The Impact of Subliminal Abandonment and Unification Cues on Eating Behavior

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ABSTRACT

Background: Subliminal presentation of visual abandonment cues leads to greater levels of eating, despite a lack of conscious awareness of the information involved. The current study examined whether this behavioral impact can be countered by the subliminal presentation of contradictory, counterschematic information (unification cues).

Method: Ninety-six nonclinical women were presented with subliminal abandonment cues, either preceded or followed by neutral or unification cues. The dependent variable was the amount eaten after the task.

Results: Presenting subliminal unification information before or after the subliminal abandonment cue significantly reduced the amount eaten (relative to the impact of neutral cues).

Discussion: These findings are consistent with a model where preconscious processing of unification cues has the effect deactivating abandonment schemas, either through inoculation or restoration. Preconscious presentation of unification cues might play a role in the broader cognitive-behavioral treatment of bulimic behaviors. © 2005 by Wiley Periodicals, Inc.

Keywords: abandonment; preconscious processing; eating

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Introduction

Although multifactorial in origin (e.g., McManus & Waller, 1995), overeating and binge eating are partly products of intolerable negative affect (e.g., Fairburn, 1997; Lacey, 1986; Meyer, Waller, & Waters, 1998), reducing immediate awareness of aversive emotional states. The roles of different emotional states have been considered, and anxiety, anger, and depression have been identified as particularly important in the triggering of binges (e.g., Agras & Telch, 1998; Arnow, Kenardy, & Agras, 1992) and are more likely than depression to be antecedents of binge eating. There is also evidence that loneliness triggers overeating, although the mechanism seems to be different to that involved in other emotion-driven eating. Loneliness is more likely to trigger overeating when the relevant trigger (e.g., an abandonment cue) is processed without conscious awareness (subliminally). This lack of awareness is achieved using presentation of a visual cue that is too rapid (e.g., 4 ms) to be detected or reported at a conscious level (e.g., Bornstein, 1990; Dixon, 1981; Silverman, 1983; Weinberger & Hardaway, 1990).

A number of experimental studies of nonclinical women have demonstrated higher levels of eating in response to subliminal abandonment cues (Gerard, Kupper, & Nguyen, 1993; Patton, 1992). In such studies, the participants are unable to identify the cue that has been presented, and yet it still has an impact on their eating behavior. However, the effect on eating is not found when the individual is aware of the threat cue (e.g., with a longer visual presentation). It is found with abandonment threat cues rather than with physical threats or other emotional cues, and is not dependent on the fear of loss of specific individual relationships (Meyer & Waller, 1999; Waller & Mijatovich, 1998).

Subliminal activation of the cognitions and emotions that drive overeating presents a potential problem for traditional cognitive-behavioral therapies. The individual is unlikely to be able to access such cognitions in order to be able to challenge them, meaning that they will be unable to reduce the emotional arousal and the consequent drive to eat. An alternative therapeutic strategy in such cases might be the presentation of subliminal symbiotic or unification cues, which some studies have shown to reduce some aspects of depressive and schizophrenic pathology (e.g., Balay & Shevrin,
avoid expectancy or contamination effects. The current study of nonclinical women will investigate whether the subliminal presentation of unification cues has the hypothesized effect of reducing the level of overeating that is known to be induced by the presentation of abandonment cues. Two patterns of effect can be predicted when such counterschematic information is presented. First, when presented after the subliminal abandonment cue, the unification cue should have a restorative effect, reducing the amount eaten (compared with a condition where there has been no unification cue). Second, when presented before the abandonment cue, the unification cue should have an inoculation effect, again reducing the amount eaten relative to the condition where there was no unification cue.

Method

Design

The study employed a between-subjects experimental design, comparing the amount eaten in the 5 min after exposure to the pairs of cues. Age, body mass index (BMI = kg/m²), and eating attitudes were used as covariates. Each woman took part in one condition only, to avoid expectancy or contamination effects.

Participants

The participants were 96 nonclinical women. They were volunteers who were recruited via a university research participation scheme or via undergraduate classes. None reported an eating disorder when asked, and women with an Eating Disorder Inventory (EDI) score of 30+ were excluded to reduce the risk of inclusion of eating-disordered individuals. There were four groups (n = 24 in each group), each defined by the two subliminal cues and the order in which they were used (neutral–abandonment; unification–abandonment; abandonment–neutral; and abandonment–unification). Table 1 shows the mean ages, BMIs, and eating attitudes (total EDI eating scores) of the four groups. Univariate analyses of variance (ANOVAs) showed that the differences among the groups for these characteristics did not approach significance.

