



Research Methods I

Assessment Information and
Guidance: Report 2 -

The Stroop Effect and Levels of
Impulsivity



Outline of today's workshop

- Run through general information on the third assessment: the research study you will be conducting and the corresponding report write-up.
- Run through where to find all information pertaining to the completion of this assessment.
- Explanation and further discussion of the research topic area and research study itself.



Report 2 Information:

- Please consult the [Assessment: Report 2 \(t-test\)](#) tile on Moodle.
- Here you will find the proforma, all materials, guidance documents, data (once collected), submission portals, etc. associated with the research study and report write-up for this assessment.

Report 2 Information:

- Other materials/documents to assist you with completion of this research study and report write-up can be found in the following locations on the module Moodle page:
- [Important Research Documents and Links](#) tile:
 - The three key BPS ethics documents
 - The UWTSD Ethics and data management policies
 - The referencing and report writing house rules
 - Journal article content and structure
 - APA 7th edition updates
- [Week Six: Psychological Tests and Scales, and Introduction to SPSS](#) tile
 - Lecture on scales and psychometrics (slides and recording)
 - Writing materials sections for Psychological Questionnaires folder
 - SPSS Recording, tutorial videos, and worksheets for practice

Report 2 Information:

- Other materials/documents to assist you with completion of this research study and report write-up can be found in the following locations on the module Moodle page:
- [Week Seven: Testing for differences \(T-test\)](#) tile:
 - T-test lecture (Slides and Recording)
 - SPSS tutorial videos
 - T-test worksheets for practice
- Throughout the sessions over the next two weeks we will continue to work together as a group to develop, conduct, and work through the main analyses of the data for the study.
 - Therefore, it is imperative that you attend all sessions (or ensure to catch-up as soon as possible if you are unable to attend).
 - Then it will be up to you to write-up the report on your own, using the guidance and materials provided.

Introduction to the research topic area

- This research study will focus on combining two areas in Psychology:
 - Cognition – specifically attentional mechanisms
 - This will make use of an experimental paradigm
 - I.e., the Stroop task (Stroop, 1935) to measure automaticity and inhibitory control (objective behavioural task)
 - Personality – specifically impulsiveness
 - This will be captured through a Psychometric measure
 - I.e., the Barratt Impulsiveness Scale (Patton et al., 1995) to measure levels of impulsivity (subjective self-report questionnaire)

Introduction to the research topic area

- Attention
 - Focused attention
 - The ability to focus on one particular aspect of a sensory input
 - Divided attention
 - The ability to concentrate on two tasks at once
 - The present study will relate to the area of focused attention

Attention

- Can we choose to focus on one aspect of a stimulus and completely ignore others?
 - Broadbent (1958): we have a filter that allows us to select the information we wish to attend (usually on basis of physical characteristics)
 - However research shows that often the information we are not attending to or trying to ignore is often processed as well
 - The 'cocktail' party phenomenon (Cherry, 1953)

Attention

- Shiffrin and Schneider (1977)
 - Distinction between controlled and automatic processes
 - Controlled processes
 - Skills that are new and not highly practised
 - Require serial processing
 - Require conscious effort and focussed attention
 - Automatic processes
 - Highly practised skills
 - Can operate in parallel
 - Can operate unconsciously and automatically

The Stroop Effect

- Stroop (1935)
 - Colour naming task
 - Identify print colour of word, ignore what the word says
 - Difficult if word meaning and print colour are in conflict e.g., **BLUE**
- Explanation
 - Intrusion of meaning from unattended channel
 - Attended channel: the colour in which the word is presented
 - Unattended channel: the word itself

The Stroop Effect

- Why does meaning intrude from unattended channel
 - Normally when we see a word, we are required to read it
 - Reading can be considered an automatic process (Shiffrin & Schneider, 1977)
 - Therefore, it is beyond conscious control
 - In the Stroop task, the participant is effectively told *not* to read a word
 - Suppress/inhibit an automatic process

The Stroop Effect

- This does not really matter in congruent conditions (words and colours match)
- However, in incongruent conditions:
 - Conflict between information about colour
 - The task at hand – name the print/ink colour
 - The automatically read colour word
 - Hence longer colour naming times in incongruent condition.

