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Early associations with food in anorexia nervosa patients and obese people assessed in the affective priming paradigm

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Abstract

Two experiments are reported that used the affective priming paradigm (Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardess, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, 50, 229–238) to uncover associations with food at a relatively automatic level. Experiment 1 tested the hypothesis that anorexia nervosa (AN; n=22) patients would show less sensitivity to the palatability of foods than unrestrained lean controls (n=27). Results indeed suggested that AN patients did not display a liking of palatable foods over unpalatable foods, whereas unrestrained controls did. Experiment 2 tested the hypothesis that obese people (n=27) would show more sensitivity to the palatability of (high-fat) palatable foods than unrestrained lean controls (n=27) would. However, results suggested that the priming effect was based on health concerns, in that participants showed a preference for low-fat palatable foods over high-fat palatable foods. Average speed of responding and context are discussed as variables influencing the affective priming effect. Taken together, results suggest that food evaluations at a relatively automatic level are controlled by an interaction between participant characteristics, stimuli characteristics, and the specific context.

Keywords: Affective priming paradigm; Anorexia nervosa; Obesity; Food preferences; Fat content; Context

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Ideally, people consume the foods they like when hungry, while at the same time pay attention to the healthiness of the foods and suitable portion size, resulting in a balanced, healthy and palatable diet. However, several groups of people can be identified for whom food is more troublesome than that. An example is the growing proportion of obese people in the Western society (Wadden, Brownell, & Foster, 2002). Obesity at least partly results from overconsumption of high-fat (palatable) foods (Hill & Peters, 1998). For obese people, high-fat palatable foods may be extra desirable (e.g., Rissanen et al., 2002). A very different group of people is formed by patients diagnosed with anorexia nervosa (AN). They are underweight and thus seem very 'successful' at restricting their food intake. As Pinel, Assanand, and Lehman (2000) propose, this severely reduced food consumption could be related to a reduction of the positive incentive value of foods. In other words, food may have become less desirable.

So, different eating styles or disorders may lead to differences in how people evaluate food, or what kind of associations they have with food. In the current research, we are interested in how this might translate to *relatively automatic* associations with food for both AN patients (Experiment 1) and obese people (Experiment 2). Prior research in our laboratory with restrained and unrestrained eaters (Roefs, Herman, MacLeod, Smulders, & Jansen, in press) and a recent study by Lamote, Hermans, Baeyens, and Eelen (2004) suggest that people make relatively automatic associations with foods based on their palatability. More specifically, results are indicative of a liking of palatable foods over unpalatable foods, at a relatively automatic level.

In these recent studies (Lamote et al., 2004; Roefs et al., in press), the affective priming paradigm (Fazio, Sanbonmatsu, Powell, & Kardess, 1986) was used. In this paradigm, two words (a prime followed by a target) are presented in quick succession. Participants just read the briefly presented prime, and only need to respond to the successively presented target. The idea behind this paradigm is that the presentation of the prime influences the speed and accuracy of responding to the target. Typically, congruent prime–target combinations (e.g., fun–flowers or disaster–death) lead to faster and more accurate responses than incongruent prime–target combinations (e.g., fun–death or disaster–flowers) (e.g., Fazio et al., 1986; for a review, see Klauer, 1998). The difference in response latencies (speed) or error percentages (accuracy) between incongruent and congruent trials is called the *priming effect*. The pattern of response latencies is informative regarding the positive and negative associations people have with the primes. Applied to the palatability of foods, if people respond faster on congruent trials (palatable prime–positive target or unpalatable prime–negative target) than on incongruent trials (palatable prime–negative target or unpalatable prime–positive target), it can be inferred that people like palatable foods more than unpalatable foods, and thus evaluate the palatability of foods at a relatively automatic level.

