarz's early study, participants were shown 92 positive and negative object words written on separate cards. Half of the participants in the study were instructed to pull a lever towards themselves if they liked the object represented by the stimulus word and to push it away if they did not; the other half of the participants were given the opposite instructions. In the meantime, the reaction times (RTs) of the participants' movements were recorded. The results revealed that participants were faster when pushing disliked stimuli away from themselves and were faster when pulling to indicate liking.

In the food domain, an early study by Staats and Warren (1974) used a similar approach–avoidance procedure (henceforth referred to as AAP). On this occasion, participants (food-deprived *versus* non-deprived) were sequentially shown food or non-food words. They were not informed in which direction they had to move the lever on each trial, they just had to learn it based on the feedback provided while their RT of each trial was recorded. The authors demonstrated that those participants who had been deprived of food learned to respond more rapidly with an approach response to food words than with an avoidance response. Moreover, this difference was of a reduced magnitude with non-deprived participants. In addition, in a second experiment, Staats and Warren asked their participants to move certain target words (including food names) towards themselves while neutral names had to be moved away. Food-deprived participants learned to make approach responses to food words more rapidly than did non-deprived participants. However, the palatability of the foods represented in the cards in these studies was not mentioned.

More recently, Seibt, Häfner, and Deutsch (2007) conducted three studies designed to examine how food deprivation influences the immediate perceived valence of food stimuli as well as people's spontaneous motivational tendencies towards them. Using an Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), these researchers assessed the perceived valence of food names as a function of the participant's need state. As expected, food deprivation led to a more positive perceived valence for food items. Through an AAP (see also Chen & Bargh, 1999; De Houwer, Crombez, Baeyens, & Hermans, 2001), Seibt et al. were able to demonstrate that approach reactions towards food pictures were facilitated for hungry as compared with satiated participants, even in a sample of individuals suffering from eating disorders (bulimia nervosa and anorexia). Importantly, the participants of all these studies were told to respond as rapidly as possible in order to assess their impulsive approach–avoidance tendencies.

One point to highlight from the abovementioned studies is that the food images (or names) have been used generally as positive stimuli towards which individuals (mostly those in a state of hunger) would tend to show approach motivation. By contrast, not much research has been conducted considering the hedonic/affective component of the foods as a factor, or other sensory properties, which often give rise to different motivational mechanisms. For instance, some researchers (e.g., Finlayson, Arlotti, Dalton, King, & Blundell, 2011; Finlayson, King, & Blundell, 2007) have included photographs of foods categorised in terms of their fat content (high *versus* low) and taste (sweet *versus* non-sweet) in order to investigate the effect of meal-induced satiation on implicit and explicit processes (although they developed a computer-based procedure unrelated to the IAT or the AAP). However, no distinction in terms of hedonic or valence scores of the foods was made; that is, all of the images showed foods that were similarly palatable.

It could therefore be argued that most of the previous research published in this area has focused on the positive hedonic aspects of food and has overlooked others, such as disgust or rejection, when measuring motivational tendencies towards foods. In this regard, Hoefling (2008) reported that food deprivation increased approach motivation not only towards palatable, but also towards unpalatable food stimuli as well. In an AAP, those participants who had been deprived of food for 15 hours had an immediate motivational tendency to approach both palatable- and unpalatable-looking foods. Satiated participants, by contrast, only exhibited an approach tendency towards the foods that looked palatable. This is in line with recent studies (e.g., Lavender & Hommel, 2007; Rotteveel & Phaf, 2004) that have argued that the initiation of approach–avoidance movements is not only automatically determined by the perceived valence of a stimulus, but also depends on processing goals and intentions as well, as mentioned earlier. Hoefling et al. (2009) confirmed their previous results by recording the electromyographic activity in the region of the levator muscle (note that the M. Levator labii is responsible for raising the upper lip, and its activity therefore captures a central component of the disgust face) in food-deprived participants.

Disgust, like other basic emotions, has a characteristic facial expression associated with it, a specific physiological state (nausea), a behavioural component (distancing oneself from the offensive object), and a characteristic feeling state (revulsion; Rozin & Fallon, 1987; Rozin, Haidt, & McCauley, 1993). Rozin and Fallon have conceptualised disgust towards food, as "that form of food rejection that is characterised by revulsion at the prospect of oral incorporation of an offensive and contaminating object" (p. 24). Previously, Rozin and Fallon (1980) had explored the attitudes and reactions to rejected substances (which would commonly be labelled as "disgusting" by consumers). They observed patterns of attitudes that suggested the existence of at least three different psychological types of rejections: (1) Distaste, primarily motivated by the food's sensory characteristics; (2) Danger, mainly because of fear of bodily harm; and (3) Disgust, a strong affect-laden rejection based primarily on the uncertainty of the nature, origin, or social history (e.g., who had touched the food previously) and on the presumption that the food will taste bad. Note that in this paper, we will refer to "disgust" as the general concept merging these three types of rejection.

To date, no study has explored immediate approach and avoidance motivations towards appealing (positive) and disgusting (negative) foods indirectly in hungry (but not deprived) and not hungry (but not satiated) healthy participants, relating them with their explicit reports. The aim of the present study was therefore to investigate these behavioural mechanisms via a joystick-based AAP and to compare them with explicit measures of pleasantness, wanting, and disgust of experiencing the taste of the foods "right now".

The hypotheses to be tested with the AAP were that: (1) participants in the no hunger (NH) condition would have stronger avoidance reactions (faster RTs when moving the joystick away) for both positive and negative foods than those in the hungry (H) condition, who would show general approach tendencies (faster RTs when moving the joystick towards themselves); (2) NH participants would show a stronger avoidance tendency towards negative than towards positive foods, but that this difference would be more modest in the hungry participants, who would exhibit a stronger approach tendency towards positive foods; and (3) when shown neutral food images, the RTs of the two experimental groups would not differ as much as with the other food categories, but the H group would exhibit a stronger approach tendency than the NH group. Additionally, we hypothesised that implicit measures would not necessarily reflect the explicit evaluations of the foods, with the explicit ratings being much more extreme and showing a higher discrimination between positive and negative foods, and neutral images receiving intermediate scores.