AUTOMATICITY MODEL

- The difficulty of removing the interference effect of the Stroop task has led some researchers to claim that the brain is wired to recognize words without effort.
- This explanation is called the "automatic word recognition hypothesis" (or automaticity hypothesis).
 - According to this theory, reading is an automatic process, which cannot be turned off.
- In other words, people see the meaning of words without much effort or consciousness.
- On the other hand, naming colours is not automatic.
 - It requires more effort than reading, thus creating interference in the Stroop task.

SPEED OF PROCESSING MODEL

- This theory suggests that word processing is much faster than colour processing.
- Thus, in a situation of incongruence between words and colours, when the task is to report the colour, the word information arrives at the decision process stage earlier than the colour information and results in processing confusion.
- On the other hand, when the task is to report the word, because the colour information lags behind the word information, a decision can be made before the conflicting colour information arrives.

Inhibition in the Stroop task and links to impulsivity

- The rationale for the link between behavioural data in the Stroop task (which involves inhibitory mechanisms to control interference) and the personality factor of impulsiveness, is that inhibition also plays a major role in impulse control (Leshem, 2016; Stahl et al., 2014).
- Impulsivity can be defined broadly as....
 - "A predisposition for rapid action, often premature and without appropriate foresight" (Dalley & Robbins, 2017; Enticott et al., 2006).
- Inhibitory dyscontrol is suggested to be an underlying cognitive cause of impulsive behaviours (Enticott et al., 2006; Logan et al., 1997).

Inhibition in the Stroop task and links to impulsivity

- Specifically, models suggest that inhibitory dyscontrol of an inappropriate response produces impulsive behaviour, as in cases of impulsive violence
- Barkley (1997) suggests that inhibitory control provides a delay in which executive functions can operate effectively.
- Bari and Robbins (2013) suggest impulsivity is a consequence of impaired executive functioning and specifically, an impulsive action would be linked to the co-occurrence of dysfunctional inhibitory processes and strong impulses.

Justification of Current Study

- Thus, to further understand these links, research investigated the relationship between impulsivity and inhibitory control through cognitive tasks (e.g., Afonso et al., 2020; Carolina et al., 2018; Enticott et al., 2006; Lansbergen et al., 2007)
- However, most research investigating the links between impulsivity and inhibitory control focus on correlations (i.e., the relationship).
- The current study will examine whether those reporting to be either high or low in impulsivity **differ** in terms of their inhibitory control ability on the Stroop task, which may result in differences emerging in response times
- Let's now review the design and running of the current study.

The Current Study

- You will act as the participants in the study
- You will be required to complete the BIS:II in order to obtain a total impulsivity score
 - With the total BIS scores from each participant, we will then work out the mean BIS score for the whole sample.
 - Each participant will then be categorised into either the high or the low impulsivity group based on their BIS score in comparison to the sample mean
 - E.g., if the sample mean was 60 and you had a BIS score of 45, you would be classified in the low impulsivity group; if your score was 83, you would be classified in the high impulsivity group.

The Current Study

- You will also be required to complete a standard version of the Stroop task:
 - Naming the ink colour of colour words
 - Both congruent and incongruent conditions
 - To establish a total response time score
- You will also be asked for basic demographic information: age and gender
 - This will be used to complete the 'participants' subsection in the method section of the report write-up.

Study Design

- What design does the research involve?
 - A cross-sectional between-subjects experimental study design.
- How many IVs are there? Explain
 - One = Impulsivity Group (established through the BIS questionnaire)
- How many levels does this IV have?
 - Two = High and low Impulsivity
- What is the DV?
 - Stroop response time score

What materials are needed?

