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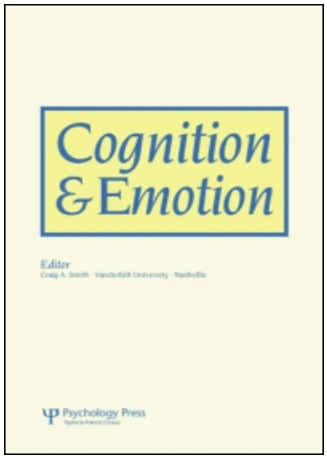

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Devaluation of distracting stimuli

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Previous research has shown that distracting stimuli are evaluated more negatively than new stimuli in a dual task paradigm (Raymond, Fenske, & Tavassoli, 2003). The present research aimed to extend this research by showing that repeatedly selecting targets in a perceptual identification task leads to lower evaluations of distracting stimuli embedded in this task, even when participants are unaware that they will be asked to evaluate the stimuli in a subsequent (separate) task. Results indeed show that repeatedly selecting target stimuli in the presence of distracting stimuli leads to devaluation of these distracting stimuli compared to both target stimuli and new stimuli in a subsequent task. The findings of the present research indicate that devaluation of repeatedly ignored stimuli arises even when stimulus evaluation is not salient during target selection.

The ability to select relevant information in the presence of distracting information is a prime prerequisite for efficient functioning. Buying groceries in a shop, booking a specific hotel on the Internet, or taking a dress or suit out of the wardrobe for a specific occasion all depend, at least partly, on the ability to select target information in the presence of distracting information. Research has shown that selecting relevant information in the presence of distracting information can have cognitive consequences in terms of a decrease in the level of accessibility of distracting information (e.g., Anderson & Spellman, 1995; Mayr & Keele, 2000; Veling & van Knippenberg, 2004, 2006). The present experiment aimed to broaden this research by showing that selecting particular information affects emotional appraisals of distracting information as well.

Recently Raymond, Fenske, and colleagues (Fenske, Raymond, & Kunar, 2004; Raymond et al., 2003; Raymond, Fenske, & Westoby, 2005) have shown that selecting a target stimulus in the presence of a distracting

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stimulus can lower the evaluation of the distracting stimulus. Their procedure consisted of a dual task paradigm consisting of several trials in which participants must first select a target in the presence of a distracting stimulus (or distracting stimuli) and after that they are immediately asked to evaluate a stimulus (either the target or the distracting stimulus, or a new stimulus; Raymond et al., 2003). Devaluation is demonstrated by more negative evaluations to distracting stimuli compared with new stimuli (Raymond et al., 2003).

The main aim of the current experiment was to examine whether the devaluation of distracting stimuli would still be obtained when the target selection task and evaluation task were separated. In the work by Raymond, Fenske, and colleagues (Fenske et al., 2004; Raymond et al., 2003, 2005), participants received a dual task paradigm that alternated between selection and evaluation. So, it is an open question whether the devaluation of distracting stimuli is dependent on participants' knowledge that they will be asked to evaluate stimuli (i.e., as a result of continuous stimulus evaluation participants assign negative affect to distracting stimuli during target selection) or whether devaluation of distracting stimuli would still be obtained when stimulus evaluation is not salient during the target selection task.

We emphasize that this is by no means a trivial issue. Previous research suggests that either the mode of encoding or mindsets can have great impact on stimulus evaluations (Cacioppo, Priester, & Berntson, 1993; Förster & Strack, 1997; Higgins, 2005; van den Berg, Manstead, van der Pligt, & Wigboldus, 2006; see also Gollwitzer & Bayer, 1999). For instance, in research by Cacioppo et al. participants were presented with Chinese ideographs and asked to either flex or extend their arms during presentation. Motor behaviour predicted evaluations of these Chinese ideographs in a subsequent task only when participants had been instructed to evaluate the stimuli during arm contraction, but not when participants judged complexity of the stimuli. This research indicates that an evaluative way of encoding stimuli can be crucial in obtaining an effect of a manipulation on stimulus evaluations.

We therefore examined whether devaluation of distracting stimuli would still be found when the target selection task is purely perceptual and separated from the evaluation task. We expected that it would, because devaluation of distracting stimuli is hypothesised to be a consequence of selective attention. Specifically, according to Raymond et al. (2005) distracting stimuli are inhibited during visual search for targets and devaluation of distracting stimuli is a consequence of this inhibition. Raymond et al. suggest that attentional inhibition directed at distracting stimuli may serve to reduce emotional salience of these stimuli, so that, in the future, they will be less likely to attract attention. If selective attention is

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indeed the causal factor, an evaluative mindset during target selection should not be needed to obtain the devaluation of distracting stimuli effect.

