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Emotion. Author manuscript; available in PMC 2009 May 18.

Published in final edited form as:
Emotion. 2008 October ; 8(5): 653–661. doi:10.1037/a0013442.

Dissociative Tendencies and Facilitated Emotional Processing

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Abstract

Dissociation is a process linked to lapses of attention, history of abuse or trauma, compromised emotional memory, and a disintegrated sense of self. It is theorized that dissociation stems from avoiding emotional information, especially negative emotion, to protect a fragile psyche. The present study tested whether or not dissociaters do actually avoid processing emotion by asking groups scoring high or low on the Dissociative Experiences Scale to judge the affective valence of several types of emotional stimuli. Manipulations of valence, modality (pictures or words), task complexity, and personal relevance lead to results suggesting that dissociation is linked to facilitated rather than deficient emotional processing. Our results are consistent with a theory that sensitivity to emotional material may be a contributing factor in subsequent dissociation to avoid further elaboration of upsetting emotion in these individuals. The findings for dissociation further exemplify the influence of individual differences in the link between cognition and emotion.

Keywords

dissociation; dissociative experiences; emotional processing; identification; categorization

Dissociation is commonly conceptualized as a disruption of identity, memory, or perception. Dissociative experiences range from common experiences of highway hypnosis (e.g., not aware of time passage on a long trip) or absorption (e.g., watching a movie or looking at a beautiful sunset) to more pathological states. These pathological states are associated with trauma, including a history of intense pain, emotional neglect, and physical or sexual abuse (Nijenhuis, Spinhoven, van Dyck, van der Hart, & Vanderlinden, 1998). Acute severe stress is also associated with transient dissociation (e.g., looking as if through a fog, altered time perception, feeling “spaced out,” etc.) even in nonpathological populations (Morgan et al., 2001). One common measure of dissociation is the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986), which has been used to measure normal and pathological dissociation according to constituent factors: absorption, depersonalization, derealization, and amnesia (Ray, June, Turaj, & Lundy, 1992; Fischer & Elnitsky, 1990; Gleaves, Eberenz, Warner, & Fine, 1995; Ross, Joshie, & Currie, 1991). These experiences of dissociation are traditionally explained according to emotional phenomena.

Dissociation was first recorded as a psychopathological phenomenon by Janet (1907) in the late 19th century when he observed persistent amnesia in some patients. Janet described a dissociation of memories due to emotions and attributed the amnesia to depleted mental

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resources resulting from experiences of extreme traumatic emotion. Around the same time, Breuer and Freud (1893/1956) noticed similar memory gaps in patients, attributing the phenomenon to active unconscious forgetfulness by the mind in order to keep disturbing emotions from consciousness ("repression"). Both theories highlight emotions as a driving impetus for engaging in dissociation either to avoid disturbing emotion (Breuer & Freud, 1893/1956) or as a consequence of trauma (Janet, 1907).

Dissociation and Emotional Memory

To understand the potential incentive for and consequences of dissociation, general memory and emotional memory performance have been examined in chronic dissociaters. Data suggest that dissociation is associated with decrements in explicit memory for emotional words. High DES individuals recall fewer negative words (e.g., "rape," "incest," and "assault") in comparison with individuals with low DES scores (De Prince & Freyd, 1999). This cannot be explained by a general memory deficit, since high DES individuals recall more nonemotional words. Further, elevations on the amnesia subscale of the DES have been associated with worse explicit recall for positive and threatening emotional words (Holtgraves & Stockdale, 1997). Thus, the emotional content of words may interfere with an otherwise intact explicit memory system for individuals with dissociation tendencies. Although memory difficulties have been demonstrated in dissociaters, there is some debate as to the conditions that produce these effects (see De Prince, Freyd, & Malle, 2007; de Ruiter, Veltman, Phaf, & van Dyck, 2007; Devilly & Ciorciari, 2007; and Devilly et al., 2007).

For implicit memory, individuals scoring high and low on the DES show similar priming effects for positive and threat-related words (Holtgraves & Stockdale, 1997). When individuals diagnosed with dissociative identity disorder are induced to switch identity states, explicit memory is negatively impacted but implicit memory is unaffected (Elzinga, Phaf, Ardon, & Van Dyck, 2003). Thus, dissociation may distance the individual from explicit recollection of emotional material but not implicit processing. It has been suggested that a failure to engage in elaborative rehearsal following encoding explains the impact on explicit but not implicit memory in dissociaters (Holtgraves & Stockdale, 1997). The question then arises as to how early in the processing stream the emotional information may be compromised.

Dissociation and Emotional Processing

Several studies have examined emotional processing in groups endorsing high levels of dissociative experience. When colored words are used to spell out emotional words as distractions from naming the color (Emotional Stroop), those with high DES scores do not perform differently than low scorers (De Prince & Freyd, 1999). High DES individuals were also not especially affected in their performance by the emotional content of the modified Stroop compared to when nonemotional incongruent color distracters were used. According to subjective experience measures, passive viewing of emotional stimuli also does not differentially affect emotion for high dissociaters in comparison with low dissociaters (de Ruiter et al., 2007), though it was not clear whether the two groups attended to the stimuli equally. When asked to imagine themselves in a future negative or threatening situation, individuals endorsing elevated DES scores rated their images as easier to generate and clearer in comparison with those of individuals endorsing fewer dissociation symptoms (Holtgraves & Stockdale, 1997).

