

# Experimenting with a variant of the stroop effect



The aim of the experimental project was to examine a variation of the Stroop effect. How cognitive processes are influenced when automatic processing takes place.

The hypothesis offered was, a significant difference in information processing times would be required over the two conditions when the Stroop effect was used. The null hypothesis states that there will not be any significance during information processing by participants when the two conditions are considered in relation to the Stroop effect.

The research was carried out using twenty participants drawn from two sources; sixteen from Open University colleagues, family and friends group; four from a local family and friends group. They were subjected to the Stroop effect test. Statistical analysis was extracted using SPSS version eighteen software. When participants read the ink colours with neutral words they took less time than when asked to read the colour of colour words.

## Introduction

Every moment of life from beginning to passing away we receive information from the environment, allowing us to respond and adapt appropriately to change. Darwin (1859) states that most species are destroyed by competitors. Lamarck (1829) states that life is a result of time and environmental communication.

The interaction between environment and organism should be considered a two-way process, we experience the environment responding appropriately. Heider (1958) presents this as cause and effect; we struggle to make sense of

our environments. What is it that allows us function in society, construct and develop knowledge, invent and develop our intellectual capabilities. Social Psychologist Sternberg (2004) views this learning and knowledge as cognitive processes.

Attention is a cognitive process and influences what is sensed and perceived. Many activities such as walking, talking, cycling, typing, driving become automatic. So when you have learned how to drive a car you store the event sequence, change gear, steer and use brakes. The driving process becomes automatic without the need for conscious awareness. Mc Daniel et al (2000) consider automatic attention leads to greater efficiency in processing information.

Psychologists discuss sensation and perception as part of the learning process. Sensation is said to be the same for everyone, most people see oranges as yellow-red yet their perception of the taste will commonly vary. Some may consider the fruit as moist and sweet; others dry and bitter. So it is impossible too conclude, that sensation will always lead too similar perceptions.

Our conscious and unconscious view of the world is altered by social and environmental conditioning. William James (1890) considers the mind gives attention to one stimulus and allocates our limited processing resources. This selective process leads to other stimuli not being processed. Kahneman (1973) suggests that the brain has a limited-capacity central processor leading to errors in how previous knowledge and current experiences are integrated. Simons and Levin (1998) experiment change blindness provides

an example of how we take in limited information in our daily lives. Richard Gregory's theory also suggests that we construct our perceptions of the world using incomplete information.

When we want to learn something new; we can have difficulties in processing the information. When two pieces of information are present the brain automatically processes. However this becomes problematic separating the linked information; this is consistent with Kahneman (1973) view of limited capacity processor. Stroop (1935) the Stroop effect is an example of a link between repeated and controlled processes. Participants look at words, example sky printed in red ink they say out loud the ink colour, not the word. Stroop (1935) observed this caused participants to stop resulting in hesitation, the colour and word interfered with each other. Reading is an automated process taking less processing time, whereas reading of ink colours cause interference therefore it takes longer.

In this research project I will examine a variation of the Stroop effect: people find it harder to name what colour ink a word is written in if the word is the name of a colour than if the word is colour neutral. The hypothesis is that there ought to be a significant difference in times taken to process information during the two conditions. The null hypothesis is that there should not be any important difference in the time taken by participants when the both conditions are examined.

Method

Design

This was a within-participant design both conditions were tested using the same twenty participants. The independent variable was a single task. The task required that the participants read out loud the colour of each word; not the words. The dependent variable was the time taken to complete this visual task. Measurements were timed using a stop watch; this was recorded to the nearest second. To control for any difficulties with colour blindness the four participants selected locally were presented with a colour test sheet (Appendix 2). They were required to identify six colours correctly. To prevent participants becoming familiar with the list of words; they were given two different lists; the colour sequence remained the same. To control for confounding variables participants were given the test at the same day and time. Instructions given to participants were those provided by the Open University, ensuring no confusion or variation in the experiment.

### Participants

The twenty participants in this experiment came from two sources; sixteen participants were recruited by the Open University as partners of this experiment. They were colleagues, family members or friends. The second source; four participants were recruited by me from a sample of fifteen friends and family. The four who participated were randomly selected. The age of participants ranged from 18 to 75 years and there were 13 women and 7 men.

