Psy-301: Cognitive Psychology

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Introduction:

Corsi block tapping task (CBTT) [1] is one of the most simple but powerful experiment in neuropsychological research. It is one of the most widely and powerful tool used by mental and cognitive psychologists as well as neuropsychologists. It is widely used in assessment of visuo-spatial memory. The corsi block is widely used for diagnostics of several diseases such as Korsakoff's syndrome [2], Alzheimer's disease [3] and to locate focal brain lesions.

CBTT has various variants. The traditional version include nine wooden blocks kept on a table. Initially, the examiner touches the blocks starting the sequence with two blocks. And the subject has to reproduce the sequence by tapping the blocks in the same order. If the sequence is reproduced, the sequence is increased by one else the procedure ends with wrong reproduction of the sequence. This version has many variants with variations in size, block placement and number of blocks. A lot of research has been conducted with these physical changes [4] and difference in heights. And also a lot of research has been conducted about the effects of detection of forward and backward sequence to assess memory [5]. They have concluded that CBT in it's forward version if very effective in assessing visuospatial memory while a lot of debate is going about the backward version of corsi block.

But in this new era of technology, there are fast and new automated ways of assessing visuospatial memory. Corsi block experiment is no different, an easy to use computerised version of corsi block would be very helpful to the neuro psychologists. Though there is no not

much research have been conducted about the effects of automated version than the manual version.

In this project, we introduce an automated web app for corsi Block known as ecorsi. This app conducts CBBT with nine blocks starting with a sequence length of one. And secondly there are two versions available for the experiment, one is the forward version and second is the backward version.

Stimulus Materials:

eCorsi is a cross-platform web application, which can run on any device with an internet connection. Basically, the whole corsi block application is running by a computer program, while the the screen acts as a tapping interface for the participant.

The program can run in two different modes: Forward and Backward. If forward is selected, the participants have to tap the sequence in the same order as shown by the program. While if backward is selected, they have to tap the sequence in exactly opposite order as shown by the program.

This program is written with HTML, Css and AngularJS, so it is fully and easily customisable. Anyone with a little knowledge of these languages could change the flashing time, color of the foreground and background, and block sequence used to assess the visuo-spatial working memory.

Experiment process:

