

Effects on attentional deficits of a device integrating digital rightward prism adaptation with serious games vs. standard rehab in right brain damaged patients: a randomized clinical trial



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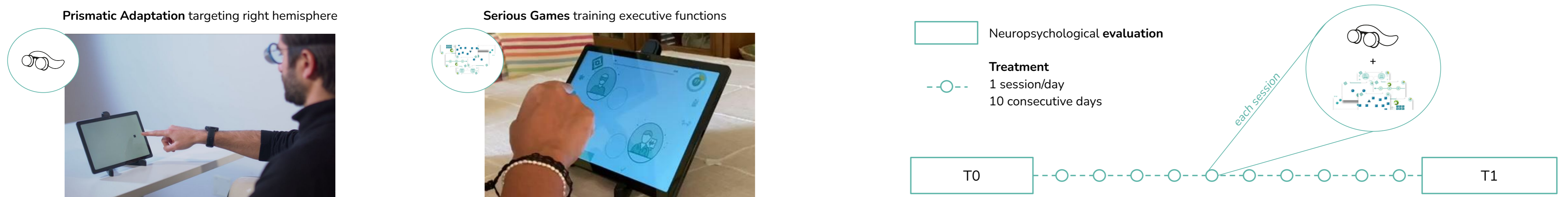
Objectives

To compare the effects on attention of a device integrating digital rightward prism adaptation with serious games vs. standard rehabilitation of attention in right brain damaged stroke patients (RBD).

Materials and Methods

Twenty-three acute RBD (mean age: 63, SD 14 years; mean education: 10, SD 5.3 years; ischemic: 12; hemorrhagic: 11) participated in a randomized clinical trial. Ten patients were assigned to an experimental (E) and 13 to a control (C) group.

Patients were evaluated with attentional matrices, digit and spatial span forward and backward, line bisection and Albert's line cancellation in a baseline condition (T0) and following a ten-days treatment, with daily sessions, five sessions per week per two weeks (T1). C was treated with traditional paper and pencil methods for stimulating attention; E was treated using a device (MindLenses Professional) combining rightward prism adaptation to visual targets digitally presented on a 10.5" tablet with 7 serious games targeting attentional and executive functions (set shifting, inhibition, planning).



Results

Test scores corrected for age and education were analyzed. E and C performance at T0 was comparable for all tests. At T0, in the experimental group 6 patients were below cut off for spatial neglect at the line bisection test and 5 at the Albert's line cancellation test; in the control group, 10 patients were below cut off for spatial neglect at the line bisection test and 9 at the Albert's line cancellation test.

Both experimental and control treatments did not significantly modify line bisection performance. In the Albert's line cancellation test, E treatment increased the number of both left ($p = 0.05$) and right ($p = 0.04$) cancellations at T1 vs T0, while C treatment did not get significant results.