The affective priming paradigm is one of the so-called indirect measures that have recently been used quite often in psychopathology research (De Houwer, 2002). The advantages of using an indirect measure are twofold. First, these indirect measures can estimate people's responses toward various stimuli without directly asking them, thereby reducing the risk of socially desirable answering. Second, responses are assumed to be relatively automatic in these kinds of tasks (Klauer, 1998), because stimuli are presented only briefly and in quick succession. This relatively spontaneous association might deviate from an association that results from more controlled processing.[1]

[1] Note that using an indirect measure does not mean the measurement of an unconscious construct. People may very well be aware of their associations, but may not be aware of what the task is assessing (Fazio & Olson, 2003). The term automatic is not meant here as an equivalent of 'unconscious', but is meant to indicate that the employed indirect measure leaves insufficient time for the participants to strategically control their response.

1. Experiment 1

Many people attempt to diet, but eventually, most dieters cannot resist the temptation of palatable foods. AN patients on the other hand seem very capable of resisting the temptation of palatable foods. You could even call them extremely 'successful' dieters. According to the positive-incentive theory (Hetherington & Rolls, 1996; Toates, 1981), people start eating because of the expected pleasure of eating (positive-incentive value of food). Pinel et al. (2000) propose that "the decline in eating that defines anorexia nervosa is likely a consequence of a corresponding decline in the positive-incentive value of food (p. 1113)." Their hypothesis of a declined positive-incentive value is based on the fact that eating can have adverse physiological effects after a period of food deprivation. Their (Pinel et al., 2000) ideas seem consistent with predictions derived from a conditioning account of eating behavior (Jansen, 1998, 2001), although the proposed mechanism of why food may have lost its incentive value is different. The basic idea of the conditioning model of food intake is that cues (e.g., sight, smell, and taste of food or thoughts about the food) that reliably signal food intake (food intake is UCS) can become conditioned stimuli (CS). These conditioned stimuli can in turn trigger conditioned responses, such as salivation and insulin release, also termed cue reactivity. This cue reactivity is subjectively experienced as craving for food. AN patients may have increasingly fewer of these conditioning experiences because they often only handle food (e.g., cooking) while they mostly avoid eating food. As a result, they do not experience the rewarding effects of food as much as other people do. This may lead to an extinction of the conditioned response, and thus a loss of food's positive incentive value.

Supporting these theories, different studies, either using psychophysiological or self-report measures (Lappalainen, Sjödén, Hursti, & Vesa, 1990; LeGoff, Leichner, & Spigelman, 1988, but see Broberg & Bernstein, 1989), found a reduced reactivity to the palatability of food in AN patients or fasting participants. Another line of research mainly focused on the sensitivity to the rewarding effects of food in AN patients. In line with the proposed theory of Pinel et al. (2000), Davis (2001) suggests that AN patients are more anhedonic than normal controls. Anhedonia is defined as a deficit in experiencing pleasure. Davis and Woodside (2002) found higher anhedonia scores in AN patients (see also Davis & Scott-Robertson, 2000), and argue that the high anhedonia scores of AN patients make food less pleasurable and thus restriction easier. It is easier to resist something that does not offer pleasure. The stress associated with extreme dieting then in turn likely leads to even higher anhedonia scores. It might then be hypothesized that also at a relatively automatic level, AN patients show a reduced sensitivity to the palatability of food. In Experiment 1, using the affective priming paradigm (Fazio et al., 1986), the hypothesis was tested that AN patients would show a reduced affective priming effect as compared to a lean control group, because food may have lost its incentive value. In other words, the hypothesis was tested that the palatable–positive and the unpalatable–negative associations would be less strong for the AN group than for the lean control group at a relatively automatic level. To test whether this effect might be specific for high-fat foods—the foods that are especially threatening for ones figure—stimuli did not only vary in palatability, but also in fat content.

1.1. Method

1.1.1. Participants

The anorexia group (AN; DSM 4th ed., APA, 1994) included 19 female anorexia nervosa patients and 3 female patients diagnosed with eating disorder not otherwise specified (EDNOS), anorectic subtype (age: M=20.6, S.D.=6.3; BMI[2]: M=15.7, S.D.=1.8; Range=12.4–17.51; Restraint Scale: M=17.4, S.D.=5.1; EDE-Q global score: M=3.3, S.D.=1.2). The three EDNOS participants met the criterion of being underweight (BMI<17.51). Sixteen of the AN patients were of the restricting type and three were of the bingeing/purging type. The control group included 27 female lean unrestrained eaters (age: M=20.4, S.D.=5.8; BMI: M=21.9, S.D.=1.6; Range=19.3–24.2; Restraint Scale: M=7.3, S.D.=2.3; EDE-Q global score: M=0.5, S.D.=0.4). Restraint status was determined on the basis of the Restraint Scale (Herman & Polivy, 1980). A participant qualified as an unrestrained eater when she scored 14 or below on the Restraint Scale. The two groups of participants were matched on age and on time of testing. The groups differed significantly on BMI, Restraint Scale, and EDE-Q global score, all p's<0.001.[3]

