“Where is the emotional Stroop effect in depression?”

Eloise Julia Fallon
Bachelor of Arts-Psychology (Honours)

Supervisor: Ami Eidels

Empirical thesis submitted in partial fulfilment of the requirements for the degree of Master of Clinical Psychology at the School of Psychology, University of Newcastle.

Date submitted: February, 2013.
Acknowledgements

I would like to thank my supervisor Ami Eidels for his enthusiasm and patience in supporting me throughout this research project. From the cognitive laboratory, Paul Williams provided greatly appreciated assistance with the data analysis, and David Elliot helped with programming and technical support during the experiment. Finally, I cannot thank my parents enough for their incredible unconditional support.
Abstract

Scope
The literature remains inconsistent regarding a negative attentional bias in depression, as shown on the emotional Stroop task. This study used a non-clinical undergraduate sample to investigate how depression severity influences performance on the emotional Stroop task compared to a new task that enforced emotional processing. Different calculations of the emotional Stroop effect (ESE) were also compared to determine the influence of depression at different stages of emotional processing.

Purpose
To examine alternative explanations for the ESE and how this relates to theories of depression beyond a negative attentional bias. By comparing the emotional Stroop task to a novel forced-processing task (forced task), this study aimed to test whether emotional processing is a mandatory outcome in the emotional Stroop task, as assumed by studies searching for an automatic attentional bias. The ESE was deconstructed into both a fast effect, where interference results from the current emotional word, and a slow effect, where interference carries over from the previous emotional word. Isolating these two effects within the context of depression allows for an investigation of whether depression increases an immediate attentional bias, the fast effect, or whether depression instead involves a difficulty in inhibiting the effect of previous emotional words, the slow effect. Both positive and negative words were included as emotional stimuli to test whether the ESE is due to interference from emotion generally, or a valence-specific bias.

Methodology
Fourteen participants completed the Beck Depression Inventory II (BDI-II) as a measure of depression severity, and the Depression Anxiety Stress Scales (DASS-21) to measure possible
confounding variables of anxiety and stress. Participants performed in two tasks: the emotional Stroop task and the forced task. In the emotional Stroop task, participants were asked to classify the print colour of emotional (positive and negative) words and non-emotional (neutral) words by pressing the corresponding coloured key. In the forced task, participants were asked to classify the colour of the words only if the word was emotional and to press a different key if the word was neutral, therefore participant responses were contingent on understanding the word meaning and emotional processing was mandatory.

Results
Six out of 14 participants scored in the depression range on the BDI-II. The ESE was significantly larger in the forced task, beyond the expected difficulty of the task. Participants demonstrated equivalent interference to positive and negative words, while interference from emotional words was significantly greater than neutral words. The ESE was therefore identified as the effect of emotion generally. Only the fast effect was significant in the forced task, while there was a significant positive correlation between depression severity (on both measures) and the slow effect across both tasks.

Conclusions and implications
The results suggest that emotional processing can be voluntary on the emotional Stroop task, which has implications for the use of the task to investigate automatic attentional processes. Studies focusing on the fast effect have often failed to find evidence of an ESE in depression. Few studies have investigated a slow ESE, and this study found that the slow effect was significantly related to depression severity. This finding suggests that a bias in depression exists in a later stage of processing with a difficulty in disengaging from the impact of emotion once processed. This difficulty may relate to other maladaptive emotion regulation
mechanisms in depression, such as rumination.

*Key words*

Depression, emotional Stroop task, emotional Stroop effect, emotional processing, attentional bias
Table of Contents

Critical Literature Review

- Depression ................................................................. 1
- Attentional bias in the emotional Stroop task ............... 2
- The Emotion Context Insensitivity Hypothesis ........... 4
- A difficulty in regulating emotion ............................. 5
- Re-interpreting the emotional Stroop effect ............... 7
- Fast and slow emotional Stroop effects ................. 9
- Assumptions of the emotional Stroop task ............... 9
- The present study .......................................................... 11
- Clinical implications .................................................. 12

Manuscript

Abstract ................................................................................. 13

1 Introduction ............................................................................. 14
- Depression ............................................................................ 14
- The Stroop and emotional Stroop tasks ..................... 15
- Alternative conceptualizations of depression .......... 16
  - The Emotion Context Insensitivity hypothesis ......... 16
  - Emotion regulation difficulties ............................ 17
- Alternative explanations for the emotional Stroop effect 18
  - Slow down to threat ................................................... 18
  - Fast and slow effects ................................................. 19
  - Voluntary emotional processing ............................ 20
- The present study .............................................................. 21

2 Method .................................................................................. 23
- Participants ................................................................. 23
- Design ............................................................................. 24
- Measures ......................................................................... 24
  - Beck Depression Inventory ................................... 24
  - Depression, Anxiety and Stress Scales ................. 25
- Stimulus ............................................................................ 25
- Procedure ......................................................................... 26

3 Results ....................................................................................... 27
- Data excluded ..................................................................... 27
- Hypotheses tests ............................................................ 27
  - Emotional Stroop effect as Emotional-Neutral ..... 27
  - Emotional Stroop effect as Positive-Negative ....... 30
  - Depression and the emotional Stroop effect (Emotional-Neutral) ... 30
  - Fast and slow effects .............................................. 31
  - Fast and slow effects with depression ................. 31
- Confounding variables .................................................. 32
- Accuracy ............................................................................ 32
| 4 | Discussion .......................................................................................................................... 33 |
|   | 4.1 Findings ..................................................................................................................... 33 |
|   | 4.1.1 Summary of the findings ....................................................................................... 33 |
|   | 4.1.2 Voluntary emotional processing .......................................................................... 33 |
|   | 4.1.3 Emotion-Neutral as the emotional Stroop effect .................................................. 34 |
|   | 4.1.4 Fast and slow effects ............................................................................................ 34 |
|   | 4.1.5 Fast and slow effects with depression ................................................................. 35 |
|   | 4.1.6 Anxiety and stress ............................................................................................... 37 |
|   | 4.2 Limitations and future research ............................................................................. 38 |
|   | 4.3 Clinical implications and conclusions ................................................................... 40 |
| 5 | References ....................................................................................................................... 42 |

References .................................................................................................................. 46

Appendices ...................................................................................................................... 50
| 4.1 Statistics of the matched emotional and non-emotional stimuli .................. 50 |
| 4.2 Manuscript submission ......................................................................................... 51 |
List of Tables

Table 1   Mean individual RT (ms) for each conditions, and emotional Stroop effects as Emotional-Neutral and Positive-Negative ......................................................... 29
List of Figures

<table>
<thead>
<tr>
<th>Figure 1</th>
<th>Emotional Stroop effect in each task</th>
<th>28</th>
</tr>
</thead>
</table>