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Memory for emotional faces in naturally occurring dysphoria and induced sadness

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A B S T R A C T

The aim was to establish if the memory bias for sad faces, reported in clinically depressed patients (Gilboa-Schechtman, Erhard Weiss, & Jeczemien, 2002; Ridout, Astell, Reid, Glen, & O'Carroll, 2003) generalises to sub-clinical depression (dysphoria) and experimentally induced sadness. Study 1: dysphoric ($n = 24$) and non-dysphoric ($n = 20$) participants were presented with facial stimuli, asked to identify the emotion portrayed and then given a recognition memory test for these faces. At encoding, dysphoric participants (DP) exhibited impaired identification of sadness and neutral affect relative to the non-dysphoric group (ND). At memory testing, DP exhibited superior memory for sad faces relative to happy and neutral. They also exhibited enhanced memory for sad faces and impaired memory for happy relative to the ND. Study 2: non-depressed participants underwent a positive ($n = 24$) or negative ($n = 24$) mood induction (MI) and were assessed on the same tests as Study 1. At encoding, negative MI participants showed superior identification of sadness, relative to neutral affect and compared to the positive MI group. At memory testing, the negative MI group exhibited enhanced memory for the sad faces relative to happy or neutral and compared to the positive MI group. Conclusion: MCM bias for sad faces generalises from clinical depression to these sub-clinical affective states.

Introduction

There is considerable evidence that clinically depressed patients exhibit a mood congruent memory (MCM) bias for negative verbal material (Bradley, Mogg, & Williams, 1995; Neshat-Doost, Taghavadi, Moradi, Yule & Dalgleish, 1998; see also Matt, Vazquez & Campbell, 1992 for a review of the early work in this area). However, this bias has been shown to be confined to depression-relevant words and not all negative words (Watkins, Mathews, Williamson & Fuller, 1992). More recently, it has been shown that this MCM bias generalises to the processing of emotional faces. For example, Ridout, Astell, Reid, Glen and O' Carroll (2003) presented clinically depressed patients and healthy matched controls with a series of photographs of faces with different emotional expressions (happiness, sadness and neutral affect) and asked them to identify the expression portrayed. The participants were subsequently given a recognition memory test for the previously viewed faces. Although the participants did not differ in their ability to identify the emotional expression displayed at encoding, the depressed patients exhibited significantly enhanced memory for sad faces, and impaired memory for happy, relative to neutral. Healthy controls demonstrated the opposite pattern with a positive bias for happy faces. Gilboa-Schechtman, Erhard-Weiss and Jeczemien (2002) reported a similar bias for sad faces in depressed patients. They also reported evidence of a memory bias for angry faces in their depressed participants. However, it should be noted that Deveney and Deldin (2004) failed to find evidence of an MCM bias for negative faces in a sample of clinically depressed patients. This finding can be explained with reference to the influential Interacting Cognitive Subsystems (ICS) model of Teasdale and Barnard (1993) that suggests MCM biases will only be evident under circumstances that require explicit processing of the emotional content of the stimuli at encoding. Ridout et al. (2009) provide support for this notion, as they reported no evidence of an MCM bias for faces in a sample of depressed patients following a non-emotional encoding task (gender identification). As Deveney and Deldin's (2004) study did not require explicit processing of the emotion at encoding an MCM bias would not have been expected. Taken together, the majority of the evidence thus far supports the presence of an MCM memory for negative faces in clinical depression, provided there is explicit processing of facial emotion at encoding.

Until recently, all studies investigating MCM bias for emotional faces in depression had been conducted with clinically depressed patients. However, a recent study by Jermann, van der Linden and D'Argembeau (2008) demonstrated that depression (indexed by the BDI-II) in a group of undergraduate students was associated with

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a memory bias for sad facial expressions. This is an important finding, but, as this research group utilised an alternative memory paradigm to the studies conducted with clinically depressed patients (Gilboa-Schechtman et al., 2002; Ridout et al., 2003), it is difficult to make direct comparisons between their findings and the previous work. With this in mind, it remains unclear if individuals experiencing sub-clinical levels of depression (dysphoria) would also exhibit a memory bias for negative faces on the original paradigm. It is also important to establish if memory bias for sad faces in dysphoria is a robust finding, given that the evidence for a negative memory bias for emotional words in sub-clinical depression has been equivocal (Direnfeld & Roberts, 2006; Matt et al., 1992; Moulds, Kandris & Williams, 2007). The presence of a memory bias for negative faces in dysphoric participants could have significant implications for these individuals, as it might act to reinforce, or even worsen, their ongoing negative affective state and could represent a risk factor for the development of more serious depressive episodes. For example, such a bias could act to confirm an individual's dysfunctional negative views of the world (Beck & Clark, 1988) or it could lead to interpersonal conflicts (Jermann et al., 2008; Persad & Polivy, 1993), perhaps due to excessive reassurance seeking (Joiner & Metalsky, 2001; Joiner & Coyne, 1999).