Measures and Procedure

The participants were blind to the purpose and procedure of the study (to reduce the impact of expectancy effects and demand characteristics) until the debriefing at the end of the study. The study involved two stages, which were separated by a week to avoid priming effects due to completion of the measure of eating attitudes. In Stage 1, the women completed the EDI (Garner, 1991). This is a well-validated measure of eating and related attitudes, which includes three subscales that directly assess eating characteristics (i.e., Drive for Thinness, Bulimia, and body dissatisfaction). As with previous research (e.g., Meyer & Waller, 1999), the total of these three subscales was used as an index of eating psychopathology among this nonclinical group.

In Stage 2, each woman was allocated to one experimental condition (blind to EDI scores), was exposed to the relevant two subliminal cues, and was then given the opportunity to eat. In the subliminal processing task, they were told that the task was to assess visual sensitivity in mild states of hunger. Therefore, each woman was asked to abstain from eating for at least 2 hr before undertaking the task. They were told that words would flash very briefly at the center of the screen, that the words would be hard to see, and that they would later be asked to try to identify the words. They were first asked to look at a fixation box in the center of a tachistoscope display. The initial display was a visual noise mask and the fixation box was marked by four white dots. The mask was replaced for 3 ms by the first cue word, which appeared at the center of the fixation box. To reduce further the risk of conscious cue awareness, the exposure time used was shorter than the 4 ms that has been used in other studies (e.g., Gerard et al., 1993; Meyer & Waller, 1999; Patton, 1992; Waller & Mijatovich, 1998). The cue word was then replaced by the mask. The first cue word was presented subliminally in this way 10 times, with each presentation separated by 5 s. After those presentations, there was a 15-s gap. Then, the second cue word was presented (in the same way and for the same number of times). In each case, the cue word was printed in lowercase letters on a white background and was 0.5 cm

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TABLE 1. Characteristics of the four groups (n = 24 in each group), showing matching for age, body mass index (BMI), and eating attitudes (EDI scores)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Cue 1</th>
<th></th>
<th>Cue 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>One-way ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>F(3,92)</td>
</tr>
<tr>
<td>Age (years) (SD)</td>
<td>22.2 (5.30)</td>
<td>24.2 (6.66)</td>
<td>22.4 (4.04)</td>
<td>22.6 (4.48)</td>
<td>0.72</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (SD)</td>
<td>23.7 (4.06)</td>
<td>21.7 (4.10)</td>
<td>22.3 (2.97)</td>
<td>21.7 (3.42)</td>
<td>1.49</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDI (SD)</td>
<td>16.6 (10.1)</td>
<td>15.3 (15.1)</td>
<td>17.9 (14.3)</td>
<td>15.8 (9.42)</td>
<td>0.20</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: EDI = Eating Disorders Inventory; NS = not significant; ANOVA = analysis of variance.
high (presented at a distance of 25 cm from the participant). These presentation parameters are identical to those used by Meyer and Waller (1999) and by Waller and Mijatovich (1998).

After presentation of the second cue, the participants were told that there would be a break while the experimenter completed the necessary paperwork. They were also informed that they had completed the part of the study that had required them to avoid eating. Therefore, a snack was provided so that they could eat if they wished. The experimenter then left the room, ostensibly to complete the necessary paperwork. The participant was left alone in the room with a bowl of crackers from which to eat. The crackers were a standard brand (Mini-Cheddars KP McVities, UK; energy content = 5.1 kcal/g). There were 100 g of crackers in the bowl at the outset. The experimenter returned exactly 5 min later and announced that the experiment was complete. The dependent variable was the weight of crackers eaten in the 5 min. The participant was then debriefed and was given an explanation of the purpose of the study. As with other studies that have used identical methodology and longer exposure times (e.g., Meyer & Waller, 1999; Patton, 1992), cue word identification during debriefing was no better than random (using a forced-choice procedure).

**Subliminal Cues Used.** Each participant was exposed to two of the three subliminal cues. Each cue was a single word, presented 10 times in succession. As with Meyer and Waller (1999), the neutral cue was the word “gallery,” and the abandonment cue was the word “lonely.” For the current study, the unification cue was the word “friendship.” These three cue words were matched for frequency of use in the English language, using the criteria of Johansson and Hofland (1989).

