

# The relationship between visuo-constructive abilities and visuomotor adaptation in stroke patients: results of a clinical trial using prism adaptation combined with serious games

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## BACKGROUND AND AIMS

Tasks investigating constructional skills, such as drawing and copying, require different steps of visual analysis, spatial processing, motor control and execution. These processes are likely impacted by visuomotor adaptation procedures such as prism adaptation.

A device that combines digital prism adaptation with a sequence of serious games targeting different functional components proved to be efficacious for rehabilitation of specific cognitive deficits in stroke patients.

Aims:

1. Compare the effects of digital visuomotor adaptation followed by cognitive stimulation vs. control rehabilitation on visuo-constructural abilities in stroke patients;
2. Measure the impact of rehabilitation of these abilities on functional daily life activities;
3. Investigate how serious games targeting different functional components correlate with rehabilitation of figure copying tasks

## PATIENTS AND METHODS

Thirty stroke patients randomly allocated to two treatment groups:

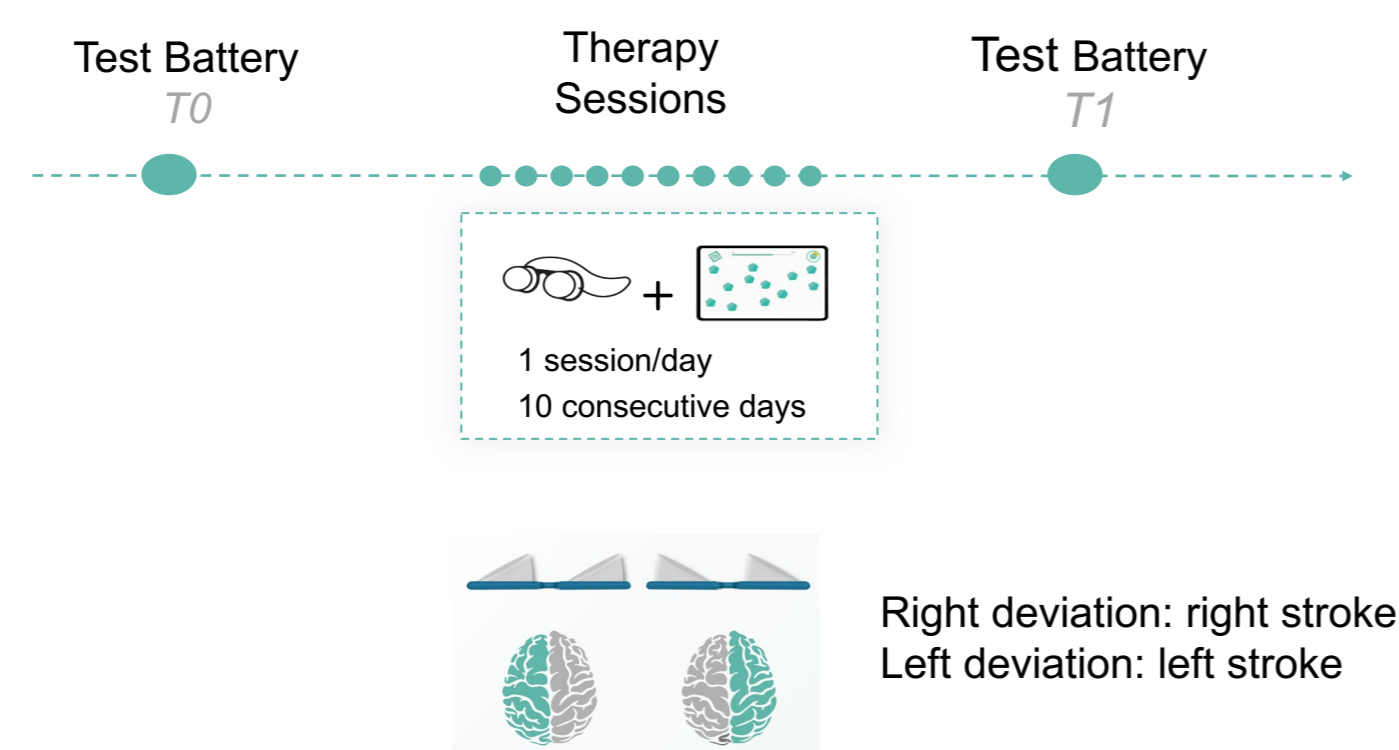
- a) combined treatment (Prism Adaptation + Serious Games; N=15); b) conventional cognitive rehabilitation (N=15)