1.1.2. Stimulus selection and timing of trials in the priming task

1.1.2.1. Primes. Six high-fat palatable foods (e.g., chocolate), six low-fat palatable foods (e.g., strawberries), six high-fat unpalatable foods (e.g., bacon), and six low-fat unpalatable foods (e.g., radish) served as primes (see Appendix A). The four groups of primes did not differ significantly in word length, $F(3,20)<1$. Palatability was determined on the basis of a pilot study, in which female university students (n=64) were asked to put a list of high-fat foods and a list of low-fat foods on order of palatability.

1.1.2.2. Targets. Twenty-four general positive (e.g., 'gift') and 24 general negative (e.g., 'pain') words served as targets (see Appendix A), and were selected according to word norms by Hermans and De Houwer (1994). The two groups of stimuli obviously differed significantly in pleasantness (negative: M=2.0, S.D.=0.31 vs. positive: M=6.0, S.D.=0.29), $t(46)=46.25$, $p<0.001$. There were no significant differences between the two groups of stimuli in affective extremity (negative: M=2.0, S.D.=0.31 vs. positive: M=2.0, S.D.=0.29), $t(46)<1$, or word length (negative: M=6.2, S.D.=2.02 vs. positive: M=6.79, S.D.=2.13), $t(46)<1$. However, a small significant difference in familiarity ratings was found (negative: M=4.8, S.D.=0.45 vs. positive: M=5.1, S.D.=0.48), $t(46)=2.38$, $p<0.05$. See Appendix A.

1.1.2.3. Trial specification. Each of the three blocks consisted of 48 trials, resulting in a total of 144 trials. Stimulus presentation was randomized. The timing of trials was modeled after the procedure of Hermans, de Houwer, and Eelen (2001). Each trial started with a warning tone (200 ms), followed by a fixation cross (500 ms). Then the prime was presented for 150 ms. After a 150 ms stimulus onset asynchrony (SOA)—the time that elapses between the onset of the prime and the onset of the target—the target was presented on the monitor. The target remained on the monitor until a response was given or for 2500 ms if no response was given. If an error was made or a response was either too slow or too fast, or if no response at all was given, a warning appeared on the screen for 300 ms. The inter-trial interval was 2500 ms.

1.1.3. Procedure

Participants started with the affective priming task. After 16 practice trials, they were given a free recall test for the primes (see Zack, Toneatto, & MacLeod, 1999). This task was included to ensure that

[2] BMI=Body Mass Index=weight/height^2.

[3] Nine *additional* participants—not included in the groups described above—were tested but were excluded from all analyses, because of a high percentage (>M+3S.D.) of trials with errors or responses that were either too slow (>2000 ms) or too fast (<200 ms) (AN, n=1), or because of weight gain (BMI>17.9) at the time of testing (AN, n=4). Four lean controls were excluded because they were either overweight, underweight, or scored above 14 on the Restraint Scale (weight and restraint status were determined after completion of the study).

participants paid attention to both primes and targets. After the memory task, the actual priming task began. Subsequently, a manipulation check was performed to check whether participants realized what the computer task assessed. For anorexia patients, the final task was to complete the Restraint Scale (Herman & Polivy, 1980). Control participants were asked to fill out the Restraint Scale and the EDE-Q (Fairburn & Beglin, 1994; Fairburn & Cooper, 1993; anorexia patients filled out the EDE-Q at the time of admittance to the eating disorder unit).