During imagery of traumatic material, a sizable minority of individuals suffering from posttraumatic stress disorder (PTSD) endorse a high propensity for dissociation tendencies in relation to a PTSD group reporting more flashbacks (Lanius et al., 2005). Dissociation traits and reports of dissociation during trauma are associated with suppressed cardiovascular responses when participants are asked to mentally reexperience traumas (Griffin, Resick, &

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Mechanic, 1997; Lanius et al., 2005). Also, only about half as many brain areas were active for dissociaters in comparison with the flashback group during trauma imagery (Lanius et al., 2005). Anecdotal notes from interviews with the dissociaters indicated emotional numbing and dissociating in order to “escape from” overwhelming emotions associated with traumatic memories. Consistent with these data, dissociation tendencies during trauma recall have been linked to effortful avoidance of arousal in fearful situations (Frewen & Lanius, 2006).

Discrepancies between subjective experience and neuropsychological test performance for dissociaters (Bruce, Ray, & Carlson, 2007; Bruce, Ray, Bruce, Arnett, & Carlson, 2007) as well as discrepancies between explicit and implicit memory for emotional words (Elzinga et al., 2003; Holtgraves & Stockdale, 1997) suggest that dissociation may influence reporting of experiences or elaboration of material at a late stage of processing. Behavioral data in the present study thus are especially important for answering questions pertaining to the degree to which dissociaters avoid processing emotion.

In order to better understand specific relationships between dissociation and emotional processing, we recruited nonclinical participants scoring high or low on dissociation measures but within normal ranges on depression and anxiety measures. We considered whether personal relevance could be a factor in emotional processing and thus gave participants the opportunity to create their own relevant emotional stimuli in addition to stimuli traditionally used in studies of emotional processing.

To increase processing demands for emotion identification and to better reflect real- world complex environments, we asked participants to do emotion identification interspersed with color word identification trials (Stroop; as in Siegle, Granholm, Ingram, & Matt, 2001). Also, since previous studies have used imagery to study dissociation while others used emotional word stimuli, the present study incorporated pictures (International Affective Picture System; IAPS; Lang, Bradley, & Cuthbert, 2005) and words varying by emotional content (Affective Norms for English Words; Bradley & Lang, 1999; a threat word list from Mathews, Mogg, May, & Eysenck, 1989; and personally generated words) to assess both modalities according to speed and accuracy of emotional processing.

To allow explorations of group differences as a function of reported executive control problems and perceived abilities to control thoughts and emotions, we administered the Dysexecutive Scale (DEX), the Emotion Regulation Questionnaire (ERQ), and the Thought Control Questionnaire (TCQ). The ERQ is a 10-item questionnaire that differentiates two primary forms of emotion regulation that have been linked to healthy or more problematic emotional functioning, respectively (Gross & John, 2003). Similarly, the TCQ asks how participants deal with unpleasant or unwanted thoughts using 30 questions separated into five subscales (Wells & Davies, 1994). These factors were evaluated as potential mechanisms by which group differences in emotional processing might become manifest since there is accumulated evidence suggesting that there are more adaptive ways to process emotion and dissociation is assumed to be a problematic response to emotions. In other populations, discrepancies have been observed between behavior and perceived abilities (e.g., Novick-Kline, Turk, Mennin, Hoyt, & Gallagher, 2005). For this reason, the DEX was utilized to assess whether any group differences in performance on the emotional processing task could be tempered by participants’ own evaluations of their cognitive abilities. The DEX asks participants to rate their own cognitive abilities on a 20-item questionnaire assessing abilities to problem solve, inhibit extraneous information, and process information efficiently (Burgess, Alderman, Evans, Emslie, & Wilson, 1998). Although the DES has been shown to moderately correlate with depression (Gleaves & Eberenz, 1995) and anxiety/general distress (State–Trait Anxiety Inventory; STAI), we were interested in the individual connection between dissociation and emotional processing apart from depression and anxiety. For this reason, we chose the widely

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used 21-item depression inventory, the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), to assess and minimize depression inclusions in our participant group as well as the trait version of the STAI (20 items; Spielberger, Gorsuch, & Lushene, 1970) to minimize anxiety/distress in our selected participants.

Hypotheses

The hypotheses for the present study focused on the possibility that dissociation is associated with emotional avoidance. On the basis of emotional imagery reports (Holtgraves & Stockdale, 1997) and subjective experience measures in dissociation (De Prince & Freyd, 1999), we hypothesized that dissociaters would effectively process emotion despite the possibility of subsequent elaboration avoidance that could lead to memory interference. The wider scope of emotional stimuli (positive, negative, neutral, and threat stimuli; pictures and words; personally and nonpersonally relevant), behavioral measures of processing effectiveness (accuracy and response time), and processing demand increases (interleaving emotion discrimination with another cognitive task) in the present study were incorporated to assess a wide scope of emotional processing associated with dissociation.

Method

Participants

Participants were drawn from psychology courses for class credit. Fifteen individuals with scores at or above 30 on the DES (high DES group) were chosen for the study in addition to 17 participants with scores below 8 (low DES group). The cutoff of 8 is in the low normal range while the score above 30 corresponds to an elevation in the range of clinical populations experiencing significant dissociative symptoms (van Ijzendoorn & Schuengel, 1996). Participants in both groups had trait anxiety scores (STAI-T) between 8 and 33 (nonanxious and nonrepressors) and BDI scores between 5 and 15 (nondepressed and nonrepressors). Over 700 students were surveyed and provided complete DES, BDI, and STAI data for potential selection as participants. E-mail and phone invitations were made to participants with scores in the range specified above on the three measures. About 20–30% of participants contacted had already signed up for enough studies to fulfill their class credits and so declined participation. Less than 5% of participants, after hearing how the study would be conducted, declined on the basis of disinclination for the procedures. Approximately 10% of students contacted did not return our messages or e-mails and so were not further contacted. Twelve members of the high DES group were White (1 Black, 2 Asian) and 9 were women; 15 of the low DES group were White (1 Black, 1 Asian, and 1 Native American) and 13 were women. Ages for the high DES group ranged from 18 to 22 years (M = 18.87, SD = 1.13) and from 18 to 19 years in the low DES group (M = 18.33, SD = 0.49). All participants were right-handed. Individuals with scores outside the ranges listed above for the DES, STAI-T, and BDI as well as individuals who did not indicate being right-handed on their surveys were not invited to participate.