**Data Analysis**

To test the hypotheses, a one-way analysis of covariance (ANCOVA) was used to determine differences in the amount eaten in the 5 min after subliminal exposure to each pair of cues. Age, BMI, and EDI scores were used as covariates to partial out any effects that might be due to the small intergroup differences in these variables. Post-hoc tests were used to determine the specific differences that contributed to the main effect.

**Results**

The following amounts were eaten by each group: Group 1 (neutral–abandonment), $M = 7.83 \text{ g (SD = 5.56)}$; Group 2 (unification–abandonment), $M = 2.63 \text{ g (SD = 3.17)}$; Group 3 (abandonment–neutral), $M = 6.46 \text{ g (SD = 3.80)}$; and Group 4 (abandonment–unification), $M = 3.04 \text{ g (SD = 3.91)}$. Thus, the women ate most under the two experimental conditions that were hypothesized to lead to greater levels of eating. Figure 1 shows the inoculation and restoration effects for the four groups. The ANCOVA showed a significant main effect of experimental condition, $F(3,89) = 7.51, p < .001$. There were no reliable covariate effects of age, $F(1,89) = 0.95$, not significant (NS); BMI, $F(1,89) = 0.77$, NS; or EDI, $F(1,89) = 0.46$, NS. Post-hoc comparison tests (least significant difference) showed that more was eaten ($p < .001$) during the neutral–abandonment condition than during the unification–abandonment condition (supporting the inoculation hypothesis) and that more was eaten ($p < .007$) during the
abandonment–neutral condition than during the abandonment–unification condition (supporting the restoration hypothesis).

**Discussion**

The current experimental study has investigated whether it is possible to counter the effect of abandonment cues (hypothesized to trigger the emotional state of loneliness) on eating. Although the participants were not a clinical group and the amounts eaten were relatively small, the findings support both hypotheses. First, when unification cues were used after the abandonment cue, the amount eaten was less compared with the amount of food eaten when the abandonment cue was followed by a neutral cue. This finding supports the restoration hypothesis, suggesting that the activation of abandonment beliefs is countered by the subsequent activation of unification beliefs. Second, when unification cues were used before the abandonment cue, the women ate less compared with the women who ate more when the abandonment cue was preceded by a neutral cue. This is evidence in favor of the inoculation hypothesis, suggesting that the activation of unification beliefs can block the activation of abandonment beliefs. Therefore, it can be concluded that counterschematic information is capable of preventing the impact of abandonment beliefs on overeating.

Previous research (e.g., Gerard et al., 1993; Meyer & Waller, 1999; Patton, 1992) has supported a model where preconscious abandonment-related information activates abandonment schemas (e.g., Young, Klosko, & Weishaar, 2003) and where escape behaviors (including eating) are used to block conscious awareness of that schema-level information and its affective consequences (the emotion of loneliness). The current findings suggest that unification cues provide counterschematic information, hence reducing the need to use the escape behaviors. These findings are similar to the ameliorative effects that have been shown with unification cues in some psychological disorders (e.g., Silverman, 1983), although those studies have not used an equivalent experimental design or behavioral marker of efficacy. It might be hypothesized that subliminal presentation of unification cues will be effective in reducing the level of binging behavior and associated cognitions among bulimic women (although unlikely to be a cure in itself). However, before their clinical implications can be determined, these findings require replication and elaboration in clinical and nonclinical groups. One critical extension will be to compare the ameliorative impact of subliminal versus supraliminal unification cues, because this would have implications for the way in which counterschematic information would need to be presented. For example, if supraliminal presentation is ineffective, then approaches that address abandonment schemas overtly (e.g., Young et al., 2003) might be unhelpful. A further issue is the specificity of the cues that are used for such preconscious information processing. Considering schizophrenic symptoms among women, Cohen (1977) has shown that father-related unification cues have a greater treatment value than mother-related unification cues, whereas the opposite tends to be true for men (Kaye, 1975). Therefore, given that eating problems are more prevalent among women, further experiments might involve manipulation of the nature of the unification cues (especially the parent identified). Finally, it will be necessary to determine whether abandonment and unification cues have similar effects on other escape behaviors, such as alcohol abuse.

**References**


