Attentional Bias for Threat Faces in Trait Anxious Children

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i) Introduction

Cognitive theories suggest that the development and maintenance of anxiety are associated with enhanced processing of threat-related information (e.g., Eysenck, Derakshan, Santos, & Calvo, 2007). Supporting this notion is a growing body of research indicating that highly anxious participants exhibit attentional biases favouring threatening interpretations of negative stimuli, such as threat-related words or images of angry faces (Hughes & Mandall, 2006; see Bar-Haim et al., 2007, for a meta-analysis). However, most of this research has focused on adolescents and adults, and the few studies that have been conducted in child populations are inconsistent. This suggests that there is a need to further investigate temporal biases of visual attention.

Consequently, the aim here was to investigate the effects of high and low levels of anxiety on temporal biases of attention in children. This was done using rapid serial visual presentation (RSVP), which assesses the attentional blink (AB) effect. Previous studies using this paradigm have found that highly anxious individuals are able to process emotionally salient stimuli more accurately than non-anxious individuals (e.g., Fox, Russo & Georgiou, 2005).

ii) Methods

Participants and Measures

- 174 local primary school children (male=91), aged 8 to 11 years (M=9.64; SD=.92), took part in a pre-selection process:
  - Trait subscale of the State-Trait Anxiety Inventory for Children (STAIC; Spielberger, 1973) administered ➔ Children’s Depression Inventory Short Form (CDI-S; Kovacs, 1992) administered ➔ Participants assigned to groups of high and low levels of trait anxiety using a tertile split ➔ Participants with high levels of dysphoria excluded.
  - Together with selection criteria, this resulted in a participant sample of 42 (23 male) children aged 8 to 11 years (M=9.57; SD=.86).
  - The State subscale of the STAIC was administered to these participants during the experiment.
  - Participants were assigned to groups of high and low levels of state anxiety after the experiment using a median split.

Stimuli

- 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).
- All stimuli were presented consecutively at a speed of one stimulus every 133.6ms.
- Stimulus presentation was controlled using Inquisit software (www.millisecond.com).

Procedure

- 120 trials in total, each containing 20 stimuli: 18 distracters and 2 targets.
- During each trial, the first target (T1) was always neutral and the second target (T2) was either a threat, positive, or neutral face. This resulted in three trial types:
  i. neutral T1 - threat T2 (threat trials)
  ii. neutral T1 - positive T2 (positive trials)
  iii. neutral T1 - neutral T2 (neutral trials)
- Neutral trials were counterbalanced so that when T1 was N1, T2 was N2 (and vice versa).
- Logs investigated were 267.2 ms, 3 (400.8 ms), 4 (534.4 ms), and 7 (935.2 ms) (see Figure 3).
- After each trial, participants were asked whether or not they had seen a face and if they had, whether it was angry, happy or neutral.
- Response accuracy was recorded automatically throughout.

Figure 1. The facial stimulus set used displaying threat, positive and neutral faces (N1 and N2).

Figure 2. Example of a trial in which T1 was a neutral face and T2 was a threat face.

iii) Results

Performance Analysis

To investigate overall performance, a repeated measures ANOVA of percent correct responses was carried out with Lag (2, 3, 4, 7) and Trial Type (threat, positive, neutral) as the IVs. This revealed a significant main effect for trial type only (F(1,66, 68.14) = 23.56, p < .001, ηp2 = .37). Pairwise Bonferroni corrected comparisons revealed that participants performed better on threat compared with positive (p = .006) and neutral (p < .001) trials, and on positive compared with neutral trials (p < .001) (see Figure 3).

Trait Anxiety Analysis

To investigate trait anxiety, a mixed ANOVA was carried out with Lag and Trial Type as the between-groups IVs. Although there was no main effect of trait anxiety, there was a significant interaction effect between trait anxiety and trial type (F(1.78, 71.30) = 27.44, p = .005, ηp2 = .13). Post hoc analyses revealed that high trait anxious participants performed better on threat compared with positive (p = .037) and neutral (p = .013) trials. Comparatively, low trait anxious participants performed better on threat compared with neutral (p < .001), but not positive (p = .23) trials. In addition, low trait anxious participants performed better on positive compared with neutral trials (p < .001) (see Figure 4).

State Anxiety Analysis

To investigate state anxiety, a similar analysis was conducted with State Anxiety (high [N = 21] versus low [N = 21]) as the between-groups IVs. There was no main effect of state anxiety and the interaction effects did not reach statistical significance.

iv) Discussion

- To summarise, findings demonstrate that there is an effect of valence on RSVP task performance irrespective of anxiety levels. This is consistent with both adult and child literature (e.g., de Jong, Koster, van Wees, & Martens, 2009, Visu-Petra, Tincas, Cheie, & Benga, 2010). It was also found that high trait anxious children demonstrate an attentional bias for threat faces, whereas low trait anxious children demonstrate an attentional bias for emotional (i.e., threat and positive) faces per se.
- This supports adult data which shows that non-clinical anxiety is associated with enhanced processing of threat-related stimuli (see Bar-Haim et al., 2007, for a meta-analysis).
- Therefore, attentional biases are potentially an important factor in understanding vulnerability, maintenance and treatment factors implicated in childhood anxiety.
- Consequently, attention training used to successfully attenuate such biases in anxious adults (see Mohrman, 2004, for a review) could also benefit anxious children.

References