At the actual experimental session, participants filled in the Thought Control Questionnaire (TCQ), Dysexecutive Scale (DEX), Emotion Regulation Questionnaire (ERQ) and filled out a list of personally relevant words between three and eight letters long with 10 words created each for positive, negative, and neutral valence. All participants signed informed consent statements as approved by the Pennsylvania State University Institutional Review Board (IRB). After filling out the paperwork, participants then sat in front of the screen at a fixed distance of 29 cm from nasion to screen for the remainder of the experiment.

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Stimuli and Sequence

Participants were first shown instructions on the computer screen for the Stroop task. They were encouraged to respond to the color that the words were displayed in rather than to the words themselves. For example, if the word *RED* was displayed in green, participants were requested to respond to the green coloring while ignoring the word *RED*. Before the first color word presentation, a mask was presented for 2 s consisting of four black plus symbols (++++) centered horizontally and vertically on the screen. Color words for the Stroop were presented for 6 s in the same location followed by a 300-ms interstimulus interval (ISI), then the mask for 2 s before another identical ISI and Stroop. Participants were asked to use the number pad's 1, 2, and 3 buttons to make responses with the index, middle, and ring fingers, respectively. Pairings of red, blue, and green colors to 1 (index finger), 2 (middle finger), and 3 (ring finger) keys were counterbalanced across high and low DES groups such that each group had equal proportions of participants with each combination. Stroop tasks presented throughout the experiment included 66% incongruent (color of word did not match printed word) and 33% congruent (color and word matched) trials. Participants practiced 12 trials of the Stroop until 80% accuracy was reached (demonstrating understanding of the task and visual/color acuity). All participants achieved this level of accuracy within three blocks of 12 practice trials. Next, participants completed 18 trials of the Stroop task without feedback.

Participants were then given instructions to rate emotional words according to *positive*, *negative*, or *neutral* on the same keys (1, 2, and 3) with button assignments for emotional category counterbalanced as colors were for the Stroop task. The emotional words included 10 words of each category (positive, negative, and neutral) from a list based on normative response data (ANEW; see the Appendix for specific word numbers used). Positive words had higher (more positive) valence ($M = 8.2$, $SD = 0.24$) than did negative words ($M = 2.16$, $SD = 0.55$); $t(9) = 45.07$, $p < .001$, and neutral words ($M = 4.55$, $SD = 0.25$); $t(9) = 49.32$, $p < .001$, according to normative data (Bradley & Lang, 1999). Negative words had lower (more negative) valence in comparison with neutral words, $t(9) = 15.41$, $p < .001$. Negative and positive words both had higher arousal ratings than did neutral words, $t(9) = 9.9$, $p < .001$, and $t(9) = 12.69$, $p < .001$, respectively. Negative and positive words had equivalent arousal ratings, $t(9) = 1.05$, $p = .32$. The three valences had equivalent word frequencies in the English language (all ps > 0.27). The word list also included a fourth category of 10 threat words taken from a list previously used to contrast anxious and nonanxious individuals (Mathews et al., 1989). Accuracy for threat words was based on correctly identifying these words as negative on the response keys. Also included were the 10 personally relevant words for each emotional category (positive, negative, and neutral) generated by each participant (total of 30 additional words). Emotional words were presented in random order. A practice block of all 70 trials was run, with feedback, and all participants exceeded 80% accuracy by the end of the practice session. The timing and duration for the emotion identification task were identical to the Stroop task in that the words were on the screen for 6 s and the same mask used with the Stroop task stayed on the screen for 2 s with 300-ms ISIs. Words were 0.5 cm high and approximately 1.25 cm wide (slight variations by word length), subtending approximately .98 degrees of visual angle.

After the practice session, an experimental block was run in which affective words were interspersed with Stroop trials. Emotional words were presented, followed by three Stroop trials and masks before and after each emotional word or Stroop. The exception was that the last color word in each sequence was followed by a 3-s reminder screen indicating finger assignments for color and emotion. A new mask then initiated the next four-part trial (emotional word judgment and three Stroop tasks). All timing for Stroop tasks and words were identical to the practice trials.

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The session with words was followed by a session including affective judgments of IAPS pictures interspersed with Stroop trials. IAPS pictures for positive, negative, and neutral categories were chosen to be strongly represented according to valence but also to have high arousal ratings (see the Appendix for picture numbers). Similar to the ANEW words, IAPS pictures in the negative category had lower (more negative) valence ratings ($M = 2.25$, $SD = 0.55$) in comparison with neutral pictures ($M = 4.29$, $SD = 0.54$), $t(9) = 7.0$, $p < .001$, and positive ($M = 6.90$, $SD = 0.98$) pictures, $t(9) = 15.23$, $p < .001$. Also similar to ANEW words, IAPS pictures in the negative and positive categories had higher arousal ratings ($M = 5.32$, $SD = 0.95$, and $M = 5.61$, $SD = 1.0$) in comparison with neutral words ($M = 3.60$, $SD = 0.97$), $t(9) = 3.88$, $p < .001$, and $t(9) = 3.52$, $p < .001$, respectively, but did not differ from each other, $t(9) = 0.58$, $p > .57$. Ten pictures from each of the three categories were presented in random order for a total of 30 pictures. As with the word task, pictures were presented with three Stroop trials after each affective judgment. The masks, finger assignment reminders, and all other timing for the picture segment were identical to the emotional word judgment task. IAPS words and masks were 5.75 cm high and 7 cm wide, subtending 11.22 degrees of visual angle. The mask for the picture judgment task was derived from applying Gaussian filters and digitally smearing a photo from the IAPS set until the picture was unrecognizable but provided similar levels of contrast and luminance to the other IAPS pictures. The mask was presented for 2 s before each IAPS picture and then replaced by the picture. Following each picture presentation, the mask was presented with Stroop words superimposed on the larger mask.