Neuropsychological evaluation before (T0) and immediately after the treatment (T1)

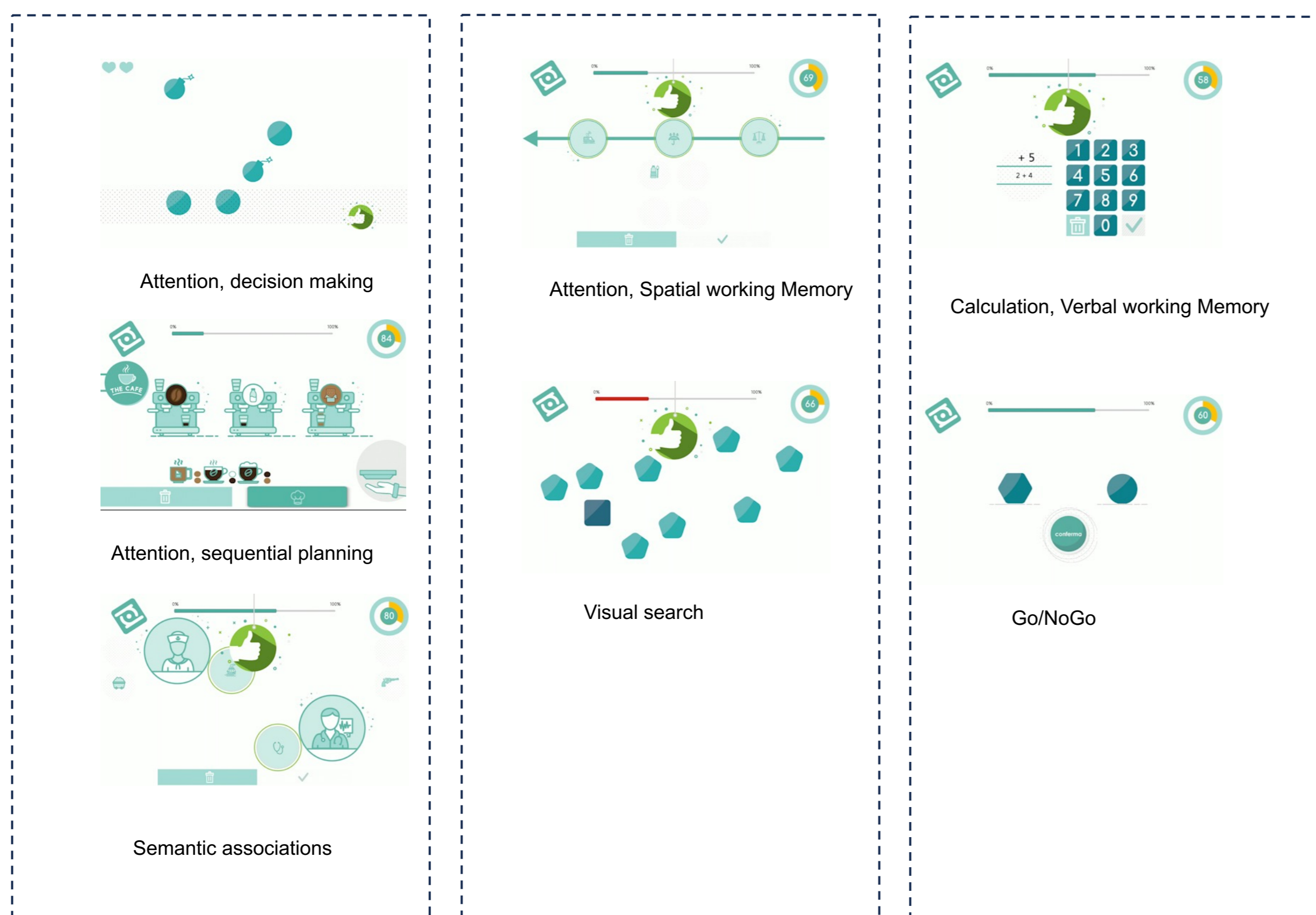
	Experimental Group	Control Group
Age (years)	65.1 (14.6)	56.9 (12.4)
M/F	7/8	9/6
Education (years)	5.9 (3.2)	13.7 (3.6)
Time since the event (days)	53.5 (29.6)	53.9 (29.7)
Time from T0 to T1 (days)	24.4 (5.2)	19.3 (5.9)
Ischemic stroke (N)	10	6
Haemorrhagic stroke (N)	5	9
Left hemisphere (N)	5	2
Right hemisphere (N)	10	13
Cortical/subcortical (N)	9/6	10/5
Neglect (N)*	4	8

\*Contralateral spatial neglect evaluated with Albert's line cancellation and line bisection tasks.

