Project title	Distraction and Working Memory (Cognitive Psychology)
Background	Working memory is the ability to store and manipulate information in the mind over brief periods of time (Clapp & Gazzaley, 2012). Existing literature has found that working memory declines with age (Clapp & Gazzaley, 2012; Janowich, Mishra, & Gazzaley, 2015; Leiva, Andrés, Servera, Verbruggen, & Parmentier, 2016). Despite this understanding, there is a lack of quality literature discerning the mechanisms that limit the working memory during healthy ageing specifically. An understanding of what limits the working memory in an older demographic would provide an important foundation for researchers and medical practitioners in finding ways to increase the longevity of the working memory and ultimately improve the quality of life for older people. Top-down processing – the ability to ignore distractions from the external environment and rehearsal of information, are both fundamental for optimal functioning of the working memory. Janowich et al. (2015) has suggested that impairment of the working memory in normal aging is a reflection of the impairment of specific mechanisms in top-down processing. However, these mechanisms are yet to be understood in depth. To better discern the mechanisms involved, the present study has adopted a response competition paradigm to compare the impact of distraction at encoding, with distraction at maintenance, in different

	age groups. By employing such a methodology, the study hopes to understand the changes arising from ageing while remembering information. Previous literature has evaluated how distractors limit working memory in elderly populations (Rodrigues & Pandeirada, 2015), however there is limited literature discussing how interferences limit the working memory over the lifespan. Hence, the present research study aims to understand how in healthy ageing, distractions impact the working memory.
Research Question	How is the working memory limited by distractions during healthy ageing?
Hypothesis	**H_0:** There is no difference in the ability to ignore distractions and the capacity of the working memory amongst all participants **H_1:** Participants who are above 40 years old have a lower working memory capacity and are less able to ignore distractions than those who are younger than 40 years old
Instrument	The following research design is adapted from McNab et al. (2015). **Instrument** • To assess the impact of distractions on working memory the smartphone game 'The Great Brain Experiment' will be used.

Participants	• Recruitment of participants to play the game could be done by advertisements (in the form of posters) at universities, youth centres, public parks, libraries and health care centres. In addition to posters, advertisements on university websites can also be used. • As seen in Figure 1.1, before the game begins, data on age, gender, education, language and mood is collected. • Data will be collected from six different age groups*: 18-24, 25-29, 30-39, 40-49, 50-59, 60-69 **Data from those under the age of 18 will be omitted as the working memory of children and adolescents is still developing* • Informed consent, as shown in Figure 1.2, will be provided by participants reading the terms and conditions of the game and choosing to 'agree' to the conditions.