Luminance values across emotional categories for words along with Stroop trials were equated (within 1 standard deviation and not significantly different by category; all *p*s>.05). Luminance values were also equated between emotional categories of IAPS pictures and the mask. To facilitate equating luminance values of IAPS pictures, some borders of the pictures were trimmed to be more similar to the rest of the pictures and all pictures were converted to black and white (gray scale). All stimuli throughout the experiment were presented on dark gray backgrounds.

Response times were analyzed for correct responses only, but accuracy data were also analyzed. Mixed-factor analysis of variance (ANOVA) was used to test valence effects (positive, negative, neutral, and threat), personal relevance effects for words (individually generated personally relevant words or from normed ANEW list), group effects (high and low DES), and interactions between the factors for response times and accuracy data. Post hoc tests for significant ANOVA main effects were conducted using two-tailed *t* tests. Greenhouse Geisser epsilon corrections for homogeneity of variance violations were implemented as determined by Mauchly's test. Effect sizes were calculated for primary results (behavioral data group differences; Cohen, 1988). Effect size corrections for small sample size were used (Hedges & Olkin, 1985). Pearson's bivariate correlation coefficients were analyzed to test relationships between the DES and other scales as two-tailed tests, but correlations significant using one-tailed tests are mentioned for exploratory purposes.

Results

Self-Report Data

As was expected, the high DES group had significantly higher scores on the DES in comparison with the low DES group (see Table 1), $t(14.59) = 12.70$, $p < .001$. The ages of the two groups were not significantly different, $t(31) = 1.82$, $p > .05$. The high DES group endorsed more problems on the Dysexecutive Questionnaire (see Table 1), $t(31) = 5.67$, $p < .001$. The two groups did not differ on reappraisal or suppression scales of the ERQ (see Table 1; *p*s>.05). On subscales of the TCQ, the groups differed only on the Punishment subscale, for which the high DES group endorsed higher scores ($M = 3.53$, $SD = 2.03$ vs. $M = 2.22$, $SD = 1.31$), $t(31) = 2.24$, $p < .05$. Though all participants had scores in the normal range, the high and low DES

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groups differed significantly in their trait anxiety and depression symptoms. The high DES group endorsed less anxiety, $t(21.25) = -7.98$, $p < .001$, and more depression, $t(31) = 4.85$, $p < .001$, in comparison with the low DES group.

In terms of correlations between scales, we were interested in dissociative experience relationships with other scales apart from anxiety or depression. Since the groups differed significantly by both STAI-T and BDI, all correlations run between the DES and other scales were run as partial correlations after removing variance from the STAI-T and BDI. The only two-tailed significant partial correlation between the DES and another symptom scale was a positive correlation with the Dysexecutive Scale ($r = .52$, $p < .005$). The only relationship significant as a one-tailed test was a positive correlation between the DES and the TCQ Distraction subscale, which assesses preferences to handle unwanted negative thoughts by thinking of something more positive ($r = .32$, $p < .05$, as one-tailed and $p = .083$ as two-tailed). The DES was correlated negatively with trait anxiety ($r = -.75$, $p < .001$) and correlated positively with depression ($r = .60$, $p < .001$) in our sample (although restricted ranges for depression and anxiety scales should be emphasized).

Response Time Data

Overall, there was a main effect of valence on response times for emotional word valence identification, $F(1.675, 51.931) = 38.77$, $p < .001$. Responses to threat words were especially fast and responses to neutral (nonemotional) words were slower (see Table 2). There was no effect of personal relevance (generated by participants relevant to them or from normative lists), $F(1, 31) = 0.07$, $p > .05$, but there was an interaction between relevance and valence, $F(2, 62) = 11.62$, $p < .001$. Personally relevant word valence identification was faster for positive and neutral words and slower for negative emotional words in comparison with nonpersonally relevant words (see Figure 1). Whether or not the words were presented alone (practice trials) or with Stroop trials intermingled also affected response times, $F(1, 31) = 71.06$, $p < .001$, such that when intermingled with Stroop trials, response times were slower (with Stroop, $M = 217$ ms, $SD = 38$; without Stroop, $M = 204$ ms, $SD = 36$). There was a main effect of group (high/low DES) on response times for emotion identification, $F(1, 31) = 10.79$, $p < .005$ (see Figure 2), and no interactions were significant with the within-subject factors. Those with higher scores on the DES were significantly faster at making emotional valence discriminations for words compared to those with lower scores on the DES, $t(31) = -2.82$, $p < .01$, $= -0.96$.

For the IAPS pictures, there was an effect of valence on response times, $F(1.83, 54.91) = 13.63$, $p < .001$. Both positive ($M = 1640$ ms, $SD = 258$) and negative ($M = 1484$ ms, $SD = 232$) emotional pictures were responded to faster than neutral ($M = 1566$ ms, $SD = 273$) pictures, $t(31) = 2.71$, $p < .05$, and $t(31) = 3.03$, $p = .005$, respectively, and negative pictures yielded faster responses than did positive pictures, $t(31) = 4.74$, $p < .001$. The group effect was significant, $F(1, 30) = 6.34$, $p < .05$, and there was no interaction between group and valence. As with emotional words, the high DES group was faster in making valence determinations for the pictures than was the low DES group (see Figure 2), $t(29.53) = -2.64$, $p < .05$, $d = -0.87$. When comparing pictures to words, there was a main effect of stimulus type, $F(1, 29) = 67.66$, $p < .001$, but no interaction between stimulus type and group status, $F(1, 29) = 0.58$, $p > .45$. Across both groups, participants responded more quickly to words ($M = 1181$ ms, $SD = 205$) than to pictures ($M = 1562$ ms, $SD = 242$), $t(31) = 10.38$, $p < .001$.