For the eCorsi experiment, participants have to sat on a table with a computer or mobile. On the initial screen, instructions to follow the experiment would be displayed. A traditional corsi block structure with nine numbered brown blocks on a light green background would be shown. Each experiment could be tested for both forward and backward sequence. A sequence of blocks would be flashed on the screen, each flash filling the square with pink color and displaying the corresponding number of the block. The flashing time is set up at 0.5 seconds with interval of 1 second. Once the flashing is completed, an instruction is displayed on the screen to tap the squares in the same order. When tapped, the squares lit up to confirm that the response is recorded. As shown in figure 4, subject's memory span is given by the last sequence length correctly reproduced by the participant in a single or two trials.
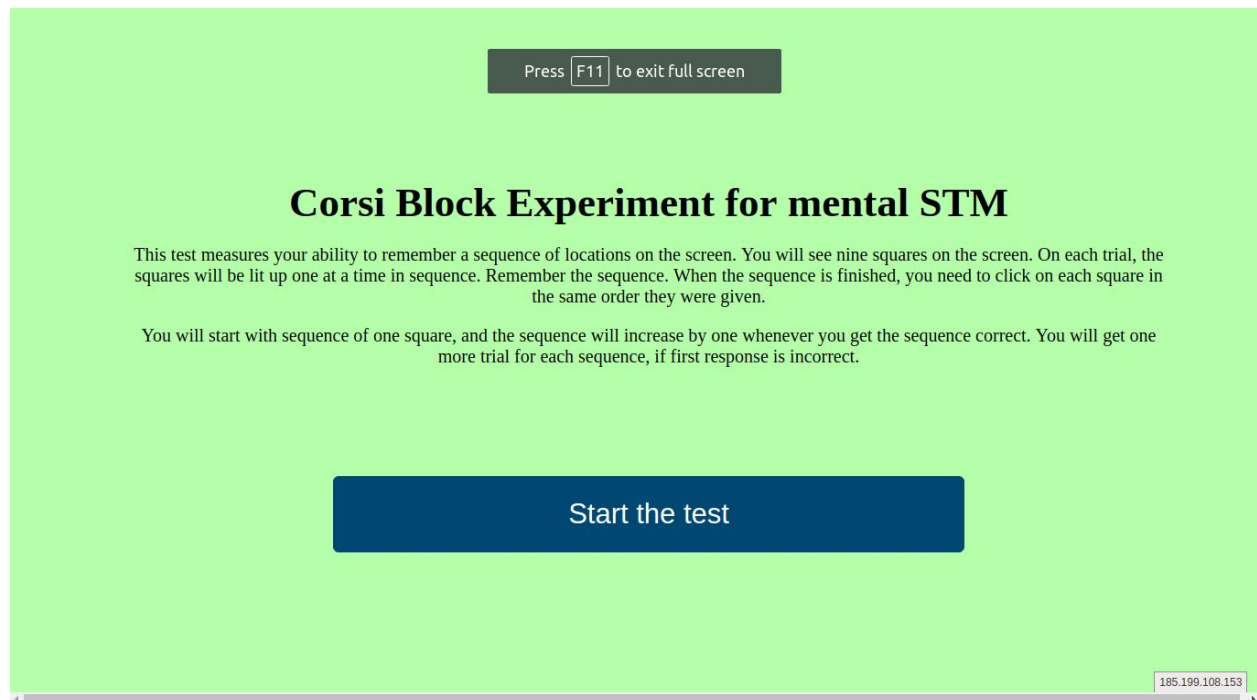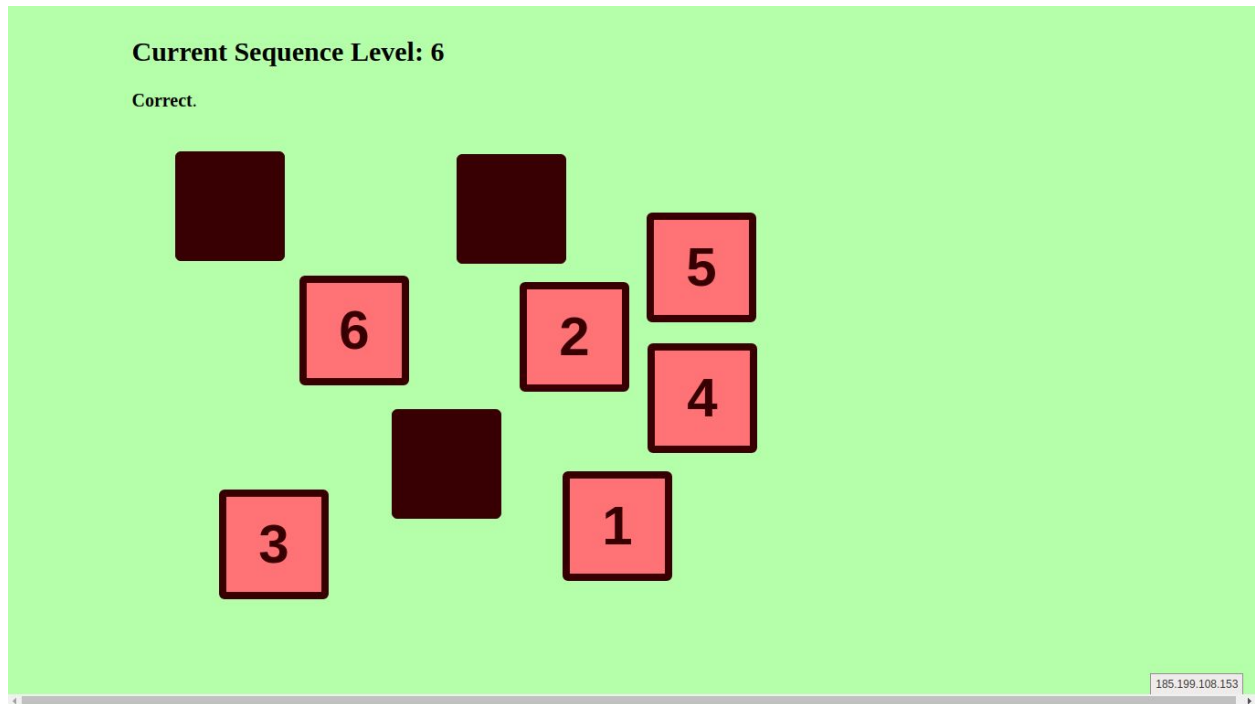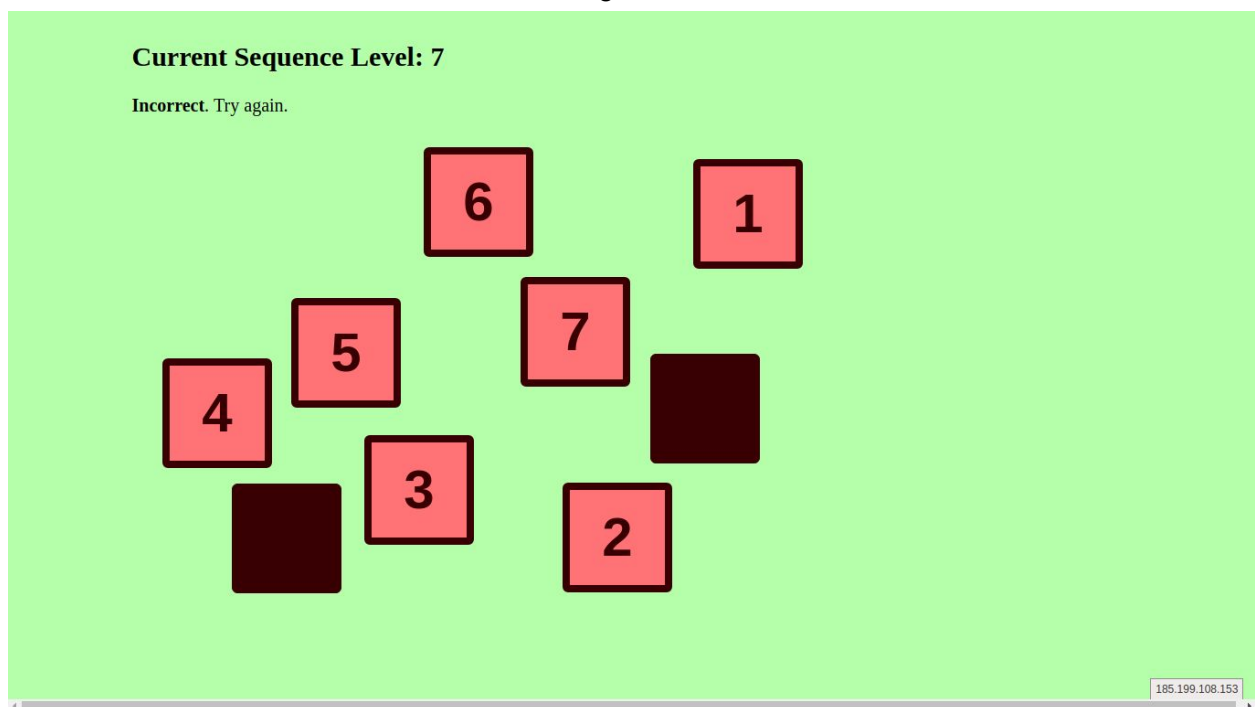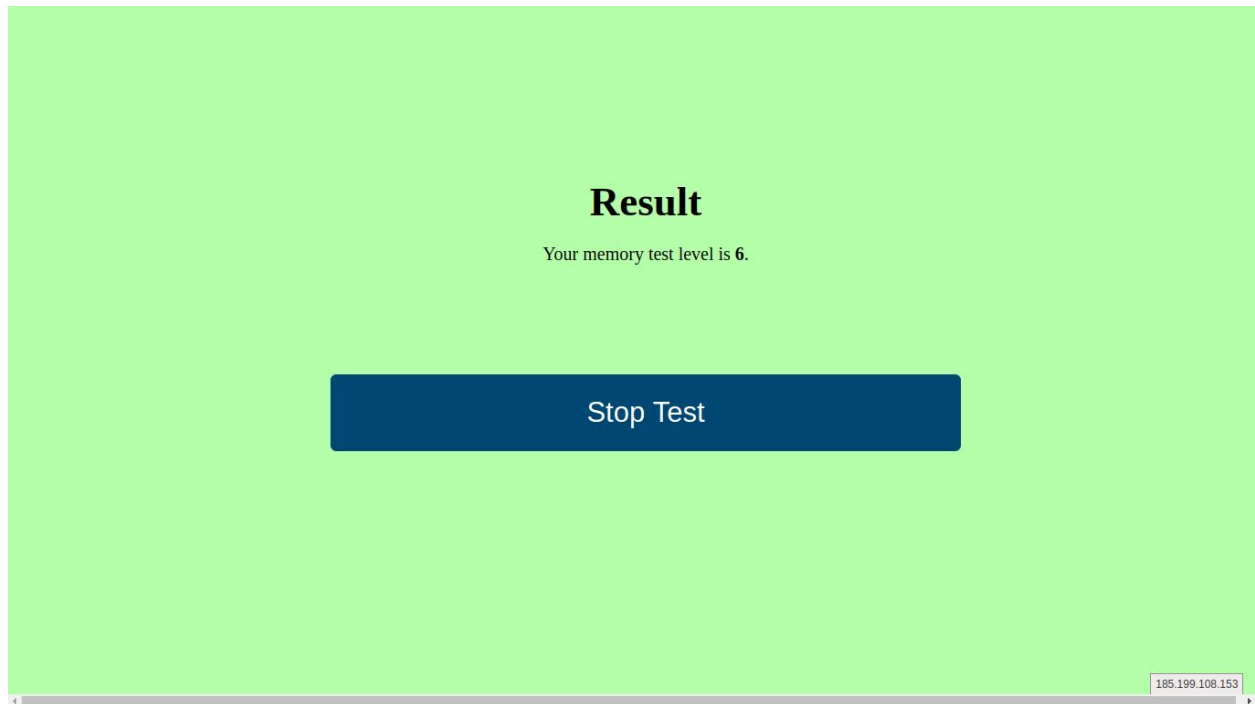

