
Are Emotional Stroop Tasks Really Emotional?

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Abstract

The Stroop task is the most widely used task for examining executive functioning. A variety of modified Stroop tasks have been created over the years. These tasks use a combination of emotionally charged words and neutral words or Xs. In general, it takes longer to identify the color of the print for emotionally charged words compared to the neutral condition. This finding has been found with suicide-related words for depressed suicide attempters (Becker, Strohbach, & Rinck, 1999) and spider-related words for spider phobics (Thorpe & Salkovskis, 1997) to name a few examples. As a result of these findings, it is currently believed that the color naming interference found in these tasks is related to specific domains of emotion information associated with a clinical patient's personal concerns (MacLeod, 2005). This study was conducted to determine whether or not Stroop interference can be obtained using information within a specific domain of non-emotional information associated with an individual's personal interests. Fifty-one controls and 17 volleyball players were shown neutral, color, and volleyball-related words in red, green, yellow, or blue print and asked to name the color print. Participants demonstrated typical Stroop interference with color-congruent and color-incongruent words ($F(1, 66)=24.76, p<.001$). There were no differences between the controls or volleyball players on color-word Stroop interference. However, there was a significant interaction between the controls and volleyball players and color naming when volleyball-related terms were used ($F(1, 66)=4.01, p<.05$). There was no difference in color naming between the neutral and volleyball words for the controls but volleyball-related words produced significantly longer RTs for volleyball players compared to neutral words. These findings suggest that Stroop interference can be obtained as long as words are personally relevant. The words do not have to be emotionally charged or related to a clinical disorder to cause interference.

Introduction

The Stroop task is the most widely used task for examining executive functioning. A variety of modified Stroop tasks have been created over the years. In particular, some variations of the Stroop task have looked at information processing in different clinical groups. These tasks use a combination of emotionally charged words and neutral words or Xs. In general, it takes longer to identify the color of the print for emotionally charged words compared to the neutral condition. This finding has been found with suicide-related words for depressed suicide attempters (Becker, Strohbach, & Rinck, 1999), spider-related words for spider phobics (Thorpe & Salkovskis, 1997), trauma-related words posttraumatic stress disorder patients (Kaspi, McNally, & Amir, 1995), social threat words for social phobics (Lundh & Ost, 1996), and eating, body shape, and weight-related words for bulimics (Fairburn et al., 1991; Cooper, Anastasiades, & Fairburn, 1992). As a result of these findings, it is currently believed that the color naming interference found in these tasks is related to specific domains of emotion information associated with a clinical patient's personal concerns (MacLeod, 2005). However, a

potential problem with this research is that the words used in the tasks have an emotional valence attached to them because of altered cognitions associated with the particular disorders examined. Therefore, it is important to examine Stroop interference in these tasks without using emotionally charged words. This study was conducted to determine whether or not Stroop interference can be obtained using information within a specific domain of non-emotional information associated with an individual's personal interests. Specifically, we examined if volleyball-related words would produce more interference for volleyball players than non-volleyball players.

Method

Participants

Fifty-one female controls and 17 female volleyball players from George Fox University, a liberal arts college in the Pacific Northwest, volunteered to participate in this study. All participants had normal color vision and normal or corrected to normal visual acuity. None of the participants reported having depression, an eating disorder, or other clinical diagnosis.

Design

Seven stimulus conditions were randomly presented in blocks of 96 trials (cf., Tucker and Schlundt, 1995). The seven conditions included food-related words (e.g., cake), neutral words (e.g., desk), animals (e.g., dog), body-related words (e.g., fat), color congruent words (e.g., RED), color incongruent words (e.g., RED), and volleyball-related words (e.g., spike). The volleyball-related words were non-emotional words that referred to different positions and behaviors in volleyball. Except for the color words, there were eight words in each block (red, green, yellow, and blue were the only color words used in the study). Words were presented in red, green, yellow, or blue print. Participants were required to respond to the color of the print using a key press ("z" for red, "x" for green, "." for yellow, and "/" for blue). Stimuli were presented and responses were recorded using SuperLab.

Procedure

Participants completed a visual acuity and color vision screening. They were then instructed that they were to press the key corresponding to the color of the print that appeared on the screen. Participants were given 20 practice trials to familiarize themselves with the color coding. After completing the practice trials, participants completed the seven experimental blocks. Each trial was self-initiated with a key press. Upon completing the experimental blocks, participants answered several brief questions concerning their involvement in sports in general and volleyball in particular along with a self-report item for clinical diagnosis.

Results

Descriptive Statistics

Median RTs were determined for each participant for each condition. Descriptive statistics for each of the seven conditions are presented in Table 1 by group (i.e., control and experimental).

Table 1. Mean RTs for each condition by group.

Condition	Control (n = 51)		Experimental (n = 17)	
	M	SD	M	SD
Food-Related	772.33	147.90	751.56	146.67
Neutral	756.06	139.06	730.85	130.15
Body-Related	780.38	157.11	740.65	131.99
Animals	797.10	160.17	784.32	179.63
Color Congruent	732.01	145.06	741.62	133.84
Color Incongruent	802.98	135.89	803.24	139.70
Volleyball-Related	744.65	117.23	786.59	142.93

Comparisons

Interference was found by comparing the experimental conditions with the neutral condition. A series of mixed 2X2 ANOVAs were conducted to examine Stroop-like interference and differences between the control and volleyball participants. No main effects or interactions were found for the food-related or body-related words. However, a significant interaction was found for the volleyball-related words ($F(1, 66) = 4.01, p < .05$). Volleyball players showed interference for volleyball-related words while the control participants showed no interference for the same words. Significant Stroop interference was found by comparing the incongruent condition with the neutral condition ($F(1, 66) = 15.25, p < .001$) and the incongruent condition with the congruent condition ($F(1, 66) = 24.76, p < .001$). Examining effect sizes using Cohen's *d* (Table 2) shows that the Stroop comparison produced the greatest amount of interference for the control and experimental groups but the volleyball-related words produced no effect for the control group and almost the same degree of interference for the volleyball players compared to color-word Stroop.

Table 2. Cohen's *d* for each experimental-neutral comparison by group.

Comparison	Control	Experimental
Food-Neutral	.117	.159
Body-Neutral	.175	.075
Incongruent-Neutral	.337	.556
Volleyball-Neutral	.082	.428

Discussion

This study was conducted to determine if increases in RT to phobic-related words, for example, is due to cognitive processing specific to the disorder or to the emotional valence of the phobic or anxiety related items. In order to answer this question, non-clinical participants completed a Stroop-like task containing non-emotional words important to their self-identity (i.e., a volleyball player). The results indicate that volleyball players show interference with volleyball-related words while non-volleyball players do not. This suggests that the Stroop interference found in previous research with different disorders is potentially due to the individuals being more cognizant of the disorder related words and not due to the emotional valence associated with these words.

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