Response Time Correlations

Word and picture valence discrimination response times were collapsed across valence (and relevance for words) since these factors similarly differentiated our high and low DES groups (with no interactions with other factors). Correlations were calculated between these response times and self-report measures that differentiated our two groups (DES, TCQ-Punishment, and

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DEX [partialing out STAI and BDI scores] as well as the STAI and BDI). No partial correlations approached significance (two-tailed or one-tailed). Anxiety was associated with slower responses to pictures ($r = .40$, $p < .05$) and depression was associated with faster responses to pictures ($r = -.43$, $p < .05$) and words ($r = -.38$, $p < .05$; again with a caveat for the limited range of depression and anxiety scores). There was a significant positive correlation between response times for picture and word valence identification, $r = .58$, $p = .001$.

Accuracy Data

Accuracy was affected by valence for emotional word emotion identification, $F(1.84, 57.04) = 10.98$, $p < .001$. Emotional words were more accurately categorized than were neutral words, and threat words were especially easy to categorize (see Table 3). There was no interaction between group status and valence, $F(1.84, 57.04) = 1.44$, $p > .20$. Personal relevance and the group variable did not individually yield significant main effects but there was an interaction between these factors, $F(1, 31) = 6.25$, $p < .05$. Individuals with higher DES scores were highly accurate especially for personally relevant words ($M = 94\%$, $SD = 5\%$) in comparison with words from the normative list ($M = 91\%$, $SD = 8\%$; Figure 3). Individuals lower on the DES had the opposite pattern: Their accuracies were better for words from the normative list ($M = 90\%$, $SD = 13\%$) than for personally relevant words ($M = 86\%$, $SD = 14\%$).

For IAPS pictures, the valence effect on accuracy was again significant, $F(1.94, 52.45) = 53.10$, $p < .001$. The group effect and interaction between group and valence were not significant ($ps>.05$). Accuracy for neutral pictures was lowest at 45% ($SD = 15\%$) and was significantly lower than both positive ($M = 64\%$, $SD = 15\%$), $t(28) = 4.44$, $p < .001$, and negative picture accuracy ($M = 82\%$, $SD = 11\%$), $t(28) = 10.43$, $p < .001$. Accuracy was highest for negative pictures and significantly better than positive picture accuracy, $t(31) = 5.28$, $p < .001$. Across all participants, there was a main effect of stimulus type (word or picture), $F(1, 27) = 3.00$, $p < .001$, but no interaction with group status, $F(1.90, 51.37) = 2.61$, $p > .05$. Words were responded to more accurately ($M = 89\%$, $SD = 11\%$) than were pictures ($M = 63\%$, $SD = 7\%$) for both groups, $t(28) = 10.81$, $p < .001$.

Discussion

The present study used an emotional processing task to examine behavioral evidence of emotional avoidance associated with dissociation. Individuals regardless of dissociative tendencies were faster at responding to emotional information (pictures and words) to which they directed their attention in comparison with neutral information (as in Siegle et al., 2001; see also Öhman, Flykt, & Esteves, 2001). In group comparisons, we found that individuals who reported more dissociative experiences were significantly faster at making emotional discriminations than were low DES individuals for pictures and words. Individuals with dissociative tendencies did not show the traditional speed–accuracy trade-off. They were both fast and accurate in labeling emotion. The low dissociaters had more errors for personally relevant words than for nonrelevant words while high dissociaters had the opposite pattern. This suggests that individuals with dissociative tendencies do not show an avoidant encoding style when initially processing emotional stimuli even when these stimuli are negative or personally relevant.

Despite reports of executive problems by our high DES group, behavioral results here and neuropsychological test data from our lab (Bruce, Ray, Bruce, et al., 2007) argue against suggestions that dissociation indicates depleted mental resources. Instead, dissociation may utilize intact mental resources during reported periods of effortful avoidance of negative emotion (Frewen & Lanius, 2006; Lanius et al., 2005). Avoidance is not likely to take place during encoding, as evidenced by effective emotional processing by our high DES group. Instead, dissociation may happen in later stages of processing when dissociaters may actively

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avoid remembering, as when dissociative PTSD patients are asked to think about traumatic experiences in rich detail (e.g., Lanius et al., 2005). Thus, dissociation may be a constructive effort to avoid thinking about sensitive emotional material that has been effectively encoded and stored but that the dissociater avoids, when possible. Despite theoretical links between emotion identification and regulation (Feldman Barrett, Gross, Christensen, & Benvenuto, 2001), it should not be suggested that the sensitivity in emotional understanding shown by dissociaters in the present study reflects effective emotion regulation. Even temporary states of dissociation are associated with increases in negative mood symptoms (Giesbrecht, Smeets, Leppink, Jelicic, & Merckelbach, 2007). Consistent with these data, elevations on the DES in the present study were associated with a tendency to consider positive sides of negative thoughts (TCQ-Distraction) but problematic tendencies to blame and punish one's self mentally for similar thoughts (TCQ-Punishment). Overall, the data suggest that individuals who report dissociative experiences initially engage emotional information but have negative personal attributions about many emotional thoughts and also tend to devalue their own mental faculties (as shown by dysexecutive scale elevations).