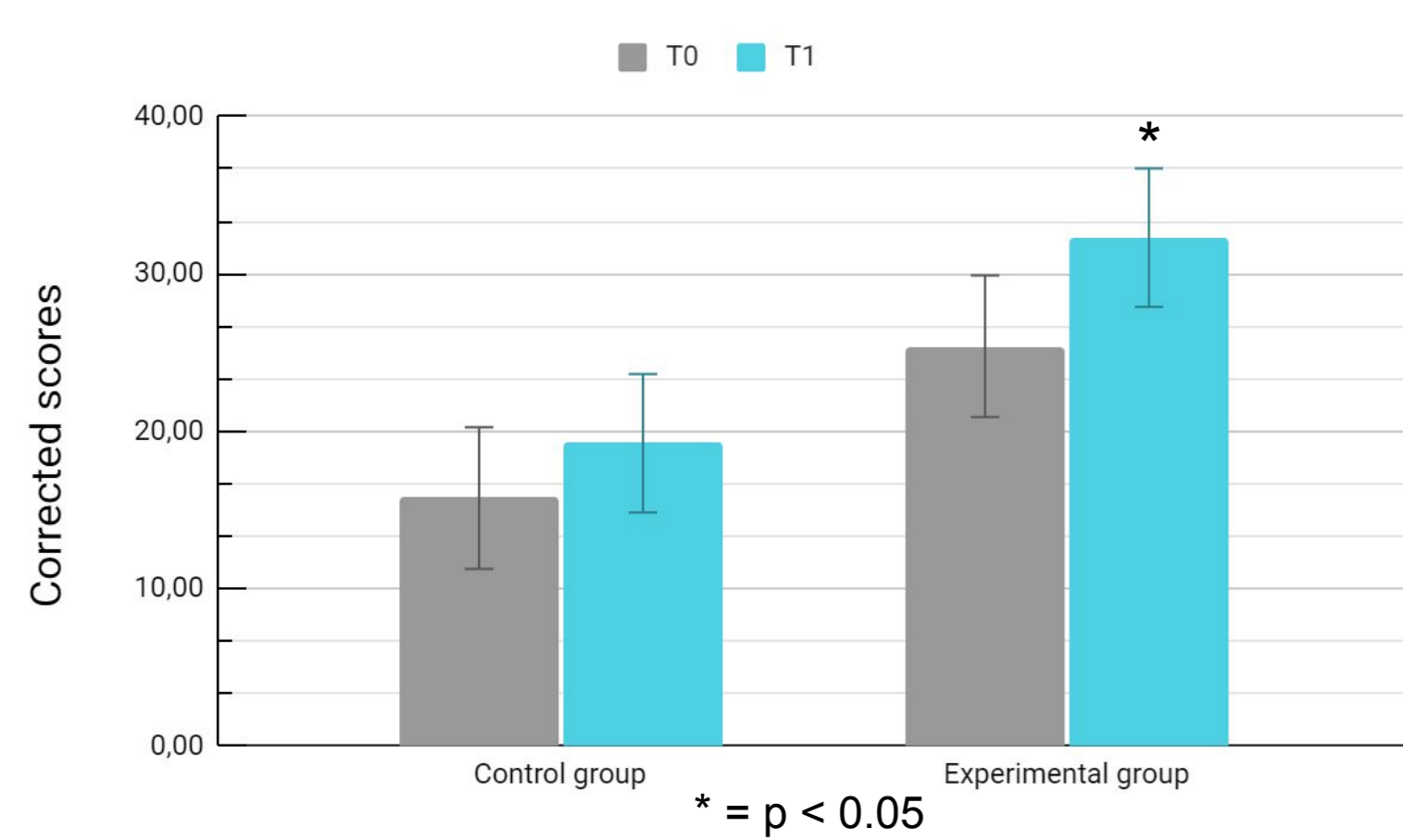
E treatment significantly increased performance in attentional matrices ($p = 0.003$), while C treatment failed to modify patients' performance ($p = 0.15$). The difference between the two treatments at T1 was significant ($p = 0.04$).

E treatment increased performance in spatial span forward ($p = 0.02$), while C treatment failed to modify patients' performance ($p = 0.08$).