1.1.4. Design

Data were analyzed using a 2 (target affect: positive vs. negative)×2 (fat content prime: high-fat vs. low-fat)×2 (palatability of prime: palatable vs. unpalatable)×2 (group: AN vs. control) analysis of variance (ANOVA), with repeated measures on the first three factors. An interaction between prime and target indicates that there is a priming effect (i.e., that the presentation of the prime influences the speed and accuracy of responding to the target). Note that there can be an interaction between prime *palatability* and target affect, suggesting an automatic evaluation of taste, and an interaction between prime *fat content* and target affect, suggesting an automatic evaluation of *fat content*. Moreover, these three factors can combine in one interaction, which means that the priming effect might be specific for only one type of food (e.g., only a palatability priming effect for the high-fat foods). Partial eta-squared (η^2) is reported as a measure of effect size for all analyses.

1.2. Results and discussion

The reported analyses are for the dependent variable response latency (speed). Analyses on percentages of errors (accuracy) did not produce relevant significant results. Response latencies associated with

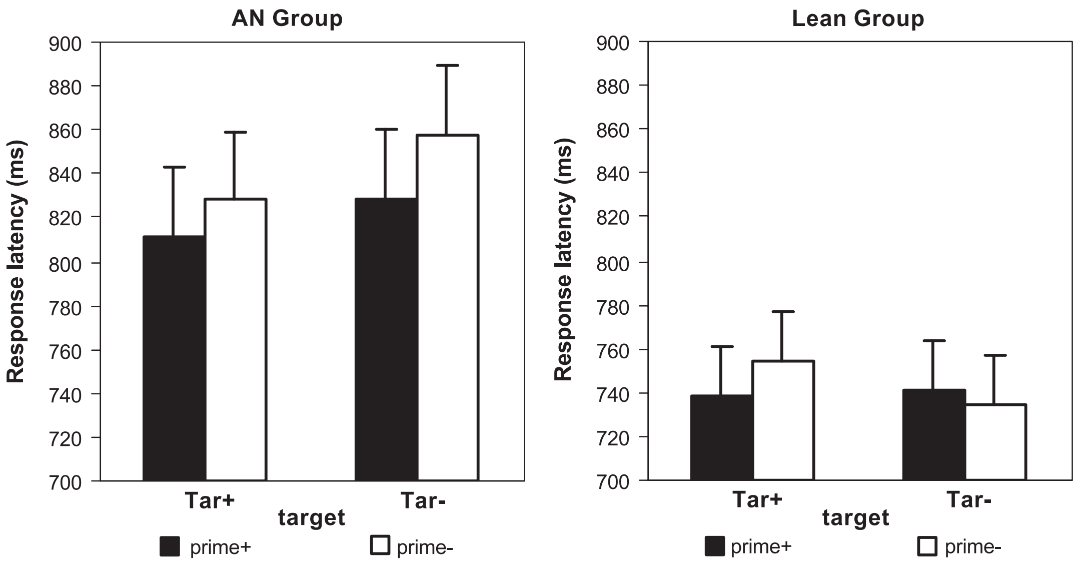

Fig. 1. Experiment 1: Mean response latencies for the target affect×prime palatability interaction, separately for the AN group and the lean control group. The means are collapsed over the factor prime fat content. Error bars represent the standard error of the mean (S.E.). The top panel represents the AN group, and the bottom panel the lean control group. Tar+=positive target, Tar−=negative target, prime+=palatable food prime, prime−=unpalatable food prime.

responses that were either too fast (<200 ms) or too slow (>2000 ms) were discarded, a total of only 0.44% of all trials. Response latencies associated with error responses (3.8%) were also discarded. See Fig. 1 for relevant means and standard errors.