Further research is necessary to evaluate the interaction between dissociation and both depressive and anxiety/distress symptoms. The positive correlation between the BDI and DES in our sample is consistent with previous research but the negative correlation between anxiety and the DES is inconsistent with other findings as well as with correlations that we examined in the larger sample of surveyed students (participants as well as nonparticipants in the behavioral study). Though our DES group endorsed slightly fewer symptoms of anxiety, their behavioral data are consistent with more anxious individuals (Oathes & Siegle, 2008). Thus, we hypothesize that dissociation, like anxiety, might facilitate emotional processing but perhaps by different pathways. We welcome future research to explore dissociative relationships to anxiety and depression further, especially in clinical populations. A taxometric analysis of the DES originally yielded some promising results, suggesting that a pathological form of dissociation may be assessed using this measure (Waller & Ross, 1997). Unfortunately, more recent research suggests that the dissociation taxon gleaned from the DES may not be stable over repeated assessments with college students (Watson, 2003) or a community sample (Maaranen et al., 2008). Also, a recent study found no differences on a well-validated clinical measure (Minnesota Multiphasic Inventory; MMPI-2) between groups categorized with the DES pathological dissociation taxon and the nonpathological group, leading the field to further question the utility of this measure for studying pathological dissociation (Davis Merritt & You, 2008). For now, we interpret our findings as related to a normal continuum of dissociation, though our high DES group endorsed scores in the range of clinical populations (see van Ijzendoorn & Schuengel, 1996), so we welcome attempts at replication of our findings in clinical populations and look forward to the possibility that a pathological type of dissociation may be ultimately differentiated from the continuum represented by the DES.

One reason why we found group differences in accuracy for words but not pictures could be that the picture stimuli used were converted to black and white images, thus potentially reducing their impact or clarity. Switching modalities of stimuli from words to pictures may also have led to both groups having trouble with categorizing pictures, reducing our ability to detect group differences uncovered with word presentations. Despite a lack of group difference in accuracy for pictures, the difference in response times for pictures as well as both response times and accuracy in word valence categorization suggest that high dissociaters are at least as efficacious, and in most cases significantly better, than are low dissociaters in tasks of emotional processing.

The results of the present study do not suggest an early detachment from the immediate stream of emotional processing assumed by previous descriptions of dissociation. In fact, emotional words generated by dissociaters were especially easy for this group to assess according to their

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emotional contents. Thus, previous findings suggesting explicit memory difficulties for emotional information with dissociation (De Prince & Freyd, 1999; Holtgraves & Stockdale, 1997) require an explanation that does not include attention lapses or other failures in emotional encoding. Our findings are consistent with a theory that dissociaters are sensitive to emotional information that may then induce them to dissociate once the information has been initially processed. It has been suggested that an initial state of vigilance in dissociative individuals may be a temporary period of threat appraisal, which may then give rise to a defining period of neural hypoactivity consistent with dissociative experience descriptions (Frewen & Lanius, 2006). Relative differences for dissociaters between personal and normative stimuli also suggest that research may need to move beyond the individual to social or interpersonal situations to witness active manifestations of dissociative tendencies. More broadly, our results support the idea that understanding the impact of attention on emotion might optimally include an assessment of behavior during the processing of emotion in addition to assessments of emotional consequences (e.g., memory and changes in subjective experience) following this processing.

Acknowledgements

We thank Sheila Bal for help with data collection and Tammi Kral for editing assistance.

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Appendix

Stimulus Set

The following are the pictures used from the IAPS image set:

Negative – 2800, 7380, 9001, 9005, 9220, 9290, 9300, 9530, 9560, 9911;

Positive – 4599, 4659, 5621, 7340, 8060, 8080, 8400, 8501, 8510, 8531;

Neutral – 2220, 2230, 2720, 6010, 7224, 7700, 7920, 9010, 9080, 9190.

The following are the words used from the ANEW set:

Negative – 125, 338, 342, 344, 349, 413, 482, 586, 591, 592;

Positive – 79, 240, 248, 251, 256, 305, 438, 735, 759, 920;

Neutral – 180, 198, 395, 677, 681, 765, 836, 905, 916, 999.