### Experimental Protocol



### Serious Games (grouped according to exploratory factorial analysis)



## SUMMARY/ CONCLUSIONS

Digital prism adaptation and serious games can improve some visuo-constructural tasks in stroke patients more than standard therapy;

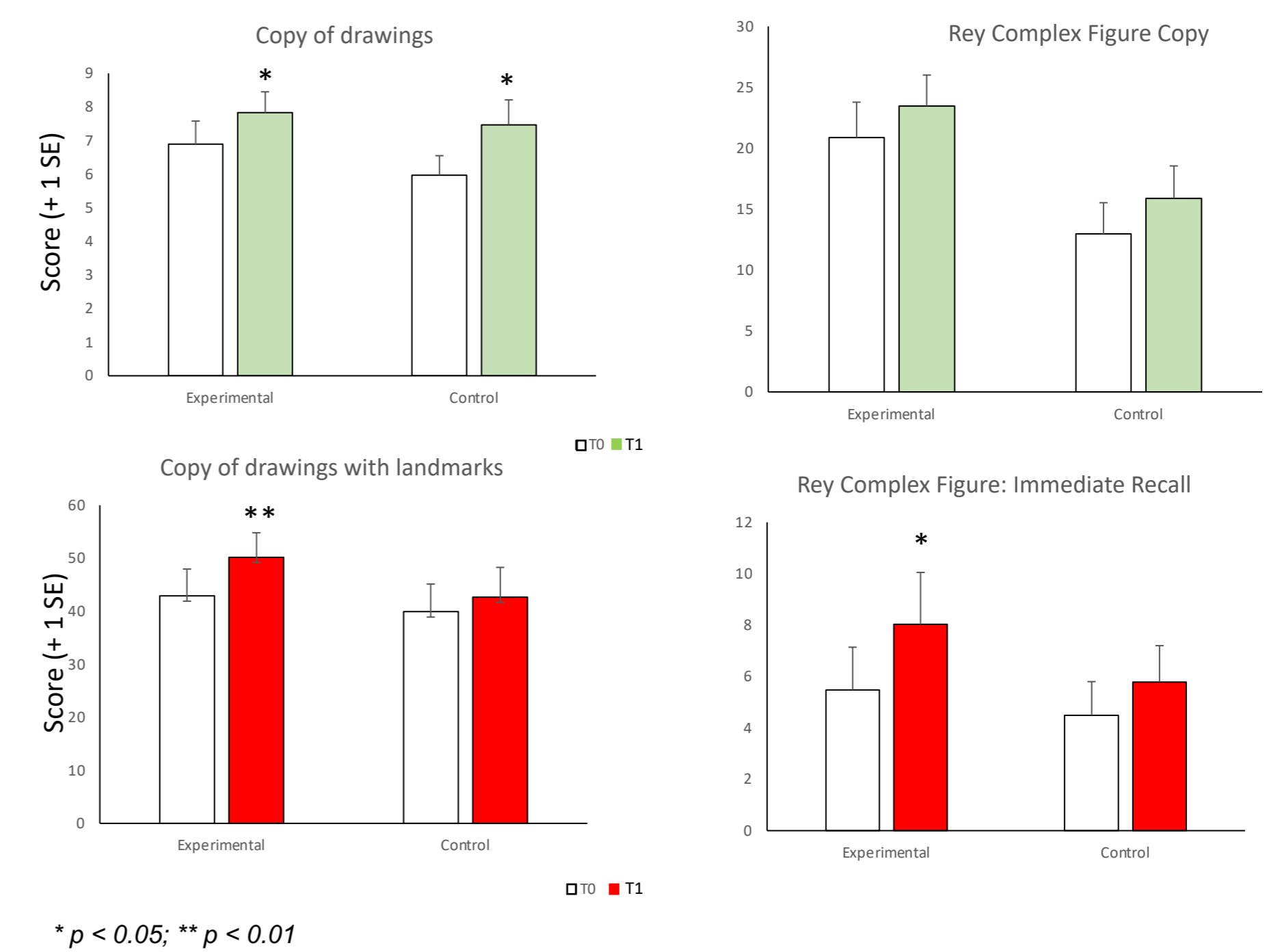
Improvements in copying tasks (Copy of drawings and Copy of drawings with landmarks) induced by prism adaptation and serious games correlate with functional improvements;