### Materials

An electronic stop watch accurate to one tenth of a second was used to record times taken by each of the four participant chose by me. The sixteen  
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participants chosen by the partnering agency (OU) had been timed to the nearest second. So I standardised timing to the nearest second when participants completed the visual task. The visual stimuli for condition one and two were presented on two separate sheets of white paper. Each sheet of paper consisted of 30 words; in two columns. There were six words repeated five times; each word printed was in different one of six colours; the print used was Arial 36 points. In condition one the six words used were nouns each object have colours attributable to the object, Sky blue, Plum purple, Lemon yellow, Grass green, Carrot orange and Blood red. In condition two the words had no colours attributable. The word order was randomised, yet the same in each condition. Examples of the condition sheets are provided in Appendix. Standard instructions were used (Appendix 6) each of the participants completed a consent form (Appendix 5)

## Procedure

A dual sampling arrangement operated with regard to participants of this research. The first sixteen participants were selected by the Open University the participants were selected from colleagues friends and family. The second group of four participants were selected at random from a group of fourteen friends and family. Each participant was asked if they would take part in a five to ten minutes cognitive psychology experiment. Those who agreed to participate signed the consent form. The four participants were tested independently of each other. Background information such as age and gender were recorded. I make certain the group of four were naive with regard to this experiment. They had no experience with regard to psychology. Instructions for condition one and two were read; they were told <https://assignbuster.com/experimenting-with-a-variant-of-the-stroop-effect/>

they would be presented with two sheets of A4 paper containing columns with words. They were to say out loud the colour ink each word was printed in; not the word. Participants were asked to complete column one and then continue too column two.

Then they would be presented with a second list of words and required to follow the same instructions. Prior to the experiment each participant was given a sample word and colour. They were told that they would be timed during the experiment. The list of words were put face down in front of them. The A4 sheet of paper was then turned over and the task began; the stop watch was started when the participant commenced reading. The time taken for condition one was recorded. The same procedure was followed for the second condition. As part of the debriefing session the participant was informed as to the aims of this experiment and was given an opportunity to ask questions.

## Results

The research hypothesis in this experiment suggests that the difference will be significant in terms of time taken when completing tasks. The time taken by participants reading word colours were measured and rounded to the nearest second.

Table 1 Mean and standard deviation for response time in seconds

Condition Mean response time (in seconds) Std. Deviation

Condition 1 24. 60 4. 581

Condition 2 22. 65 4. 030

Table 1, indicates that the mean response time in seconds for the condition one and two are significantly different, with the mean time taken in condition two being 1.95 seconds shorter than condition one. An independent sample t-test carried out on the data, revealed the difference between the two conditions was statistically significant ( $t(19) = 2.890$ ;  $p = .009$ ;  $d = .0045$ ). On the basis of these result the null hypothesis should be rejected.

## Discussion

The hypothesis suggested the time required to complete the task would show a significant difference during information processing. It would take longer to process information in condition one and less in condition two. Schneider and Shiffrin (1977) two process theory linked controlled and automatic information processing, suggesting the former requires more processing resource than the latter. In this experiment reading words is an automatic process; identifying word colours is a controlled process.

Response times in condition one was significantly different from condition two. Condition one participants may have been distracted by the underlying significance of their characteristic colours. The words in condition two could have no word colour association. The neutral coloured words are differently processed by the brain than the coloured words in line with interference theory.

Stroop (1935) and Lavie (1995) had similar results. Stroop found automatic process (reading) impact on controlled processes (naming ink colours).

These automatic process present with drawbacks; they can not be stopped,  
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preventing controlled processes happening. Lavie (1995) demonstrated how information processing is obstructed when there is too great a perceptual load. Engel (1971) attentional tunnelling, only allows small amounts of information be processed. The evolutionary perspective suggests this is significant; when an unexpected attack or event requires an instant response. McLeod (1977) supports a multi-processor model of attention, that we can process visual and auditory inputs through a number of channels. McLeod results indicated reaction times were not slowed when carrying out a number of tasks in the experiment. If our processing ability is restricted; because of scarce cognitive capacity; it is reasonable to suggest participants will not perform well during a dual task test. In this experiment participants started reading the list slowly; their response to the coloured stimuli improved. It appears what had been a controlled response was now becoming automatic.

The limited number of words and participants selected might have affected the research outcome. Possibly the task of reading twenty words on two lists was insufficient to prove interference. The task of reading the colour inks allowed participants take as much time as they required; therefore they may not have been under any pressure with such a limited sample.

In conclusion the experiment gives support to the Stroop effect; automatic processes are lightly too require much less processing resources than required by controlled processes