- Information sheet
 - To provide details of the study and general topic area, what tasks are involved/what the participant will be required to do, estimated amount of time it will take, contact details of the researcher, etc.
- Consent form
 - Reiterate tasks and timings, explain participant rights (withdraw at any time without penalty: explain how), details of data storage arrangements, confidentiality and anonymity, researcher details, confirmation of understanding form details and confirm consent, etc.
- Demographics sheet
 - Age and gender (with option of prefer not to say)

What materials are needed?

- BIS:11
 - Thirty statements, each with four response choice options
 - See [Writing Materials Sections for Psychological Questionnaires Folder](#) in Week Six tile for examples of the level of detail and type of information required when writing-up about the questionnaires used in a study in the materials sub-section of a report.
- Stroop task words and standardised instructions
 - 40 trials with congruent and incongruent conditions
 - To establish total time to name correct ink colours
- Debrief sheet
 - Explain purpose/aims of study, explain how tasks investigated research question, offer final opportunity to withdraw, provide researcher contact details, etc.

What is the research question?

- Does Stroop task response time significantly differ between those who report being high in impulsivity compared to those who report being low in impulsivity, based on a sample mean?

What is the research hypothesis?

- One-tailed (directional):
 - Participants high in impulsivity will be significantly *faster/slower* at completing the Stroop task.
 - Direction would depend on results from previous work
- Two-tailed (non-directional):
 - Stroop task completion times will significantly differ between those high and low in impulsivity.
- Null hypothesis:
 - There will be no significant difference in Stroop task completion times between those high and low in impulsivity.

Data Analysis

- All raw data will be entered into SPSS
 - Demographic information of age and gender
 - Stroop total response time score
 - Score on each of the 30 BIS items
 - SPSS will then be used to reverse score the 11 BIS items, and calculate each participants total BIS score (using the 11 reversed scored items).
 - Once we have each participants total BIS score, we can then calculate the BIS sample mean.
 - With this mean sample BIS value, we can then tell SPSS to allocate each participant into either the high or low impulsivity group.
 - Once this is complete, we can then conduct the descriptive and inferential analyses.

Data Analysis

- Independent/between samples design
- Two groups (one IV with two levels: high/low)
- What will the analysis involve?.....
- We will analyse the data using the independent-samples t-test for unrelated / between-samples designs
 - Looks at the difference between scores of the two different groups
 - Works out the mean difference between the group
 - Investigates if the difference is significantly different from zero (what would be expected if there was no difference between the groups)

Next week....

- General info on t-tests (Monday's lecture recording)
- Run through all the materials (Tuesday's session)
- Run the study – data collection (Tuesday's session)
- Run through the analyses for this study in detail (Friday workshop)
- In the meantime:
 - Familiarise yourselves with the topic area and research study elements (materials/guidance documents on moodle)
 - Read the literature provided to you on Moodle and make a start composing the 'Introduction' section of the report
 - Ensure you have access to SPSS and are familiar with using the software and entering data.

The report		To establish whether there is a significant difference between individuals high and low in impulsivity and reaction times on a Stroop task	1,500 words
(1) Abstract (approx. 100-150 words – not part of word count) Summary of report Include the following details: • Background to your study • Method - brief statement of design and sample • Results - main findings in words (Not the actual statistics.) • Conclusion and implications of your findings-in one line if possible.		(3) Methodology (approx. 200 words) • Participants • Design • Materials • Procedure	(6) References (not part of word count) Before appendices APA format – alphabetical
(2) Introduction (approx. 600-700 words) Theory/ Introductory information Literature Rationale Research question and Hypothesis		(4) Results (approx. 100-150 words) Brief description of treatment of data Descriptives section (<i>M</i> and <i>SD</i> Table) Inferentials section (t-test outcome)	(7) Appendices (not part of word count) Stroop task (words) Standardised instructions Information sheet and informed consent form Debrief sheet Ethics form Raw data (scores) SPSS outputs
(5) Discussion and conclusion (approx. 400-500 words) • Restate findings • Relate findings to hypothesis and previous studies in the literature (in your intro). • May need to tentatively advance explanations for unexpected results. • Critically evaluate study - limitations • Future research suggestions • Implications of findings and few lines concluding the importance of what you have found.			