As hypothesized, results suggest that the AN group was not sensitive to the palatability of the food primes in the affective priming task, whereas the control group was. The three-way target affect×prime palatability×group interaction was marginally significant, $F(1,47)=3.13$, $p=0.08$, $\eta^2=0.06$, and qualified a target affect×group interaction, $F(1,47)=5.13$, $p<0.05$, $\eta^2=0.10$, a main effect of prime palatability, $F(1,47)=6.22$, $p<0.05$, $\eta^2=0.12$, and a main effect of group, $F(1,47)=5.89$, $p<0.05$, $\eta^2=0.11$. In a separate analysis on the AN group, it appeared that the palatability of the prime did not influence AN patients' responding to the target, $F(1,21)<1$. Results of a separate analysis on the control group suggest that prime palatability did influence the control participants' responding to the target. Control participants tended to be faster on congruent trials (palatable–positive or unpalatable–negative) than on incongruent trials (palatable–negative or unpalatable–positive). This target affect×prime palatability interaction was marginally significant, $F(1,26)=3.99$, $p=0.056$, $\eta^2=0.13$. Prime fat content did not influence the priming results, as it was not involved in any significant interaction with target affect, all F's$(1,47)<1$.

2. Experiment 2

For Experiment 2, our hypothesis for the obese group was actually the opposite from our hypothesis for the AN group in Experiment 1. Pliner, Herman, and Polivy (1990) review evidence that obese people are more sensitive to the palatability of foods. In one study, for example (Spiegel, Shrager, & Stellar, 1989), obese participants consumed more than lean controls of the highly preferred food, and slightly less than lean controls of the nonpreferred food. In another study (Nisbett, 1968)—that was actually the first to explicitly study obese–lean differences in finickiness—it was found that a palatability manipulation had the greatest effect on the obese people, in that obese people ate more of good-tasting ice cream than lean controls. Obese and lean controls ate about the same amount of the bad-tasting ice cream.

Apart from being more sensitive to the palatability of foods in general, several studies suggest that obese people have a specific preference for high-fat (palatable) foods. Different studies suggest that obese people consume more of their daily calories in fat, although the evidence is not entirely conclusive (Bray & Popkin, 1998; Jéquier, 2002; Lissner & Heitmann, 1995; Willett, 1998). Other studies specifically focused on the *preference* for high-fat foods, and were supportive of a heightened preference for high-fat foods (e.g., Drewnowski, Kurth, Holden-Wiltse, & Saari, 1992; Gerding & Weinstein, 1992; Rissanen et al., 2002).

Based on these lines of research, Experiment 2 tested the hypothesis that obese people would show a stronger priming effect based on palatability as compared to a lean control group. More specifically, it was hypothesized that the obese group would have stronger positive associations with palatable foods and stronger negative associations with unpalatable foods than a lean control group. Moreover, it was hypothesized that this positive association would be most pronounced for high-fat palatable foods. In other words, it was hypothesized that their stronger preference for palatable foods would be specific for the high-fat foods.

2.1. Method

2.1.1. Participants

The obese group included 27 female obese participants (age: M=36.5, S.D.=8.8; BMI: M=40.3, S.D.=7.4, Range=30.1–65.6; Restraint Scale: M=19.3, S.D.=3.8), and the control group included 27 female lean unrestrained eaters (age: M=36.6, S.D.=8.7; BMI: M=22.0, S.D.=1.5, Range=18.4–24.8; Restraint Scale: M=8.4, S.D.=3.2). The two groups of participants were matched on age and on time of testing. The groups differed significantly on BMI and the Restraint Scale, both p's<0.001.[4]

2.1.2. The experiment

The specifications of the affective priming task, the direct measures and the procedure were exactly the same as in Experiment 1. The only exceptions being that the EDE-Q (Fairburn & Beglin, 1994; Fairburn & Cooper, 1993) was not included, and that testing took place in a quiet room at a local hospital. For all analyses partial eta-squared (η^2) is reported as a measure of effect size.

2.2. Results and discussion

The reported analyses are for the dependent variable response latency. Analyses on percentages of errors did not produce relevant significant results. Response latencies associated with responses that were either too fast (<200 ms) or too slow (>2000 ms) were discarded, a total of only 0.45% of all trials. Response latencies associated with error responses (2.6%) were also discarded. See Fig. 2 for relevant means and standard errors.