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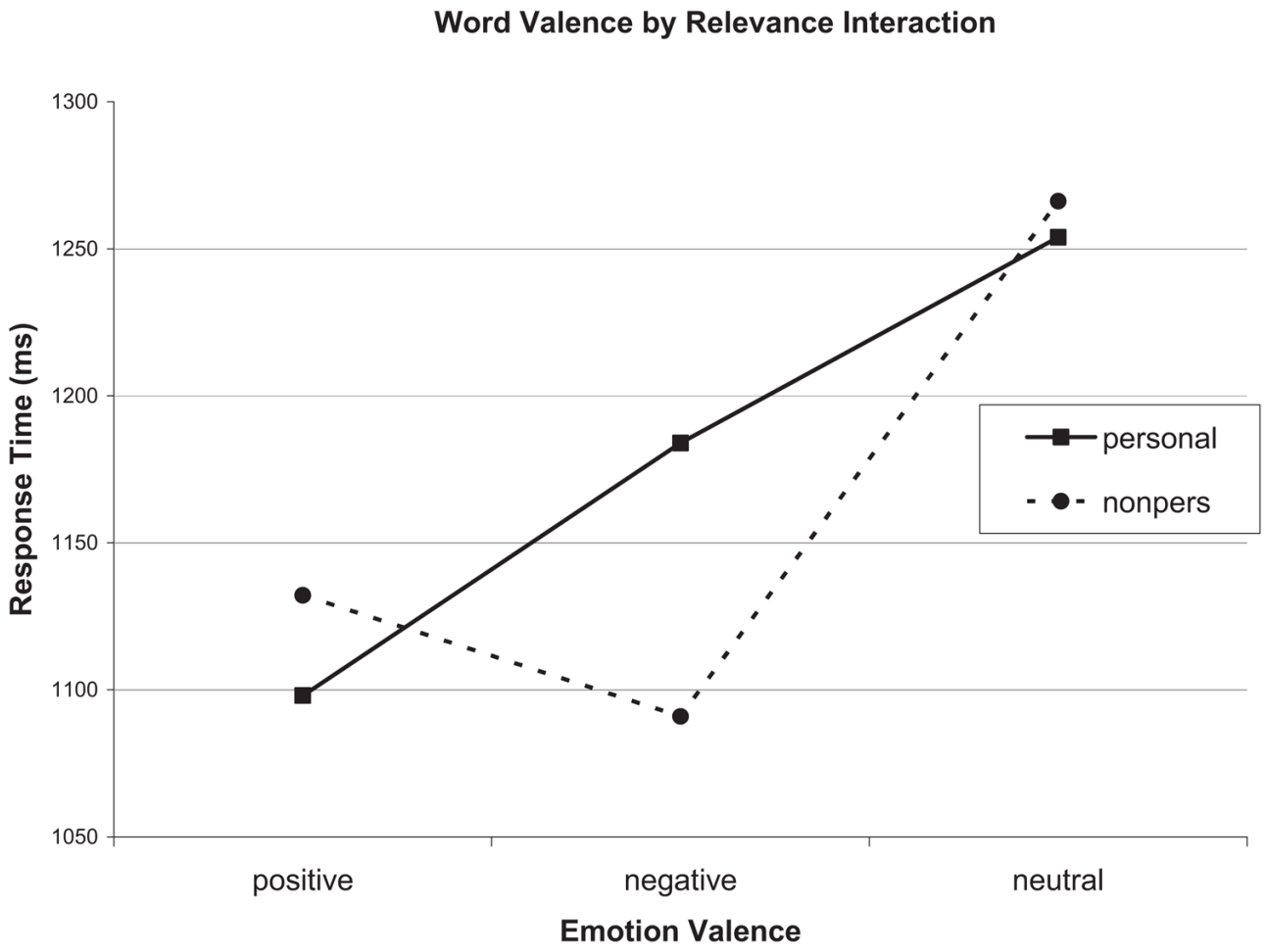

Figure 1.
Response time word valence by relevance interaction. *Personal* refers to words generated by participants themselves as "personally relevant." *Nonpers* refers to words from a normative list according to emotional category.

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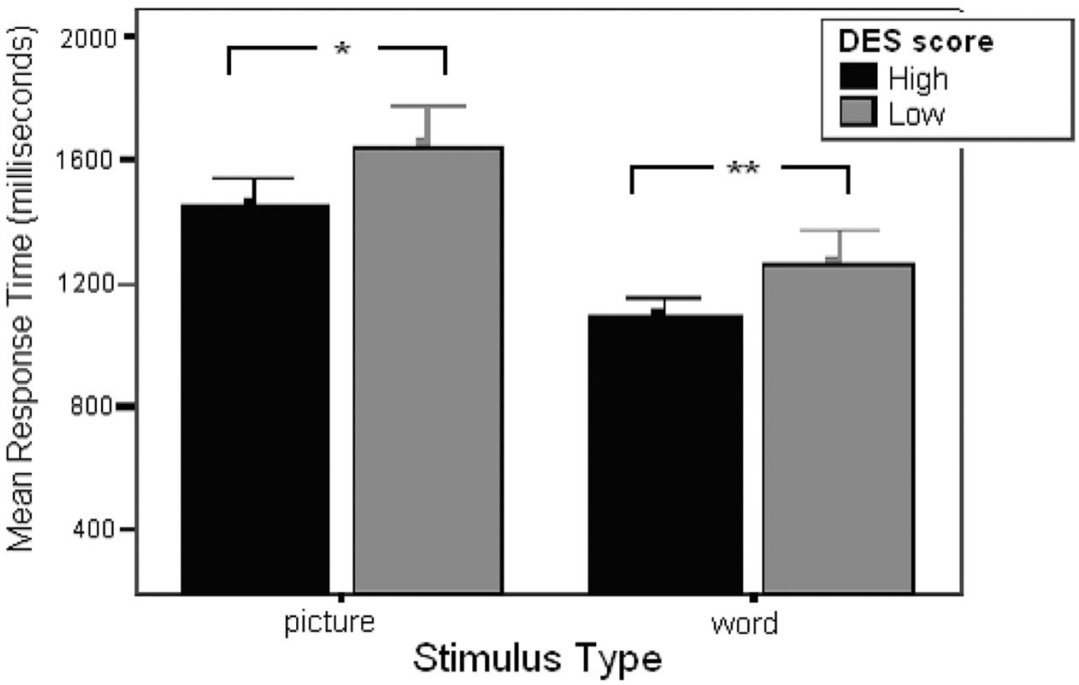

Figure 2.
Response times separately listed for emotional pictures (*picture*) and emotional words (*word*) by group (high or low score on Dissociative Experiences Scale [DES]). * Group difference at $p < .05$. ** Group difference at $p < .01$.

