

Adaptation of an eCorsi version: the elaboration and implementation of a modified Corsi block-tapping task for digital tablets measuring visuo-spatial short-term and working memory

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Introduction

- The Corsi block-tapping task is widely known as a neuropsychological test used to assess visuo-spatial working memory.
- Originally the test is administered using nine identical square blocks positioned on a board. The task requires reproduction of a sequence.
- Several digital versions have since been developed [1,2,3].
- Participants were assessed with a modified version of the eCorsi task (in forward, backward recall order), developed for digital tablets
- The aim of this study was to compare recall accuracy and performance on the two different conditions: hidden grid and visible grid.
- Values and limits of the modified eCorsi are discussed.

Keywords: visuo-spatial working memory, visuo-spatial short-term memory, computer-based neuropsychological testing, touchscreen

Methods

Participants

- 71 Hungarian students from Transylvania were assessed (N=71), aged between 16 and 34 years old, mean age M=20,10, SD=3,55
- gender distribution: 39,4% male (N=28) and 60,6 % female (N=43)

Instruments

eCorsi block-tapping task (Hungarian digital version)

- measures visuo-spatial short-term memory (span forward) and visuo-spatial working memory (span backward)
- contains two different conditions were developed: one with no grid (hidden grid, see Fig.1A.), and one with a visible grid (see Fig.1B)

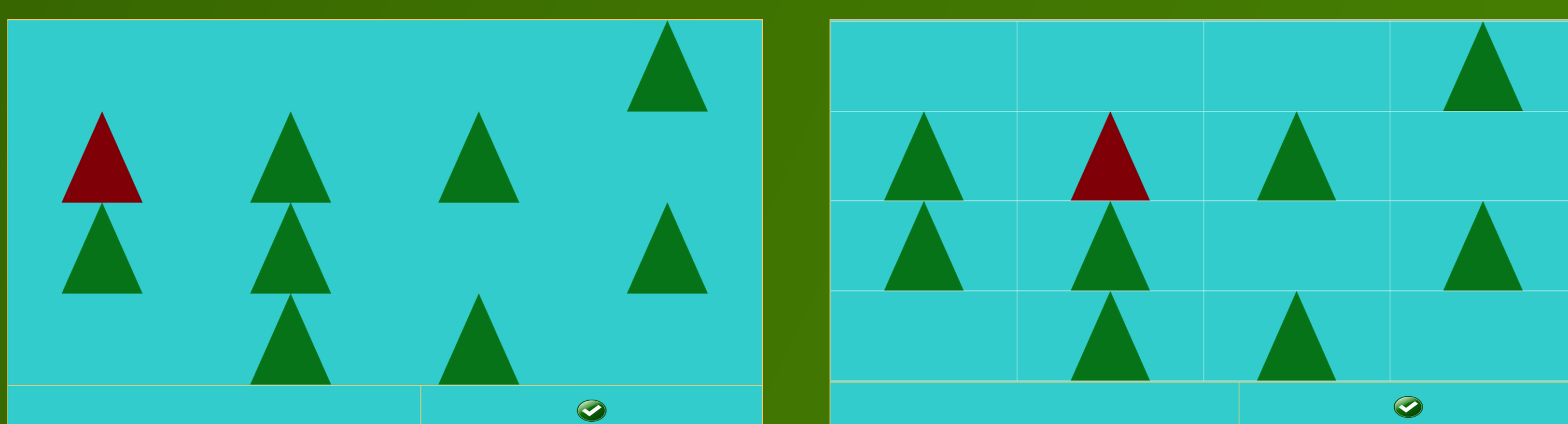


Figure 1A-B. Example from the evaluation phase, hidden grid and visible grid

- measurements:
 - correct answers (CA= the score of the total number of correct sequences)
 - CA_FW1 $\alpha=.703$ (16 item, N=65), CA_BW1 $\alpha=.654$ (16 item, N=60),
 - CA_FW2 $\alpha=.597$ (16 item, N=39), CA_BW2 $\alpha=.647$ (16 item, N=39)
 - CA_FW1+2 $\alpha=.752$ (32 item, N=39), CA_BW1+2 $\alpha=.776$ (32 item, N=39)
 - number of correct answers (NCA= the score of the total number of correct elements from sequences, 2 trials/ level, 1st level 2 elements - 8th level 9 elements)
 - number of incorrect answers (NICA= total number of incorrect elements from all sequences)
 - number of correct positions (NCP)
 - number of incorrect positions (NICP)
 - total reaction time (TRT)

Results

Table 1. Differences between high school (1) and university students (2), results of independent t test