A marginally significant target affect×prime fat content×prime palatability interaction, $F(1,52)=3.72$, $p=0.06$, $\eta^2=0.07$, qualified a main effect of target affect, $F(1,52)=37.92$, $p<0.001$, $\eta^2=0.42$. A separate analysis for the palatable food items, suggests that participants preferred low-fat foods over high-fat foods. The target affect×prime fat content interaction for palatable items was marginally significant, $F(1,52)=2.98$, $p=0.09$, $\eta^2=0.05$. This effect suggests that health concerns influenced the priming effect. For unpalatable items, the target affect×prime fat content interaction was absent, $F(1,52)<1$. A possible explanation for the different pattern of results for palatable and unpalatable foods may be that people have stronger negative associations with high-fat palatable foods (e.g., chocolate) than with high-fat unpalatable foods (e.g., bacon), because these high-fat palatable foods are exactly the foods that are often craved but considered forbidden in a typical weight loss diet. Results did not differ between groups; none of the interactions involving target affect, prime (fat content or palatability) and group were significant, all F's(1,52)<1.07.

[4] Based on beforehand defined exclusion criteria several additional participants—not included in the groups described above—were excluded from all analyses. Six additional participants had medical problems with the thyroid gland. One additional participant was under the influence of alcohol at the time of testing. Two additional participants had a high percentage (>M+3S.D.) of trials with errors or responses that were either too slow (>2000 ms) or too fast (<200 ms). Ten additional control participants scored 15 or above on the Restraint Scale or were overweight (BMI>25) (weight and restraint status were determined after the participant completed the study).

3. General Discussion

In line with the proposed theory of Pinel et al. (2000) and the conditioning model of eating behavior (e.g., Jansen, 1998), the AN group did not show a palatability priming effect. They did not display any evidence of positive associations with palatable foods or negative associations with unpalatable foods, when tested in the affective priming paradigm. In line with prior research (e.g., Davis & Woodside, 2002; LeGoff et al., 1988), these results suggest that the palatability of food may no longer be an important characteristic of food for AN patients, whereas this is very important for most people (Eertmans, Baeyens, & Van den Bergh, 2001; Pliner & Mann, 2004). As Pinel et al. (2002) also suggest, this 'symptom' of AN patients makes food restriction easier, in that it is easier to resist something that is not considered pleasurable. Possibly, when AN patients start eating more again—and experience the

