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Self-control conflict in the eating domain

A cognitive, affective, and behavioral perspective

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Supplementary Materials 1

Is Conflict Adaptation Protected from Motivational Distraction by Food Cues?

This chapter is based on:

Becker, D., Jostmann, N. B., & Holland, R. W. (2016). *Is conflict adaptation protected from motivational distraction by food cues?* Unpublished manuscript.

In four studies we have shown that conflict adaptation is not fully protected in the presence of a motivational distractor (see Chapter 2). In those studies motivational distractors always represented monetary gain or loss cues. We chose to manipulate motivation with monetary cues because people are highly familiar with money and its motivational meaning, and because monetary cues have been shown to reliably trigger motivational processes (Pessiglione et al., 2007; Zedelius et al., 2014). Another type of cue that is also highly familiar to people as well as strongly motivational in nature is hedonic food cues (e.g., representing high calorie or sweet food). Hedonic food cues have been shown to attract attention and to consume working memory resources (Rutters, Kumar, Higgs, & Humphreys, 2015), which in turn can interrupt current task goal processing (see Higgs, 2015). We therefore predicted that presenting hedonic food cues at the non-target location of a present trial would have a similarly disruptive effect on conflict adaptation as monetary cues. Moreover, we also predicted that the disruptive powers of hedonic food cues will be much more pronounced for participants who are highly sensitive to food rewards (e.g., hungry).

Method

Participants

Sixty-four individuals participated in the current study. They were recruited via the University of Amsterdam participant panel and their participation was compensated with course credit or 5 euro. Participants were only allowed to take part in the study if they liked sweets, and if they had not eaten within the last 30 minutes.

Materials and Procedure

Before participants entered their individual cubicle, they passed by a little 'sweet shop' that resembled a pick and mix sweet stand (a table with three glasses of different sweets, bags and a weighing scale). The experimenter explicitly pointed out that this 'sweet shop' was part of the experiment. In the cubicle, participants gave informed consent, and started the main task. The main task was comparable to the one used in Study 2.4, in which participants were instructed to respond to the color of the inner circle (target) and to ignore the color and shape of an outer figure (non-target). The outer figure could have three different shapes: one that resembled a sweet and two that did not have a meaningful shape (see Figure SM1.1). They also learned that every time a sweet shape appeared, they automatically won 1 gram of sweets (independent of

present trial performance). They were told that at the end of the experiment they could visit the 'sweet shop' to pick the accumulated amount of sweets, but only if their overall accuracy level was above 80 % (see Study 2.4).

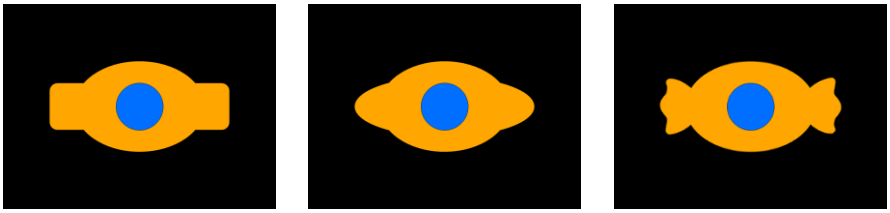

Figure SM1.1. Examples of incongruent stimuli used in the present study. The left and middle shape are meaningless, the right shape represents a sweet and signals the automatic gain of 1 gram of sweets.

The most significant changes with respect to Study 2.4 were the following. First, no initial training phase was administered because we expected the sweet shape to be distinct and meaningful enough (cf. euro-coin in Study 2.1 and 2.2). Second, whereas in Study 2.4 each trial started with the short presentation of the distractor stimulus (see Weissman, Egner, Hawks, & Link, 2015), that distractor prime was omitted in the present study. As a consequence, the present task resembled a traditional flanker task, rather than a temporal flanker task.

All other aspects of the main task were identical to the task used in Study 2.4: There were two practice phases, one in which only target circles were presented (32 trials) and one in which the whole stimulus (target and distractor figure) was presented (24 trials). The experimental phase comprised four blocks of 96 trials. Trial sequences were semi-controlled (see method section of studies in Chapter 2), and there were four response options (four colors), which were paired (blue and yellow vs. red and green) so that color combinations never repeated across two trials. Half way participants received interim performance feedback.

After participants had completed the task, they were asked several check questions (e.g., how much sweets they earned per sweet stimulus), and to evaluate all shapes (0 negative – 100 positive). If participants' overall accuracy was above 80% they were then allowed to pick the accumulated amount of sweets from the 'sweet-shop' (60 grams). Finally, they completed a short questionnaire including demographic information, current hunger and craving levels (visual analogue scale ranging from 0 to 100), their height and weight, the concern for dieting subscale (6 items measured on 4 point scales, $\alpha = .75$,

Herman & Polivy, 1980), and the power of food scale (21 items measured on 5 point scales, α = .91, Lowe et al., 2009).

Results

We had to exclude the data of the first six participants because of an initial error in the experimental code which was subsequently mended. The final sample consisted of 58 participants (42 women, M_{age} = 21.90, *SD* = 2.93, M_{BMI} = 22.05, *SD* = 4.06).

The data was prepared as in all previous studies. Overall accuracy was high (96 %). No outliers were spotted. As intended, participants were more positive about the sweet shape (*M* = 75.21, *SD* = 17.21) compared to the neutral shape (*M* = 53.72, *SD* = 14.61), *t*(57) = -8.26, *p* < .001. We then conducted a 2(previous congruency) × 2(present congruency) × 3(present shape) repeated measures ANOVA and obtained a main effect of present congruency, *F*(1, 57) = 87.49, *p* < .001, η_p^2 = .61. Responses to congruent trials were faster compared to responses to incongruent trials. The interaction between previous and present congruency (conflict adaptation) was at trend level, *F*(1, 57) = 3.01, *p* = .088, η_p^2 = .05. The predicted three-way interaction was not obtained, *F*(2, 114) = 0.02, *p* = .982, η_p^2 < .001.

Entering participants' current hunger levels (*M* = 49.42, *SD* = 27.78), current craving for sweets (*M* = 58.26, *SD* = 24.01), concern for dieting (*M* = 2.38, *SD* = 0.59) or PFS scores (*M* = 3.08, *SD* = 0.63) or BMI (*M* = 22.05, *SD* = 4.06) as an additional factor (centered) into the model did not change the pattern of results.

Discussion

The present study did not support our hypothesis that also hedonic food cues on the non-target location of a present trial interrupt the conflict adaptation effect. However, it should be noted that we did not obtain a significant conflict adaptation effect in the first place, which makes it difficult to explain the absence of its moderation. One potential reason for why we did not obtain a conflict adaptation effect in the present study is that we did not prime the distractor before the target was presented (see Study 2.4 and Weissman et al., 2015). Weissman and colleagues have argued that for conflict adaptation to occur the distractor needs to be processed first, which was not the case in the present study. Future research is needed to further investigate the degree to which conflict adaptation is compromised in the presence of motivational distractors that represent hedonic food rewards. To do that, one should,

however, switch back to a paradigm in which the conflict adaptation effect is most likely to be obtained (i.e., distractor is processed first).