Figure 1

Figure 2

Figure 3

Result

Your memory test level is **6**.

Stop Test

185.199.108.153

Figure 4

Pattern of Results and its Interpretation:

The evaluation is done on two parameters: the block span and the total score. The block span is defined as the largest sequence correctly reproduced by the participants and the total score is the product of the block span and the number of trials. However, the block span is not a very accurate measure because of the limited possible range (1-9). Moreover, it does not take into account the performance within each level on both trials, as only one of the two trials has to be correct. However, total score includes the performance on both the trials.
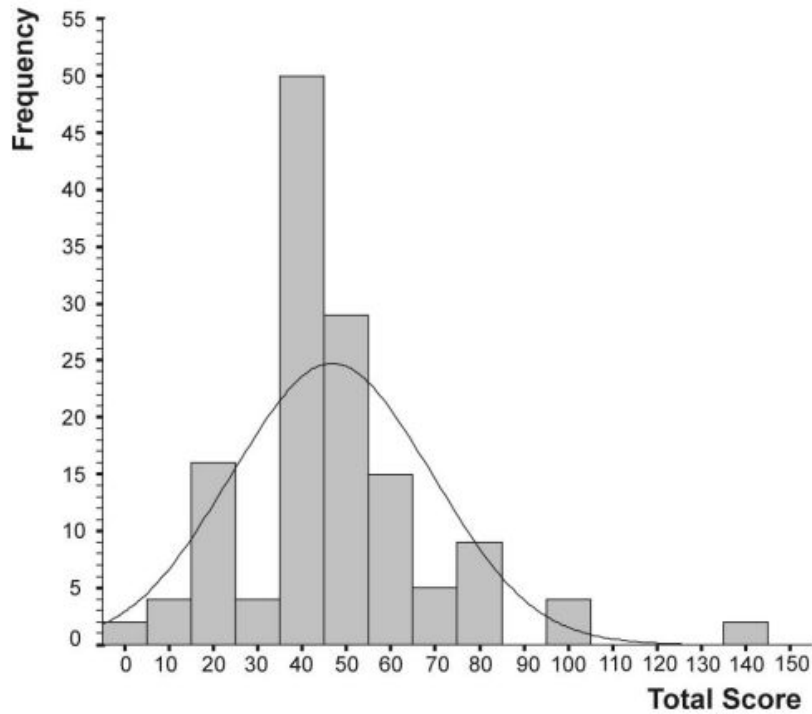
Figure 5: Frequency distribution of the total score

Percentiles	Age Group		
	≤ 20[a]	20–40[b]	> 40[c]
5	28.7	37.0	16.6
10	35.0	40.0	20.0
20	37.0	40.0	38.0
30	44.8	44.4	40.0
40	54.0	54.0	41.6
50	60.0	54.0	48.0
60	60.6	60.0	52.8
70	65.8	70.0	54.0
80	74.2	78.2	60.0
90	92.2	86.4	68.4
95	131.1	100.8	76.3

[a]$n = 21.$ [b]$n = 27.$ [c]$n = 22.$

Figure 6: Percentiles for the Total Score of the Corsi Block-Tapping Task based on age groups

References

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[2]   Arts NJ, Walvoort SJ, Kessels RP. Korsakoff's syndrome: a critical review. Neuropsychiatric Disease and Treatment. 2017;13:2875-2890. doi:10.2147/NDT.S130078.

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[4]   Morris RG, Baddeley AD, "Primary and working memory functioning in Alzheimer-type dementia", J Clin Exp Neuropsychol. 1988 Mar; 10(2):279-96.

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