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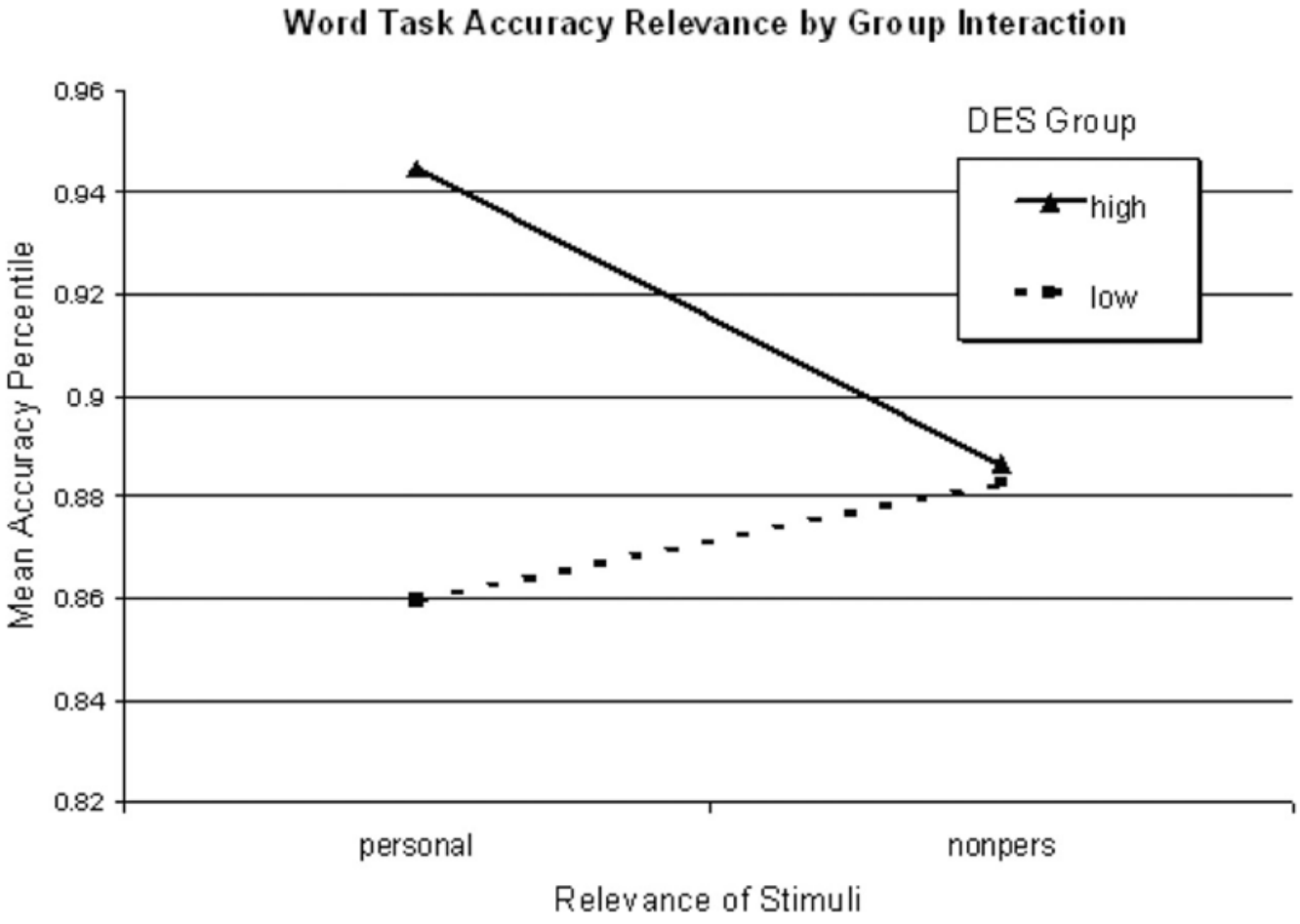

Figure 3.
Accuracy according to group interaction. *Personal* refers to words generated by participants themselves as "personally relevant." *Nonpers* refers to words from a normative list according to emotional category. Groups are differentiated by high and low scores on the Dissociative Experiences Scale (DES).

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Table 1

Group Comparisons on Self-Report Scales

Scale	High DES	Low DES
Dissociative Experiences Scale (DES)	47.87 (13.46)	3.28 (2.14)*
Dysexecutive Scale	28.00 (10.07)	11.89 (6.09)*
ERQ-Reappraisal	30.00 (4.46)	28.39 (4.69)
ERQ-Suppression	13.40 (4.72)	10.17 (4.59)
TCQ-Distraction	11.27 (2.99)	11.28 (2.87)
TCQ-Social Control	7.20 (2.73)	6.61 (2.61)
TCQ-Punishment	3.53 (2.03)	2.22 (1.31)
TCQ-Reappraisal	8.20 (2.48)	7.78 (1.86)
State-Trait Anxiety Inventory (trait)	19.07 (4.76)	30.11 (2.70)*
Beck Depression Inventory	9.73 (3.75)	3.22 (2.78)*

Note. Mean scores and standard deviations are listed for self-report scales administered. DES = Dissociative Experiences Scale; ERQ = Emotion Regulation Questionnaire; TCQ = Thought Control Questionnaire.

* Significant group differences at $p < .001$.

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Table 2

Comparisons of Response Time According to Emotional Category in Word Valence Identification Task

Category	Positive	Negative	Neutral
Threat	43.28 (169)	68.97 (131)**	191 (180)***
Positive		26 (137)	148 (171)***
Negative			122 (155)***

Note. Table lists mean differences (column minus row) in milliseconds, response time, and standard deviations of differences in parentheses.

* Significant differences at $p < .01$.

** Significant differences at $p < .001$.

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Table 3

Comparisons of Accuracy Data According to Emotional Category in Word Valence Identification Task

Category	Positive	Negative	Neutral
Threat	4 (11)*	2 (10)	12 (16)***
Positive		−2 (11)	7 (12)**
Negative			9 (14)***

Table lists mean differences (row minus column) of percent accuracy and standard deviations of differences in parentheses.

* Significant difference at $p < .05$.

** Significant differences at $p < .01$.

*** Significant differences at $p < .001$.