As noted above, confirmatory evidence of an MCM bias for negative faces in dysphoria would represent an important addition to the current literature on the influence of mood on face processing. However, it is the case that individuals may exhibit elevated scores on depression inventories for a number of different reasons (Vrendenberg, Flet & Krames, 1993); hence any observed effects on memory might not be attributable to the mood of the participant per se, but to some other factor or factors. One way to address this issue would be to investigate memory for emotional faces in healthy individuals (screened for past and/or present depression) who had undergone a positive or negative mood induction. Previous work looking at the effect of induced mood on memory for emotional words has tended to report biases in line with the direction of induced mood, i.e. individuals with an induced negative mood exhibit biased memory for negative words and those in an induced positive mood demonstrate enhanced memory for positive words (see Matt et al., 1992 for a review). However, recent evidence (Direnfeld & Roberts, 2006) suggests that induced dysphoria is actually associated with "even-handed" processing of positive and negative words rather than a negative bias. Nevertheless, the majority of available evidence suggests the type of induced mood is likely to influence memory for the different faces, which in turn would contribute to the current understanding of the influence of mood on face processing.

The aim of the current research was to assess the influence of naturally occurring (Study 1) and induced dysphoria (Study 2) on memory for emotional faces in order to establish if the memory bias for sad faces that has been reported in clinically depressed patients (Gilboa-Schechtman et al., 2002; Ridout et al., 2003) generalises to these sub-clinical affective states.

Study one

Overview and predictions

Dysphoric and non-dysphoric participants, categorised according to their scores on the latest version of the Beck Depression Inventory (BDI-II; Beck, Brown & Steer, 1996), were presented with a series of emotional faces and were asked to identify the emotional expression displayed by each face. Participants were subsequently given a recognition memory test for these faces. It was predicted that, at memory testing, dysphoric participants would remember a greater number of sad faces than happy or neutral. Conversely, non-dysphoric participants were expected to remember more of the happy faces than sad or neutral.

Method

Participants

Forty-five undergraduate students (30 females, 15 males) took part in the current study in exchange for course credit. The participants were categorised based on their scores on the latest version of the Beck Depression Inventory (BDI-II; Beck et al., 1996). In line with the procedure used in Koster et al. (2005), participants scoring 0–5 were categorised as non-dysphoric and participants scoring 10+ were classified as dysphoric. This method resulted in the inclusion of 25 dysphoric participants (18 females, 7 males; mean age = 20.2 years, SD = 1.3) and 20 non-dysphoric participants (12 females, 8 males; mean age = 21.4 years, SD = 4.4). The two groups were matched on gender, age and educational achievement. The study was passed by Aston University's Research Ethics Committee.

Measures

The Beck Depression Inventory II (BDI-II; Beck et al., 1996) was used to allocate participants to the dysphoric or non-dysphoric groups and to assess the degree of state depression. The State-Trait Anxiety Inventory (STAI; Spielberger, 1983) was utilised to measure the participants' dispositional and situational anxiety. This was considered important, as previous studies have reported changes in face processing associated with elevated state and trait anxiety (Bradley, Mogg, Falla & Hamilton, 1998; Mogg & Bradley, 1999). The Digit Symbol Substitution (DSS) and Digit Span (DS) tasks from the WAIS battery (Wechsler, 1981) were used as distracter tasks during the delay period between encoding and retrieval. These tasks were also included to control for any group differences in general cognitive function, as such a differences could confound the interpretation of the emotion identification and recognition memory data.

Emotional faces

The facial stimuli utilised in the current study were drawn from the set used by Ridout et al. (2003) augmented with images from the Ekman and Friesen (1975) series. The total set of faces consisted of 50 grey-scale photographs of different individuals portraying emotional facial expressions. Thirty of these individuals (15 males, 15 females) portrayed both happiness and sadness. The remaining twenty (10 males, 10 females) portrayed a neutral expression. Two sets (A & B) of 30 stimuli were constructed for the encoding phase. Each set featured 10 happy, 10 neutral and 10 sad faces (portrayed by 15 male and 15 female actors). In order to control for the effect of facial distinctiveness on the memory for the faces, individuals portraying happiness in set A portrayed sadness in set B and vice versa. Different individuals portrayed the neutral expressions in sets A & B. Inspection of the emotion identification data from Ridout et al. (2003) reveals that the two sets of faces do not differ in terms of perceived happiness (Set A = 93.3%, SE = 4.2; Set B = 97.3%, SE = 1.8), sadness (Set A = 82.7%, SE = 4.3; Set B = 85.3%, SE = 3.1) or neutral affect (Set A = 60.1%, SE = 3.9; Set B = 60.1%, SE = 2.8); $t(28) = 0.9$, $p > 0.05$, $t(28) = 0.5$, $p > 0.05$ and $t(28) = 0$, $p > 0.05$, respectively. The faces presented at memory testing consisted of 30 familiar (either encoding set A or B) plus 20 novel distracters (5 happy, 5 sad & 10 neutral).

Procedure

Initially, participants completed the BDI-II and STAI according to the standard instructions for these measures. Participants scoring