Double attention bias for positive and negative emotional faces in clinical depression: Evidence from an eye-tracking study

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1. Introduction

According to cognitive models (Beck, 1967, 1976; Bower, 1981), biases in the processing of emotional information have a crucial role in the onset and maintenance of depressive symptoms. These theories predict that depressed individuals can be characterized as displaying negative biases in all aspects of information processing, including interpretation, memory, and attention.

Depressed individuals have been found to have attentional biases in some cognitive reaction-time tasks; however, evidence for this negative bias is mixed (Mogg & Bradley, 2005). In the emotional Stroop color-naming task, researchers have observed an increase in the interference by negative words in individuals with depression. However, this interference was only found in conditions when relatively long stimuli exposure durations of 1 s or more were used (Gotlib & Cane, 1987; Segal, Gemap, Truchon, Guirguis, & Horowitz, 1995). Studies in which words were presented for shorter durations have typically obtained null findings (Bradley, Mogg, Millar, & White, 1995; Mogg, Bradley, Williams, & Mathews, 1993). Similar results have been found with the dot-probe task. For example, Donaldson, Lam, and Mathews (2007) presented 72 pairs of words (36 words each at 500 ms and 1000 ms durations) to a sample of depressed patients. They found that individuals with clinical depression were faster than non-depressed controls in detecting dot-probes that appeared in the same location as a negative word when it was presented for 1000 ms. Both groups were observed to equally attend to stimuli presented for 500 ms durations. Given this pattern of findings, some authors have suggested that depression is characterized by elaborative, rather than automatic processing, in contrast to anxiety disorders (Mogg & Bradley, 2005). According to this notion, Teachman, Joormann, Steinman, and Gotlib (2012) have concluded that attentional biases in depression are conscious and intentional, while those observed in anxiety disorders are unconscious and unintentional.

In accordance with this view, other researchers have proposed that depressed individuals may not necessarily be quicker at directing their attention to negative information than control participants, but that once negative stimuli capture their attention they experience difficulties disengaging their focus (Gotlib & Joormann, 2010). Unfortunately, the reaction time tasks used in these studies are not able to directly assess whether the attentional
Armstrong and Olatunji (2012) review the existing eye-tracking deployment of attention. The recent meta-analysis conducted by because they provide a relatively continuous and direct measure of attention processes have turned to eye movement recording tasks. To overcome these limitations, researchers interested in selective gazes with negative stimuli (Caseras, Garner, Bradley, of them were conducted with clinical samples. Results from these studies use very different experimental methodologies. Kellyough, Beevers, Ellis, and Wells (2008) designed a 2 × 2 matrix with dysphoric, aversive, positive, and neutral images. These authors found that depressed participants spent more time viewing dysphoric images relative to positive, aversive, and neutral ones in comparison to healthy controls. No orienting biases to negative information were found. On the other hand, Mogg, Millar, and Bradley (2000) designed an attentional task with pairs of images comprising an emotional and a neutral facial expression that were displayed for a relatively short period (i.e., 1000 ms). In this study, orienting components of attention were assessed (i.e., initial orientation and latency for the first orientation), but maintenance components were not. The data revealed that clinically depressed patients did not show orienting biases to negative information.

Despite these initial findings, further research using eye-tracking technology is necessary to clarify the role of attentional biases in depression. To better elucidate the mechanisms underlying attentional biases in depression, our study improved several methodological domains found in current literature. Firstly, our research builds upon existing literature by including participants with clinical depression rather than analogue samples. Secondly, unlike in earlier studies, we included in the same design orienting and maintenance measures to assess both components of attentional biases simultaneously. Another improvement of our study over previous research is that we included two different parameters to assess orienting and maintenance components. More specifically, we assessed orienting response by direction and latency of initial gaze, similar to Mogg et al. (2000), whereas we measured maintenance response by duration of the first fixation and total fixation time (see procedure below). Also, to enhance the detection of maintenance components (Gotlib & Joormann, 2010) we used a relatively long exposure time for the stimuli (i.e., 3000 ms). Therefore, the current study was designed to assess the different components of visual attention in depressed and non-depressed participants when presented with negative, positive, and neutral facial expressions in a free viewing paradigm. The advantage of using emotional faces is that they are more likely to be ecologically valid than words (Gross, 2005) and are better at attracting attention due to their higher interpersonal relevance. Based on previous studies of eye movement (Eizenman et al., 2003; Kellyough et al., 2008) and reaction time tasks (Gotlib, Kasch, et al., 2004; Gotlib, Krasnoperova, et al., 2004), we hypothesized that depressed participants would show a negative bias in the maintenance of gaze specifically with regards to sad facial expressions (i.e. duration of the first fixation and total fixation time) but not in the orientation of gaze (i.e. direction and latency of initial gaze). With respect to happy expressions, our second hypothesis was that the depressed group would show an absence of positive bias in comparison with the control group in the maintenance of gaze indices (Ellis et al., 2011). Finally, in accordance with Oehlberg et al. (2012), we hypothesized that the severity of depression would be related specifically to the magnitude of attentional biases to sad facial expressions but not angry ones.

2. Method

2.1. Participants

A sample of 16 participants diagnosed with current MDD and 34 never-depressed controls (ND) took part in the study. Depressed patients were recruited from an outpatient university psychology clinic before therapy had begun. Trained interviewers administered the Structured Clinical Interview for the DSM–IV (SCID; First, Spitzer, Gibbon, & Williams, 1995) to patients during their first session in the study and those with a primary diagnosis of MDD were included in the depressed group. Individuals with current or lifetime diagnosis of Bipolar Disorder, psychotic symptoms, and
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