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# The emotional Stroop effect in anxiety disorders General emotionality or disorder specificity?

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## Abstract

Selective attentional biases, often documented with a modified Stroop task, are considered to play an important role in the etiology and maintenance of anxiety. Two competing explanations for these effects are selectivity for highly emotional words in general vs. selectivity for disorder-specific words. We tested these explanations in 32 patients with generalized anxiety disorder (GAD), 29 patients with social phobia (SP), and 31 non-anxious controls. Stimuli were of four kinds: GAD-related words, SP-related words, words with a neutral valence, and words with a positive valence. Different attentional biases were observed: GAD patients were slowed by all types of emotional words, while SP patients were distracted specifically by speech-related words. © 2001 Elsevier Science Inc. All rights reserved.

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## 1. Introduction

Cognitive models of anxiety have received increasing empirical support over the past decade (e.g., Barlow 1988; Beck, Emery, & Greenberg, 1985; 1992).

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These models focus on attentional processes because one function of anxiety is the detection of threat, enabling the individual to react quickly. According to cognitive theories (e.g., Bower, 1981, 1987; Williams, Watts, MacLeod, & Mathews, 1988, 1997), anxiety patients' attention should be biased selectively towards threatening stimuli. To understand cognitive biases of attention, psychological theories and clinical research have increasingly turned to information processing paradigms derived from experimental cognitive psychology.

A classical paradigm adapted to this purpose was originally introduced by Stroop (1935). The modified version of the Stroop task is the paradigm most frequently used to show attentional biases in anxiety patients. The general approach of this task is to demonstrate selectively biased attention by showing diminished performance in a task condition where threatening stimuli could cause distraction. Specifically, participants are asked to name the ink color of words, disregarding their content. The basic finding is that, compared to other words and other participants, patients with anxiety disorders take longer to name the color of threatening words.

The modified Stroop task has been used successfully with a variety of anxiety patients, among them patients with panic disorder (Ehlers, Margraf, Davies, & Roth, 1988; McNally, Riemann, & Kim, 1990; McNally, Riemann, Louro, Lukach, & Kim, 1992), obsessive–compulsive disorder (Ilai, Shoyer, & Foa, 1991), specific phobia (Lavy, van den Hout, & Arntz, 1993), social phobia (SP, Hope, Rapee, Heimberg, & Dombek, 1990), and posttraumatic stress disorder (Foa, Feske, Murdock, Kozak, & McCarthy, 1991; Kaspi, McNally, & Amir, 1995). Furthermore, there are several studies of patients with generalized anxiety (Martin, Williams, & Clark, 1991; Mathews & MacLeod, 1985; Mogg, Mathews, & Weinman, 1989). Most of these studies found the expected specific distraction effect, i.e., patients were specifically slowed in naming the print color of threat-related words. This effect occurs both with word-by-word and card-by-card presentation of the words, although it seems to be stronger with the blocked card-by-card format (Holle, Heimberg, & Neely, 1997; McNally, Amir, & Lipke, 1996). The color-naming interference does not seem to be due to inter-item priming, repetition of the items, or even more critically, on conscious attention. Four studies (MacLeod & Hagan, 1992; MacLeod & Rutherford, 1992; Mogg, Bradley, Williams, & Mathews, 1993; Mogg, Kentish, & Bradley, 1993) could demonstrate distraction by threatening stimuli presented subliminally. Hence, the interference seems to be a genuine bias of anxiety patients.

Mathews and MacLeod (1985) conducted one of the first studies using the modified Stroop task with anxiety patients. They found highly specific effects: patients who worried mostly about physical harm were particularly slow in naming the color of physical threat words, whereas patients worrying about social threat were especially slow in naming social threat words. Similarly, Hope et al. (1990) reported that panic patients were slowed by physical threat cues, but not social threat cues, whereas the opposite held for social phobics. Specific, albeit slightly different, effects were also reported by Mogg et al. (1989). Martin et al.

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