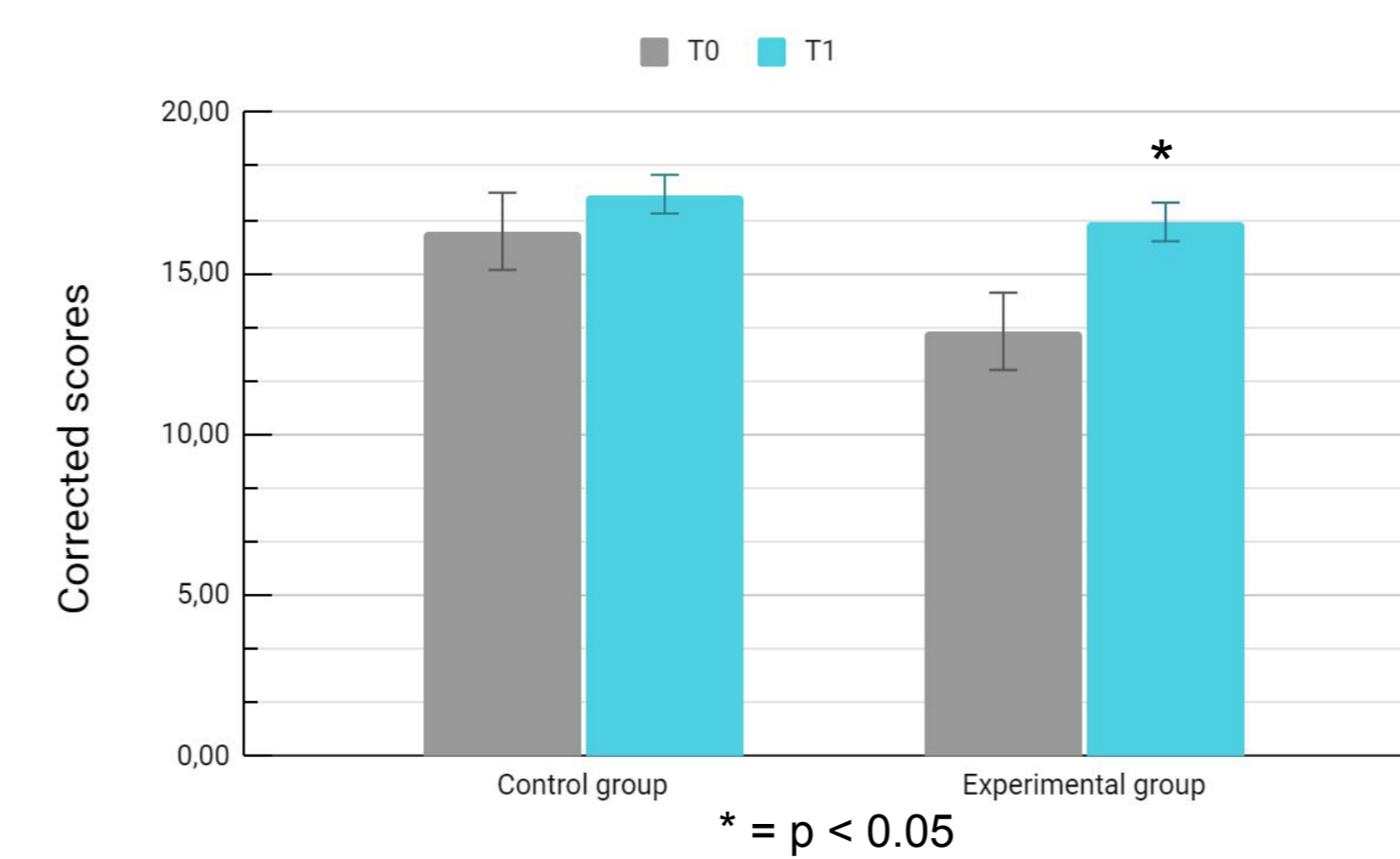
No significant differences were observed in experimental and control groups in digit and spatial span backward performance.

ANOVA on equivalent scores of all attentional tasks (spatial and verbal span forward, attentional matrices) showed a significant interaction of Group \times Condition ($F = 5.3$; $p = 0.02$). Treatment on experimental but not in the control group improved attentional scores.

