The Effects of Anxiety and Dysphoria on the Attentional Blink in Children

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Introduction

Cognitive models of anxiety and depression suggest that the development and maintenance of such mood disorders is associated with enhanced processing of negative information (e.g., Beevers, 2005; Eysenck, Derakshan, Santos, & Calvo, 2007). Supporting this notion is a growing body of research indicating that highly anxious participants exhibit attentional biases favoring threatening interpretations of negative stimuli, such as images of angry faces (Bar-Haim et al, 2007). Similar findings have been made in relation to dysphoria, i.e., subclinical depression (e.g., Hadwin et al, 2003).

Typically, research in this area involves using rapid serial visual presentation (RSVP), which assesses the attentional blink (AB) effect, to measure temporal components of visual processing. Studies using this paradigm have found that highly anxious/dysphoric individuals are able to process emotionally salient stimuli more accurately than non-anxious/dysphoric individuals (e.g., Fox, Russo and Georgiou, 2005; Koster et al, 2009). However, most of this past research has focused on adolescents and adults, suggesting that there is a need to replicate these findings in a child population.

In consequence, the overall aim of this study was to investigate the role of temporal processing in children with a tendency towards anxiety and/or dysphoria. The objectives were i) to investigate the effects of high and low levels of anxiety on temporal biases of attention in a child population and ii) to investigate the effects of high and low levels of dysphoria on temporal biases of attention in a child population.

Methods

Participants were 103 children (52 male, aged 8 to 11 years, recruited from local primary schools. The selection criteria were i) normal or corrected-to-normal vision and ii) English as the first language. Levels of anxiety and dysphoria were measured using the State-Trait Anxiety Inventory for Children (STAIC; Spielberger, 1973) and the Children's Depression Inventory (CDI; Kovacs, 1992), respectively.

The experiment involved an RSVP task (see Maratos, Mogg & Bradley, 2008), where participants had to determine whether threat, positive or neutral faces (see Figure 1) were embedded in a stream of distractor stimuli (i.e., pictures of scrambled faces – see Figure 2 for examples). There were 120 trials in total, each containing 20 stimuli: 18 distracters and two target pictures. All stimuli were presented consecutively at a speed of one stimulus every 133ms. This was controlled using inquisit software (www.millisecond.com).

During each trial, the first target stimulus (T1) always appeared as a neutral face and the second target stimulus (T2) was a threat, positive, or neutral face. This resulted in three types of trials: i) neutral T1 – threat T2 (threat trials); ii) neutral T1 – positive T2 (positive trials); and iii) neutral T1 – neutral T2 (neutral trials).

For each trial, the stimulus events were as follows: an initial random sequence of distractor stimuli (either five or eight consecutive stimuli), T1, a further random sequence of distractor stimuli (either one, two, three or six consecutive stimuli), T2, and then the remaining random distractor stimuli (ranging from four to twelve consecutive stimuli) (see Figure 3).

After each trial, participants were required to report which face(s) they had seen using buttons on a response pad that corresponded to the different faces.

Preliminary Analyses & Discussion

A factorial repeated measures analysis of variance (ANOVA) of correct responses was carried out with Lag Position (2, 3, 4, and 7) and Face Type (threat, positive, neutral) as independent variables. This revealed a significant main effect of lag position (Wilk's Lambda = .724 F(3, 78) = 8.99, p < .000, η² = .28) and face type, (Wilk's Lambda = .421 F(2, 79) = 54.41, p = .000, η² = .58).

For the main effect of lag, pair-wise Bonferroni corrected comparisons revealed a typical blink effect. That is, participants performed better on trials at lag position 2 compared with lag position 2 (p = .000) and lag position 3 (p = .001). Participants further performed better on trials at lag position 4 compared with lag position 2 (p = .006). For the main effect of face type, pair-wise Bonferroni corrected comparisons revealed better performance on trials with angry and happy faces (p = .000, p < .000, respectively) compared with neutral faces. In line with adult data, this suggests an effect of valence on RSVP task performance.

To investigate anxiety, two mixed ANOVAs were carried out with State and Trait Anxiety as the between-groups variables using upper and lower tertiles. These revealed a significant interaction between state anxiety and lag position only (Wilk's Lambda = .829 F(3, 48) = 3.30, p = .028, η² = .17) (see Figure 4). To clarify the interaction, Bonferroni corrected independent T-tests of percent correct responses, with State Anxiety (low and high) as the independent variable, were undertaken separately for each lag position. Results indicated that participants with high levels of anxiety performed significantly worse at lag 7 than those with low levels of state anxiety (p < .004). This suggests that highly anxious children do not display a typical blink profile. To investigate this further, analyses controlling for dysphoria will need to be conducted. In addition, data for a control RSVP task involving non-valent stimuli will need to be analysed.

![Figure 1. The schematic facial stimuli used displaying threat, positive and two neutral facial expressions.](image)

![Figure 2. Examples of the distracter stimuli used.](image)

![Figure 3. Example of a double-target trial in which T1 was a neutral face and T2 was a threat face.](image)

![Figure 4. A graph demonstrating the effects of state anxiety on the mean percentage of correct responses at lag positions 2, 3, 4, and 7.](image)

References