

Visuo-spatial ability improvements in typical development children involved in the Arrowsmith Program

Laura Herrero,¹ Cecilia Inés Theirs,¹ Francisco David Pascual,¹ Miguel Ángel Pérez-Nieto¹
¹Psychology Dept., Universidad Camilo José Cela, Spain



✉ lherrero@ucjc.edu



INTRODUCTION

Background

- The Arrowsmith program is a cognitive intervention focused on the enhancement of multiple cognitive processes whose weakness is associated with learning disabilities (Bryant, 2015; Weber et al., 2019).
- The Symbol Relations Task is a computer based visual-spatial processing task with increasingly levels of difficulty. This task is based on analogical clocks reading that involves not only counting but also perceptual-recognition strategies (Siegler & McGilly, 1989), and operation abilities to establish relationships on clocks times (Friedman, & Laycock, 1989).
- Exploratory results of a 6-week intensive intervention using The Symbol Relation Task in students with learning disabilities have revealed significant improvements in processing speed and global cognitive efficiency (Rose & Jagger-Rickels, 2019).

Aim

- To explore the involvement of different perceptual and cognitive processes in this task, and how these processes could be improved in typical developing children.

METHOD

Participants

- 17 typical development children aged 8-9 ($M = 8.12$, $SD = .22$), who belonged to the same school.

Materials

- Trail Making Test (processing speed), Rey-Osterrieth Complex Figure Test (visuo-spatial construction, copy and recall), Wisc Symbol-number (visuo-spatial memory, Raven's Matrix A, B, C, D., E (fluid intelligence). Arrowsmith Clocks assessment parts A and B.

Procedure

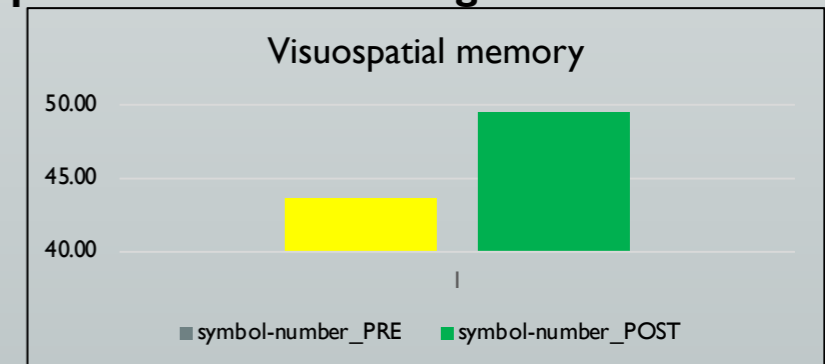
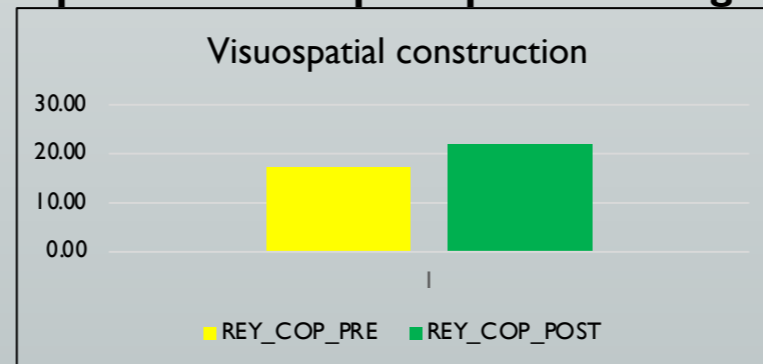
- 3-month longitudinal study
- Children were assessed within one week of the beginning of the intervention and immediately after the training was completed.

RESULTS

Involvement of perceptual and cognitive processes in Symbol Relations Task

- Significant correlations among initial clocks assessment and fluid intelligence ($r = .73$, $p = .01$) and visuo-spatial construction (copy) ($r = .60$, $p = .02$).

Improvements in perceptual and cognitive processes after training



DISCUSION

- Overall, children improved their visuospatial abilities after three months of training regarding our baselines.
- Our results pointed out that the intervention using The Symbol Relations Task could be effective not only in students with learning disabilities but also in typical developing children.
- Further research is needed to determine how the cognitive mechanisms involved may be differently involved in children with and without learning disabilities in the Symbol Relations Task

REFERENCES

- Friedman, W. J., & Laycock, F. (1989). Children's analog and digital clock knowledge. *Child Development*, 60, 357-371.
- Rose & Jagger-Rickels, 2019. A Brief Intensive Learning Intervention Affects Resting State Connectivity and Neuropsychological Test Performance. *Poster presentation at the Society for Neuroscience Conference in Chicago*.
- Shin, M., & Pedrotty Bryant, D. (2015). A synthesis of mathematical and cognitive performances of students with mathematics learning disabilities. *Journal of Learning Disabilities*, 48, 96-112.
- Siegler, R. S., & McGilly, K. (1989). Strategy choices in children's time-telling. In *Advances in psychology* (Vol. 59, pp. 185-218). North-Holland.
- Weber, R. C., Denyer, R., Motamed Yeganeh, N., Maja, R., Murphy, M., Martin, S., ... & Boyd, L. (2019). Interpreting the preliminary outcomes of the arrowsmith Programme: a neuroimaging and behavioural study. *Learning: Research and Practice*, 5(2), 126-148.