To test whether selection of target stimuli in the presence of distracting stimuli would cause devaluation of distracting stimuli we developed a simple letter-circling task. Participants received a sheet of paper that contained 448 letters, half of them in italics. They were asked to circle the letters that were in italicised (or regular) font type. We manipulated this task so that four letters were always italicised (i.e., the target stimuli) and four letters were always in regular (i.e., the distracting stimuli) font type. After participants had completed this task they received an ostensibly unrelated task in which they were requested to evaluate 12 letters. Four of these letters were targets in the letter-circling task, four of these letters were distracting in the letter-circling task and four letters were new. We hypothesised lower evaluations of the distracting stimuli compared with both the target stimuli and new stimuli. Note that this latter comparison would be a true indicator of devaluation.

METHOD

Participants and design. Twenty-one participants took part in this experiment. They completed this experiment as part of other unrelated experiments. The design was a 1 factorial (stimulus type: target, distracting, new) within-subjects design.

Materials. The stimuli for the letter-circling task were 12 consonants (i.e., *t*, *r*, *d*, *p*, *j*, *z*, *h*, *m*, *b*, *g*, *v*, and *k*). Eight letters were used in the letter-circling task (4 target stimuli and 4 distracting stimuli) leaving 4 letters as new stimuli. Six sets were constructed that varied stimulus type (target, distracting or new) of each letter between participants. Through construction of these sets we ensured that each consonant served equally often as a target, distracting or new stimulus. Within each set, letters were presented in a fixed order in the letter-circling task.

The letters in the letter-circling task were presented in Arial, font size 16. Each consonant was separated by a space. The letter-circling task consisted of eight letters (i.e., 4 target and 4 distracting stimuli) each presented 56 times resulting in a total of 448 letters. Throughout the letter-circling task four letters were consistently presented in italics (e.g., *r*, *v*, *h*, *j*) and four letters in regular font (e.g., d, k, p, b). Some of the participants were instructed to circle letters in italics others were instructed to circle letters in regular font type. All instructions and presentation of the consonants in the evaluative rating task were displayed in Times New Roman, font size 12.

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Procedure. Participants received a questionnaire consisting of three pages. The cover story read that participants would receive two independent tasks. The first task was ostensibly about examining attentional processes in a difficult task. Participants were instructed to circle letters that were presented below the instructions of this first task. Some of the participants were asked to circle letters in italics and the others were asked to circle letters that were in regular font type. To enhance credibility of the cover story we instructed participants to circle italic (regular) letters from left to right and from above to below (i.e., in reading direction), as quickly as possible, without looking back, and without correcting errors. The instruction of the first task ended by stating that after finishing the task participants could turn over the first page and continue to read instructions for the second task.

The cover story of the second task read that we needed evaluative ratings of letters for future research. Participants were requested to rate 12 letters on 9-point scales ranging from 1 (*not at all beautiful*) to 9 (*very beautiful*). Below these instructions each letter was presented with a scale underneath. Letters were presented in the order that they are typed in the materials section above. The status of each letter (target, distracting or new) varied between participants as a result of the construction of the stimulus sets outlined above. Thus, although the letters were presented in a fixed order the results cannot be explained through the order in which we presented them. Finally, participants were asked to write down the purpose of the study. None of the participants guessed the true purpose or hypothesis of the current experiment.

RESULTS

We first checked how participants performed on the letter-circling task. As a criterion for successful performance, we checked the last two rows of the task for errors (approximately 65 letters). This inspection showed that participants were very successful in distinguishing italicised from regular letters with three exceptions. Three participants did not consistently circle the letter "z" when it was in italics, even though their instruction was to circle italicised letters. One participant consistently circled the letter "z" in italics, even though the instruction was to circle regular letters. We excluded evaluative ratings concerning these errors from the dataset. Nevertheless, the analyses reported below are also reliable when these ratings are included in the dataset treating the not circled "z" as a distracting stimulus and the circled "z" as a target stimulus. Finally, one participant reported that it was unclear whether the letter "v" was in italics or not. We excluded the evaluative rating of this letter for this participant from the dataset. However,

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inclusion of this rating in the dataset did not alter the results. Next, we checked for outliers, but within each participant's rating there were no ratings beyond 3 standard deviations from the mean. So, in total we excluded five ratings (i.e., errors), retaining 98% of the ratings for analyses.