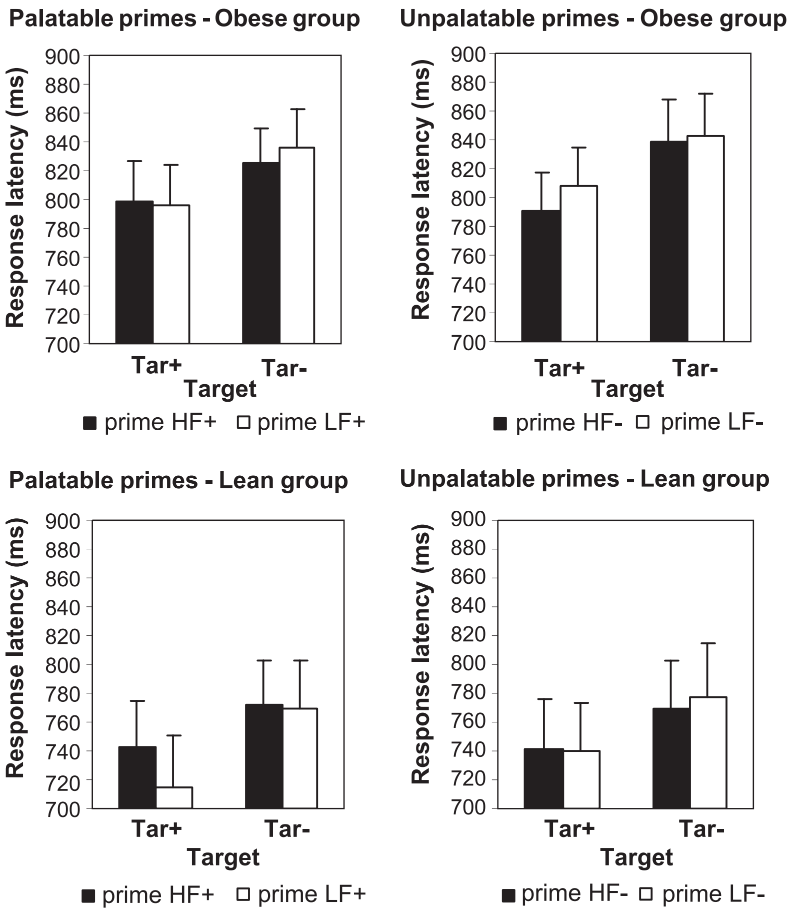

Fig. 2. Experiment 2: Mean response latencies for the target affect×prime fat content interaction, represented separately for palatable and unpalatable primes, and separately for each group (obese and lean control group). Error bars represent the standard error of the mean (S.E.). The top two panels represents the obese group, and the bottom two panels the lean control group. Tar+=positive target, Tar−=negative target, Prime HF+=palatable high-fat food, Prime LF+=palatable low-fat food, Prime HF−=unpalatable high-fat food, Prime LF−=unpalatable low-fat food.

rewarding effects of food-palatability of food may become important again. This in turn would make food restriction more difficult. It is also possible that a more explicit treatment is necessary to restore palatability as an important characteristic of food. This might for example be achieved by frequently pairing the sight or taste of palatable food with actual consumption (classical conditioning).

As hypothesized, the control group in Experiment 1 did evaluate the palatability of the foods in the affective priming task, in that their results reflected a liking of palatable foods over unpalatable foods. These results are perfectly in accordance with prior research using the affective priming paradigm to assess food likes and dislikes (Lamote et al., 2004; Roefs et al., in press) in which similar results were found. However, unexpectedly both the obese group and the lean control group in Experiment 2 did not base their evaluation of the foods on the palatability, a finding that may seem difficult to reconcile with the findings of Experiment 1. More specifically, in Experiment 2, both groups of participants showed a preference for low-fat palatable foods over high-fat palatable foods. This suggests that their responses were controlled by health and weight concerns.

Notably, the findings of Experiment 2 resemble other prior research in our laboratory (Roefs & Jansen, 2002) with a *different* indirect measure, the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998). Importantly, fat content was very salient in the IAT study, because food stimuli had to be categorized as either high-fat or low-fat. In this IAT study, both an obese group and a normal weight control group preferred low-fat foods over high-fat foods, and this effect was most pronounced for the obese group. Thus, health and weight concerns instead of palatability probably controlled the responses in this IAT experiment. In the current experiments—using the affective priming paradigm—participants were not required to classify foods as either high-fat or low-fat, thereby avoiding a focus on the fat content. Probably, participants spontaneously classified the foods as being high-fat vs. low-fat, instead of being palatable vs. unpalatable. As Olson and Fazio (2003) pointed out, correspondence between the IAT and the affective priming paradigm can only be expected when participants categorize the stimuli in an affective priming task according to the same feature (e.g., fat content) as in an IAT.

Why then would both an obese group and a normal weight control group (Experiment 2) 'spontaneously' base their evaluations of the food on fat content instead of palatability? Admittedly health and weight concerns are strong for obese people, but in the study by Roefs et al. (in press), a group of restrained eaters—who are concerned about weight—based their evaluation of foods on palatability as well, and displayed the same pattern of results as a control group of unrestrained eaters—a liking of palatable foods over unpalatable foods. So, the current findings of Experiment 2 stand in sharp contrast with prior findings with the affective priming paradigm (Lamote et al., 2004; Roefs et al., in press).

A possible explanation may be found in the average speed of responding (see Hermans, Smeesters, De Houwer, & Eelen, 2002). Notably, participants in the current experiments were relatively slow in comparison with prior research (Lamote et al., 2004; Roefs et al., in press). In Experiment 2, this was most pronounced for the obese group. As Hermans et al. (2001) showed, the priming effect is only present when the SOA is fairly short (150 ms is optimal). Probably, the automatic effect of the prime on the target dissipates at a longer SOA, because too much time for more controlled processing is available. Following the same line of reasoning, slower responding might cause the priming effect to disappear as well. Moreover, this slower responding may leave just enough time to realize the health or weight-related negative aspects of high-fat foods, resulting in a priming effect based on fat content—a negative association with high-fat foods. In other words, it could be that this understanding takes a little longer than an evaluation based on taste, and thus dominates the somewhat slower response. Interestingly, the

AN group in Experiment 1 was also slower than the control group, and their average speed of responding was similar to the obese group. This slowness in responding in the AN group might have contributed to the absence of a palatability priming effect in that group. Note that the absence of a palatability priming effect was not replaced by a fat content priming effect in the AN group. Exactly why the AN group and the obese group were relatively slow in the current experiments is unclear however. These groups might be slower in general, or they might have been slowed down by the presentation of the food words because food is a source of worries for them (compare the emotional Stroop effect; Williams, Mathews, & MacLeod, 1996).

