

Attentional biases in the processing of threat: Is there specificity between stimuli and arousal responses?

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The phenomenon of selectivity or attentional bias refers to the preferential tendency to attend to threat-relevant rather than non-threat or neutral stimuli, when both are presented simultaneously (Calvo & García-González, 1999). A primary function of anxiety is to detect danger in potentially hostile environments; this is why attentional biases have been considered highly characteristic of anxiety disorders (Eysenck, 1992; Mogg & Bradley, 1998). There is widespread evidence that individuals with high trait anxiety preferentially attend to threat related words or stimuli (MacLeod & Mathews, 1991; Quero, Baños & Botella, 2001). The Emotional Stroop task, in its masked and non-masked versions, is the most frequently used task to assess cognitive biases. Some investigations show evidence in favour of an attentional bias towards threat in general, whereas others point out the existence of content-specific attentional biases, depending on the individual's own fears. The experimental work we present analyses the existing relationship between self-informed physiological anxiety levels and attentional biases towards specific and congruent stimuli with the arousal response, using a backward pattern masking emotional Stroop task, in the general population (N= 28).

Hypotheses

- H1** Participants with high scores in the physiological anxiety factor will show larger attentional bias towards physiological activity threat related words.
- H2** Attentional biases will be found in those participants scoring high in the physiological anxiety factor when undergoing a subliminal or masked attentional task.

Method

Participants

Twenty eight undergraduate students of the Complutense University of Madrid, selected and assigned to the different groups according to their direct scores in the physiological factor (self-informed physiological activity as measured by the ISRA):

- High physiological activity group:
Sample was composed of 14 women, with ages ranging from 20 to 32 years (Mean age=22.33; Sx = 2.94).
- Control group:
Composed of 14 women, with ages ranging from 19 to 51 years (Mean age=23.28; Sx = 5.71).

Materials

Inventory of Situations and Responses of Anxiety (ISRA; Miguel-Tobal & Cano-Vindel, 1986).

Backward masked Emotional Stroop task: three programs were designed with E-Prime 1.0 software.

Design

A 2x3x2 design (participants x tasks x content).

- 1** A fixed factor (A): participants with high physiological activity vs. participants with low physiological activity.
- 2** A first repeated measures factor (B): three experimental conditions:
 - a** Social anxiety situation: the participant had to imagine the description read out loud by the experimenter.
 - b** Sadness-depression situation: free recall task of a personal situation.
 - c** Physiological activity situation: by undergoing voluntary hyperventilation.
- 3** A second repeated measures factor (C): Stimuli content: 1. threat-related words, 2. neutral words.

Procedure

- 1** Accommodation and adaptation period (variable time).
- 2** Instructions and protocol explanation.
- 3** Practical example of Stroop task.
- 4** Reading of social description task during 2 minutes.
- 5** Presentation of backward masked Emotional Stroop task (social threat words).
- 6** Emotional realism and involvement self-informed assessment.
- 7** Sadness imagination task (free recall) for 2 minutes.
- 8** Presentation of backward masked Emotional Stroop task (depressive words).
- 9** Emotional realism and involvement self-informed assessment.
- 10** Voluntary hyperventilation task.
- 11** Presentation of backward masked Emotional Stroop task (physical threat words).
- 12** Emotional realism and involvement self-informed assessment.

References

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Results

Table 1: Test of inter-subjects effects

Source	S. S.	D. L.	F	Significance
Intersection	56720830.98	1	465,428	.000 ***
Group	1006506.23	1	8,259	.008 **

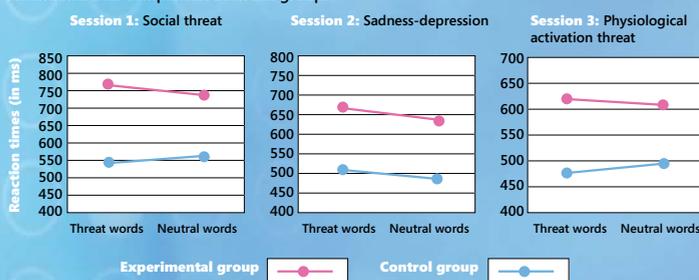
Table 2: Test of within-subjects effects

Source	S. S.	D.L.	F	Significance
Session	274827.78 28129.98	1	28129.98 5.18	.002 ** .032 *
Session x Group	38611.82 674.93	1	1.64 0.12	.212 .727
Content	1899.54	1	1.03	.320
Content x Group	6414.54	1	3.47	.074
Session x Content	387.50 1678.62	1	0.14 0.65	.712 .426
Session x Content x Group	140.99 1291.78	1	0.05 0.50	.824 .485

Level of significance: * p<.05; ** p<.01; *** p<.001

Figures 1, 2 and 3: Attentional bias measured in reaction times (in ms) towards threat and neutral words under three experimental conditions

Attentional bias comparison between groups.



- 1** Results show statistically significant differences between groups ($F=8.26, p<.01$). The experimental group (high physiological anxiety) shows larger reaction times than the control group.
- 2** Tests of within-subjects effects showed statistically significant differences depending on the session ($F=11.69, p<.02$) and ($F=5.18, p<.03$), i.e., experimental conditions explain attentional biases.
- 3** No significant differences were found in the session x group, stimuli content, and content x group interactions ($F=3.46, p<.07$).
- 4** Participants with high physiological anxiety did not require more time to respond to threat words than to neutral words ($p>.074$).

Conclusions and Discussion

- Individuals high in physiological anxiety show larger reaction times (a measure of attentional bias in the backward masked Emotional Stroop task) when responding to either threat or neutral words under the three experimental conditions; no specific bias was detected towards threat nor the physiological anxiety factor related stimuli.
- Attentional resources seem to be directed towards threat; nevertheless, we cannot reach the conclusion that there is a specific attentional bias towards negative information.
- Contradicting numerous studies, our results do not support the attentional bias specificity hypothesis.
- General biases were found towards all the material, threat and non-threat words.
- Interference effect was found to be significant at a pre-attentional processing level, when individuals carried out the backward masked Emotional Stroop task. Few studies have used "backward pattern masking" in order to measure attentional bias. Using this paradigm, participants with high levels of physiological anxiety were found to show a strong attentional bias towards all stimuli. Are we observing attentional biases at a pre-conscious level? Or quite the opposite: Does this task actually measure attentional bias towards information in general and not threat?
- Future research with a larger general population sample, including both sexes, is required to confirm our results.