To test whether distracting stimuli were evaluated more negatively than both target stimuli and new stimuli we performed a Stimulus Type (target, distracting, new) × Stimulus Set (set 1, set 2, set 3, set 4, set 5, set 6) × Instruction (circle italic vs. circle regular) mixed analysis of variance (ANOVA) repeated on the first factor. This analysis produced the predicted main effect of stimulus type, $F(2, 18) = 5.05$, $p < .05$, partial $\eta^2 = .36$. Next, we conducted simple effect tests between stimulus types to test whether this main effect was indeed caused by lower evaluations towards distracting stimuli. Consistent with our hypothesis these tests revealed reliably lower evaluative ratings of distracting stimuli ($M = 5.02$, $SD = 1.18$) compared with both target stimuli ($M = 5.75$, $SD = 1.03$) and new stimuli ($M = 5.55$, $SD = 0.94$), respective comparisons $F(1, 20) = 8.65$, $p < .05$, partial $\eta^2 = .30$ and $F(1, 20) = 5.86$, $p < .05$ partial $\eta^2 = .23$. Thus, distracting stimuli are indeed devaluated as indicated by more negative evaluation towards distracting stimuli compared with new stimuli. The difference between target and new stimuli was not reliable, $F < 1$.

DISCUSSION

In the present experiment we have shown that repeatedly selecting a target in the presence of distracting stimuli leads to devaluation of the distracting stimuli. This result conceptually replicates and extends earlier work by Raymond, Fenske, and colleagues (Fenske et al., 2004; Raymond et al., 2003, 2005), that is, the devaluation of distracting stimuli effect even when the target selection task and evaluation task are separated. The results show that a simple perceptual task, i.e., circling letters in italicised (regular) font type in the presence of distracting stimuli and without any reference to evaluations, can nevertheless influence evaluations of distracting stimuli in a subsequent evaluation task. Thus, devaluation of distracting stimuli is not dependent on an evaluative mindset during encoding of the stimuli. This finding is consistent with the idea that devaluation of distracting stimuli is a consequence of selective attention and hence not dependent on an evaluative way of encoding the stimuli. Moreover, we replicated the devaluation of distracting stimuli with a new procedure thereby adding to the reliability and generalisation of the devaluation of distracting stimuli phenomenon.

We used minimal instructions to make participants believe that the evaluation task was independent of the letter-circling task (i.e., that we needed evaluative ratings of letters for future research). Nevertheless, the

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fact that none of the participants guessed the purpose of the study is suggestive of independence. More importantly, however, we intended to show the reverse, i.e., that devaluation of distracting stimuli occurs even when there is no mentioning of evaluations during the target selection manipulation. This is exactly what the present data demonstrate.

The fact that distracting stimuli are actually devaluated compared with new stimuli might seem surprising in light of the mere exposure effect (i.e., exposure to stimuli renders them more positive compared with new stimuli in evaluations, see Zajonc, 2001). However, it is important to note that in mere exposure paradigms attentional processes were not manipulated and the effects of repeatedly ignoring a distracting stimulus in favour of a target stimulus were not examined (for a similar argument see Raymond et al., 2003). In addition, the fact that the target stimuli are not evaluated more positively than new stimuli may depend on the type of stimuli used. In the present experiments we used highly familiar stimuli (letters) that are positive as indicated by a mean evaluation of new stimuli of 5.55. This evaluation is reliably above the midpoint of the 9-point scale, $F(1, 20) = 7.12$, partial $\eta^2 = .26$, $p < .05$. Mere exposure effects, however, are usually and almost by definition found on unfamiliar stimuli such as Chinese ideographs (Bornstein, 1989; Zajonc, 2001).

It has been suggested that inhibition of distracting stimuli is functional because it preserves the distinction between target and non-target information (Anderson, 2003; Dijksterhuis & van Knippenberg, 1998; Veling & van Knippenberg, 2006). In a related vein, Raymond et al. (2005) have proposed that devaluation of distracting stimuli may be functional in the sense that devaluated stimuli are less likely to guide future behaviour. The present research is consistent with this notion by showing that devaluation is still present in a task that was presented after the target selection task. It is not clear, however, whether devaluation of distracting stimuli has any functional significance. The findings of the present investigation encourage a fruitful examination of these questions in future research.

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