However, the average speed of responding cannot be the only explanation for the absence of a palatability priming effect in Experiment 2, because the speeds of responding in the control groups of Experiments 1 and 2 were about equal, whereas their priming effects were very different. For the control groups, the priming effect in Experiment 1 was based on palatability, whereas it was based on fat content in Experiment 2. Possibly, the context in which Experiment 2 took place influenced the results. All participants in Experiment 2 were tested in a room in a local hospital, an environment which obviously emphasizes health. As Blair (2002) reviews, very subtle context manipulations can influence the outcome of indirect measures. So, the fact that Experiment 2 took place in a hospital may explain the current finding of Experiment 2 that participants focused on the healthiness of the palatable foods. Importantly, Experiment 1 took place in a more neutral environment, a test room in a university building.

Interestingly, the AN group was the only group that did not base their evaluation of the foods on palatability when tested in a neutral environment, whereas the control group in Experiment 1, and the participants in prior studies (Lamote et al., 2004; Roefs et al., in press), did—all tested in a neutral environment. It would be interesting to see how obese people would respond in a more neutral environment, or possibly an environment that emphasizes the palatability of the foods. This latter manipulation of emphasizing palatability would also be interesting for an AN group, to see if the situation can make them consider foods as (un)palatable again. As Mitchell, Nosek, and Banaji (2003, p. 467) put it, "automatic attitudes are defined within the context established by the situation". Mitchell et al. consider attitudes as online reconstructions, not as fixed entities that are simply retrieved from memory. As these authors also suggest, their and similar findings (see Blair, 2002 for a review) cast doubt on the idea of the existence of a single true attitude. In the case of attitudes toward foods, it certainly appears that how people evaluate foods is not simply controlled by the palatability of the foods or the specific characteristics of the participants. It seems to be an interaction between participant characteristics, stimuli characteristics, and the specific context.

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Appendix A

High-fat palatable foods: chocola (chocolate), chips (chips), friet (fries), croissant (croissant), pizza (pizza), roomijs (ice cream).

High-fat unpalatable foods: haring (herring), speklap (slice of bacon), pate (pate), boter (butter), pindakaas (peanutbutter), walnoten (walnuts).
Low-fat palatable foods: aardbeien (strawberries), druiven (grapes), meloen (melon), kip (chicken), popcorn (popcorn), drop (liquorice).
Low-fat unpalatable foods: spruiten (Brussels sprouts), witlof (chicory), zuurkool (sauerkraut), andijvie (endive), radijs (radish), kabeljauw (cod).
Positive targets: vrede (peace), trouw (loyalty), zomer (summer), knuffel (hug), romantiek (romance), zonneschijn (sunshine), humor (humour), lente (spring), geschenk (gift), verrassing (surprise), cadeau (gift), baby (baby), feest (party), schoonheid (beauty), geboorte (birth), bruid (bride), bloesem (blossom), verjaardag (birthday), regenboog (rainbow), vlinder (butterfly), wens (wish), hemel (heaven), boeket (bouquet), melodie (melody).
Negative targets: oorlog (war), haat (hatred), ongeluk (accident), drugs (drugs), werkloosheid (unemployment), ongeval (accident), pijn (pain), dood (dead), scheiding (divorce), puist (pimple), zorgen (worries), roddel (gossip), belediging (insult), verdriet (grief), afval (garbage), schade (damage), angst (fear), schuld (guilt), vrees (fear), examens (exams), gebrek (defect), paniek (panic), vuilnis (garbage), mug (mosquito).

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