		N	M (SD)	t (df)	Sig. (2-tailed)	Cohen's d
CA_TOTAL_FW1	HIGH SCHOOL STUDENTS	40	9.90 (1.98)	.52 (69)	.60	0.12
	UNIVERSITY STUDENTS	31	9.61 (2.62)			
NCA_TOTAL_FW1	HIGH SCHOOL STUDENTS	40	19.80 (3.96)	.55 (69)	.58	0.13
	UNIVERSITY STUDENTS	31	19.19 (5.23)			
CA_TOTAL_BW1	HIGH SCHOOL STUDENTS	39	8.54 (2.34)	-.43 (60)	.66	0.11
	UNIVERSITY STUDENTS	23	8.83 (2.74)			
NCA_TOTAL_BW1	HIGH SCHOOL STUDENTS	39	17.08 (4.69)	-.43 (60)	.66	0.11
	UNIVERSITY STUDENTS	23	17.65 (5.48)			
CA_TOTAL_FW2	HIGH SCHOOL STUDENTS	39	10.26 (2.11)	12.99 (56)	.00	4.04
	UNIVERSITY STUDENTS	19	3.63 (.95)			
NCA_TOTAL_FW2	HIGH SCHOOL STUDENTS	39	20.51 (4.22)	12.99 (56)	.00	4.04
	UNIVERSITY STUDENTS	19	7.26 (1.91)			
CA_TOTAL_BW2	HIGH SCHOOL STUDENTS	39	8.49 (2.32)	-.51 (60)	.60	0.13
	UNIVERSITY STUDENTS	23	8.83 (2.74)			
NCA_TOTAL_BW2	HIGH SCHOOL STUDENTS	39	16.97 (4.65)	-.51 (60)	.60	0.13
	UNIVERSITY STUDENTS	23	17.65 (5.48)			
CA_TOTAL_FW1+2	HIGH SCHOOL STUDENTS	40	19.90 (3.99)	8.78 (69)	.00	2.11
	UNIVERSITY STUDENTS	31	11.84 (3.61)			
NCA_TOTAL_FW1+2	HIGH SCHOOL STUDENTS	40	39.80 (7.99)	8.79 (69)	.00	2.11
	UNIVERSITY STUDENTS	31	23.65 (7.23)			
CA_TOTAL_BW1+2	HIGH SCHOOL STUDENTS	39	17.03 (4.26)	8.25 (60)	.00	2.28
	UNIVERSITY STUDENTS	23	8.83 (2.74)			
NCA_TOTAL_BW1+2	HIGH SCHOOL STUDENTS	39	34.05 (8.52)	8.25 (60)	.00	2.28
	UNIVERSITY STUDENTS	23	17.65 (5.48)			

Note: CA= correct answers, the score of the total number of correct sequences, NCA= number of correct answers, the score of the total number of correct elements from sequences, 2 trials/ level, 1st level 2 elements - 8th level 9 elements, FW= forward, BW= backward, FW1, BW1= no grid (hidden grid condition), FW2, BW2 = visible grid condition, FW1+2 = FW1+FW2

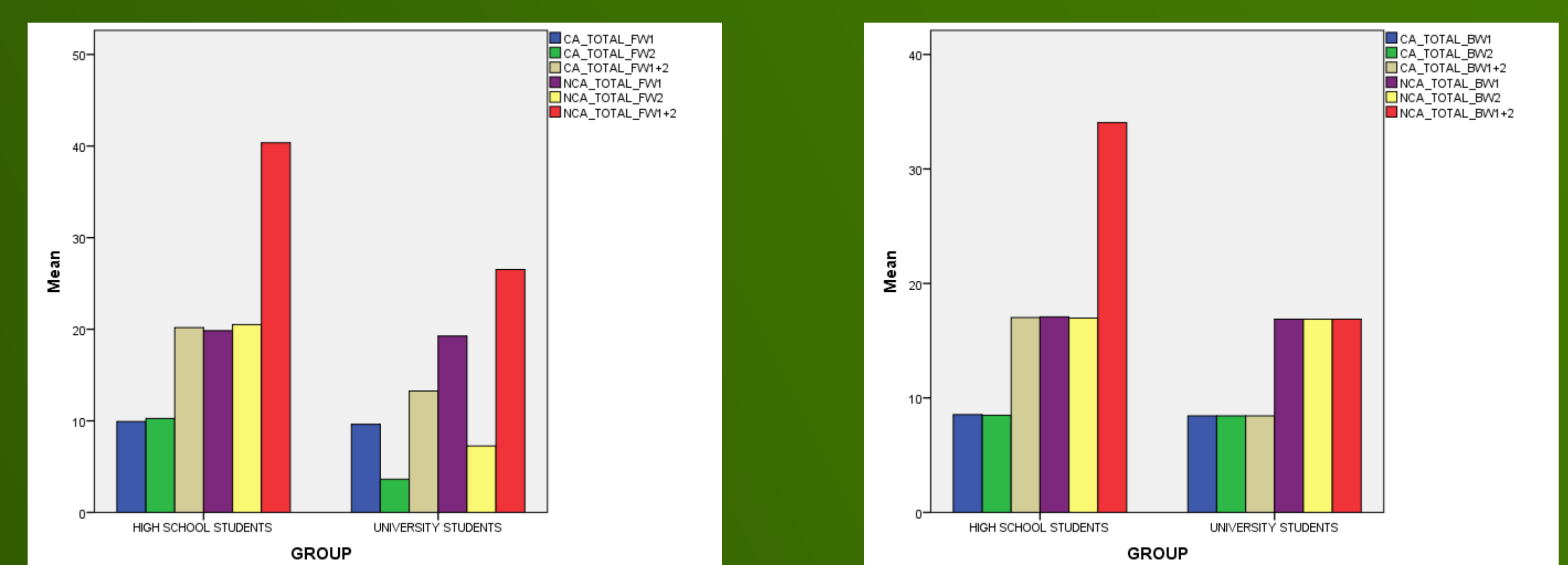


Figure 2A-B. Differences among high school students and university students in visuo-spatial short-term memory and working memory performance. NOTE. CA=total correct answers, NCA=total correct elements, FW1, BW1= grid hidden, FW2, BW2=grid visible

Conclusions

- No significant differences in the hidden grid condition (span forward 1) between high school and university students (see Table 1)
- Significant differences were found in the grid visible condition (span forward 2) – CA, NCA, NICA, TRT – high school students performed better than university students (see Table 1, Figure 2A)
- Significant differences among high school students and university students were found in visuo-spatial short-term memory (span forward 1+2) in CA, NCA, NICA, TRT and working memory performance (span backward 1+2): CA, NCA (see Fig.2B) – high school students performed better than university students

Selective bibliography

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