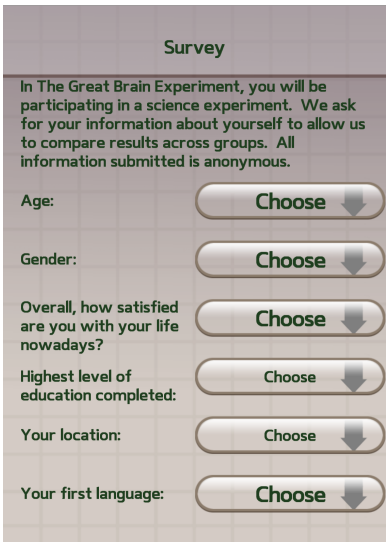


Figure 1.1

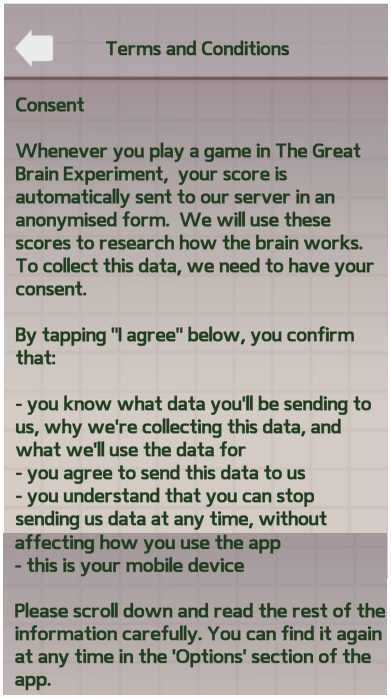
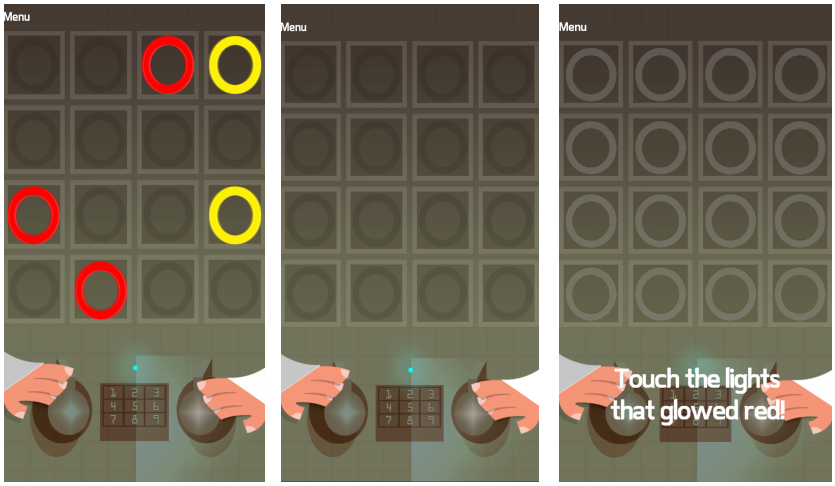


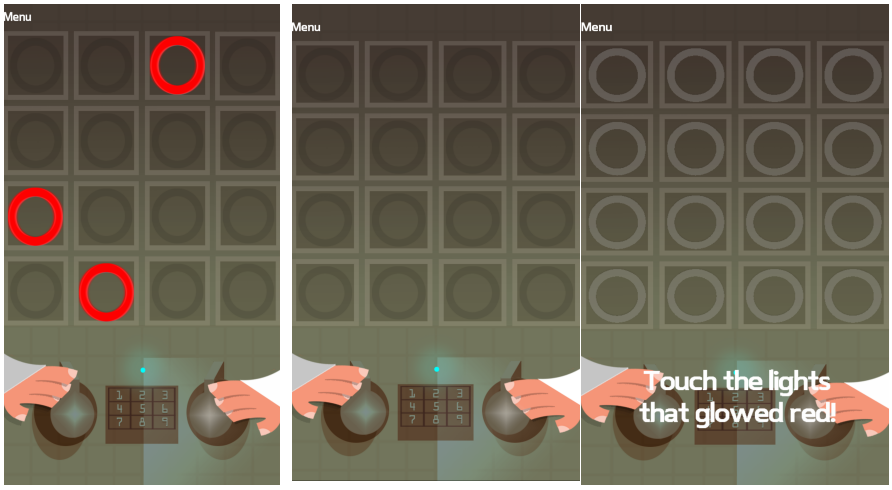
Figure 1.2

Research Design	**Design** Condition 1 – Encoding Distraction • Participants are presented with red circles and yellow circles on a 4x4 grid for 1 second. • Participants are expected to remember the position of the red circles and ignore the position of the yellow circles • After a 1 second delay, participants are presented with an empty 4x4 grid, in which they have to press the positions in which the red circles had appeared  Condition 2 – Maintenance Distraction • Participants are presented with red circles on a 4x4 grid for 1 second • During the 1 second delay, yellow circles appear on the 4x4 grid • Participants are expected to remember the position of the red circles and ignore the position of the yellow circles

- After the delay, participants are presented with an empty 4x4 grid, in which they have to press the positions in which the red circles had appeared

Control – No Distraction

1. Participants are presented with red circles on a 4x4 grid for 1 second.
2. Participants are expected to remember the position of the red circles



3. After a 1 second delay, participants are presented with an empty 4x4 grid in which they have to press the positions in which the red circles had appeared

Data Analysis

- ACNOVA will be used to assess and compare the ability to ignore the distraction during encoding and the distraction during maintenance among the different age groups

Limitations	An experiment that does not take place in a laboratory environment may be prone to various extraneous variables, such as location and noise. For instance, whether the participant plays the game in a crowded train or on the sofa at home, or even whether they play with a friend or family member can impact their performance. Furthermore, the means of recruitment may limit the diversity of the sample. For example, if the majority of the participants are recruited from one specific university or faculty, there are chances that their shared educational background would be reflected as a bias, in the data collected. To account for this, the participants should be asked where they heard about the game from. However, the main advantage of conducting this experiment through a smartphone is the ease of collecting a large amount of data. A large sample size would reduce the difference between the sample mean and population mean, therefore reducing sampling error.

References

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