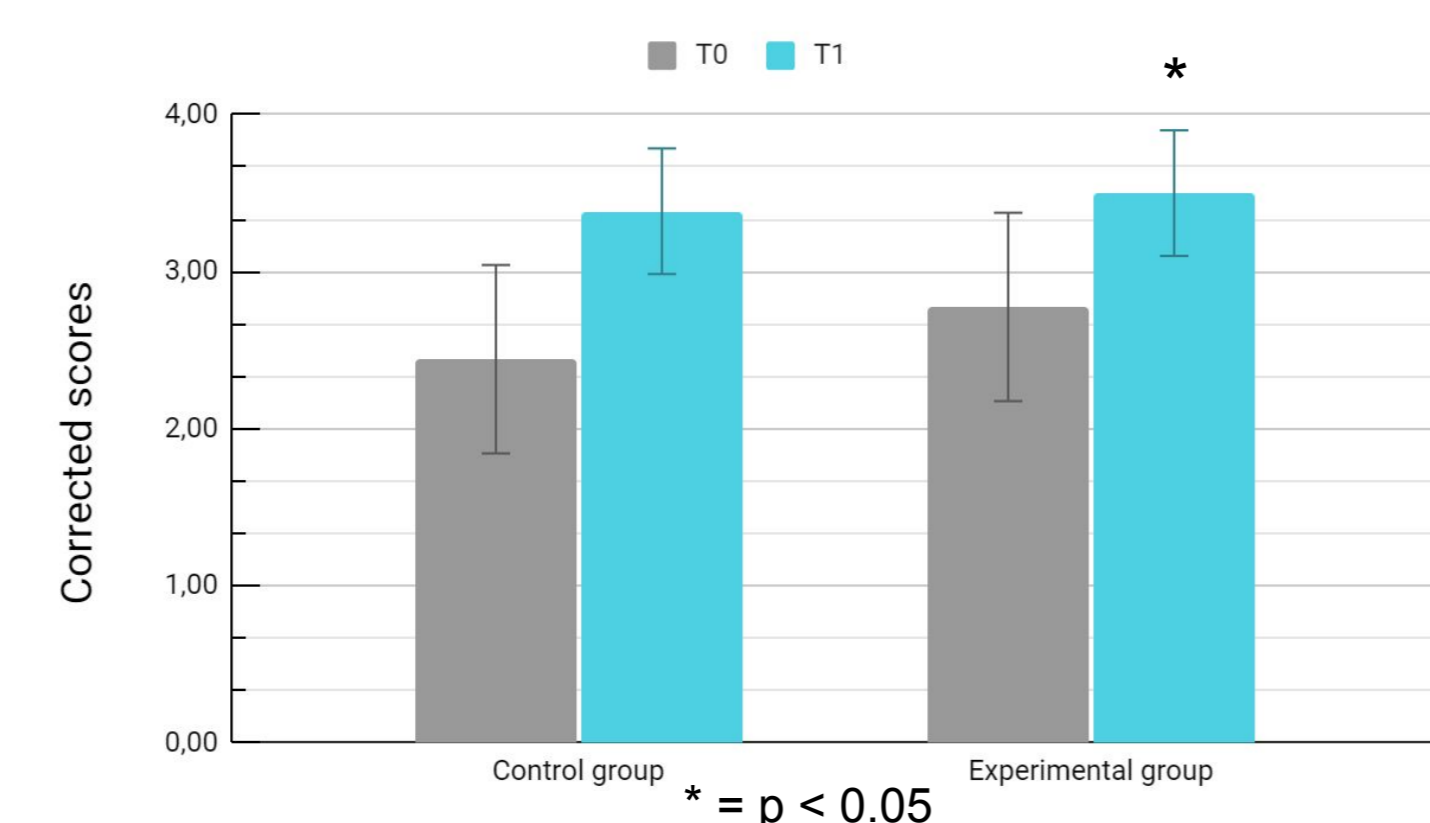
Attentional Matrices Tasks



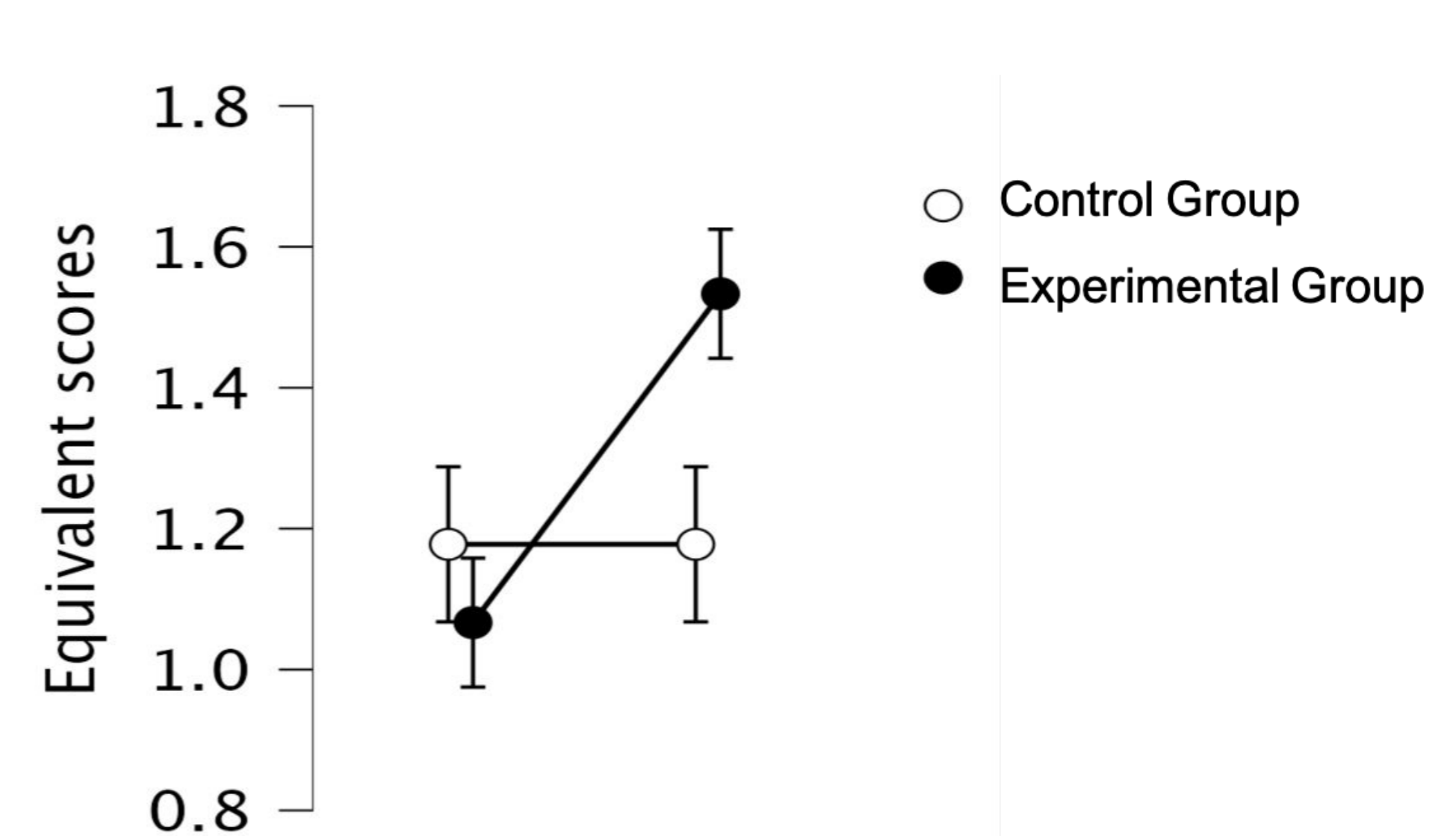
Line Cancellation Task



Corsi Forward Task



Attentional Tasks



Discussion and Conclusions

Results may suggest that digital rightward prism adaptation primes attentional networks making them more responsive to the stimulating effects of serious games for rehabilitation of attention in RBD patients.

The integration of digital prism adaptation with serious games induces both process and modality-specific effects on attention in stroke patients.

References:

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Tsujimoto K, Mizuno K, Nishida D, Tahara M, Yamada E, Shindo S, Kasuga S, Liu M. Prism adaptation changes resting-state functional connectivity in the dorsal stream of visual attention networks in healthy adults: A fMRI study. *Cortex.* 2019; 119:594-605.