Serious games targeting visual attention and planning selectively predict improvement in figure copying tasks (Copy of drawings and Copy of drawings with landmarks);

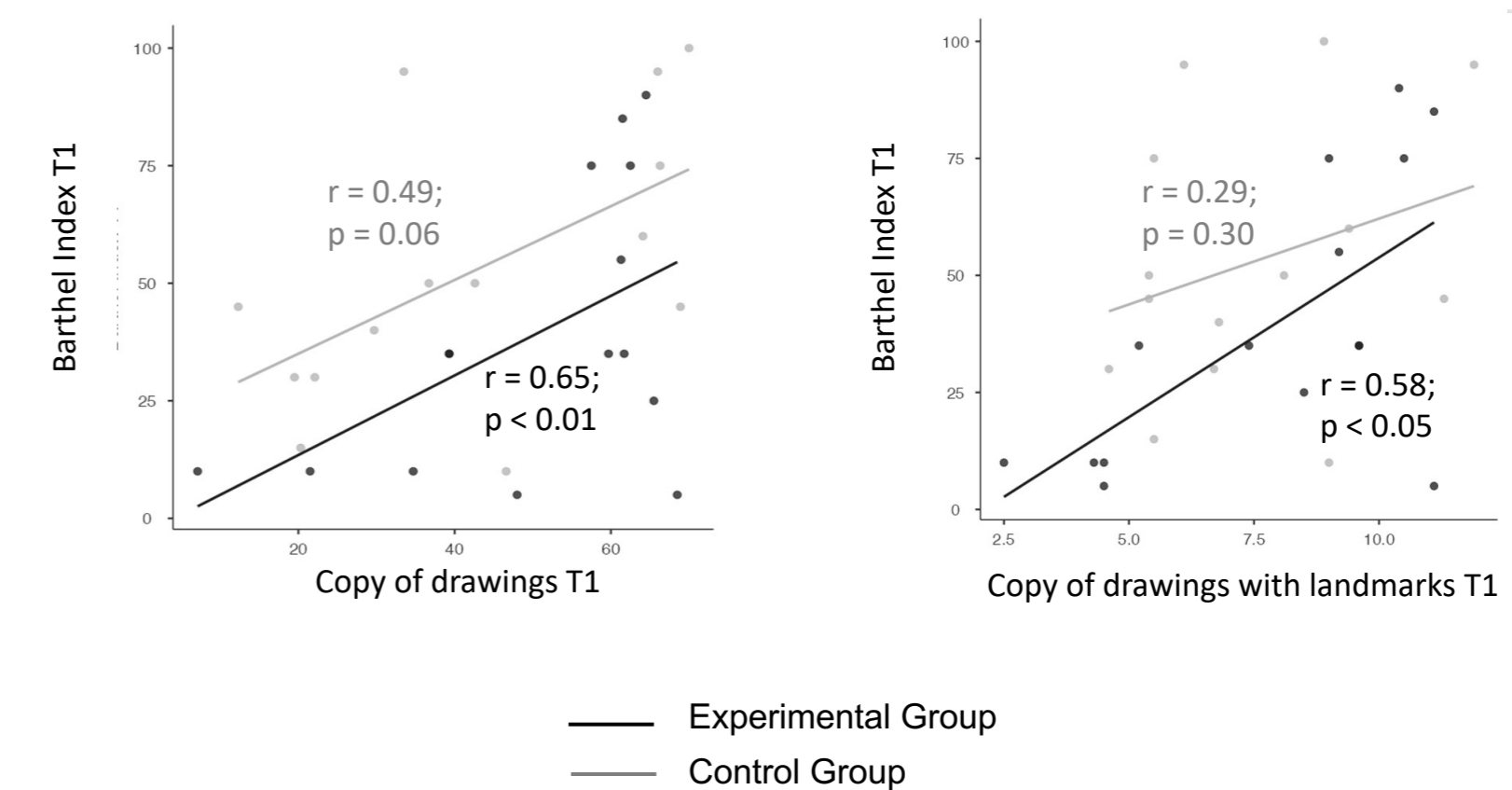
Processes like visual attention, semantic analysis and planning are modulated by prism adaptation with deviation ipsilateral to the affected hemisphere, and this modulation can be trained by specific serious games

## RESULTS

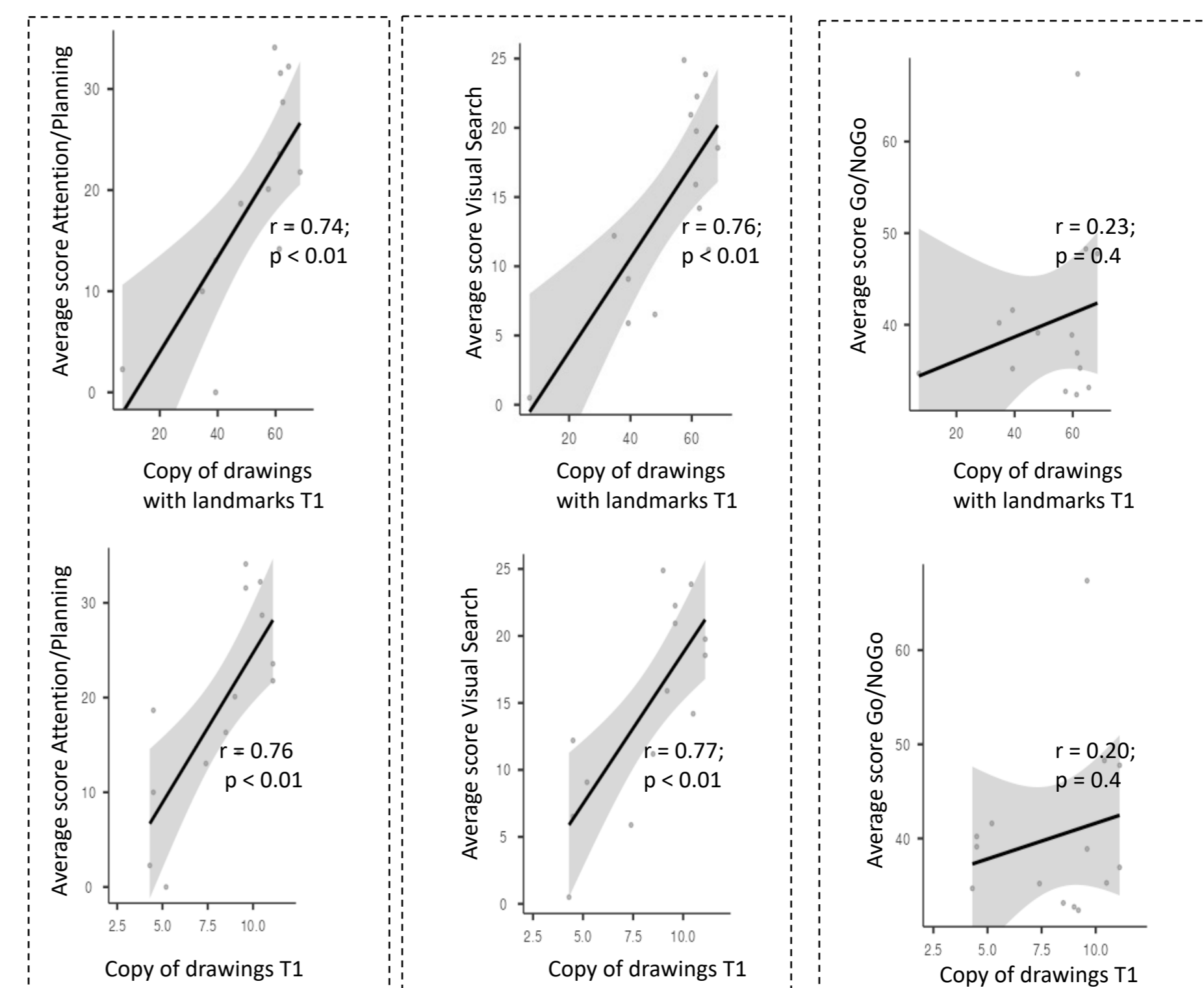
### Aim 1. Compare the effects of digital visuomotor and cognitive stimulation vs. control rehabilitation on visuo-constructural abilities



### Aim 2. Measure the impact of rehabilitation of visuo-constructural abilities on functional daily life activities



### Aim 3. Investigate how serious games targeting different functional components correlate with rehabilitation of figure copying tasks



### Examples of Copy of drawing with landmarks tasks in T0 and T1, in experimental group

