SENSORIMOTOR CONTINGENCY LEADS TO DEVELOPMENTAL CHANGES IN THE NEURAL MECHANISMS SUPPORTING VISUAL RECOGNITION

VINCI-BOOHER, S., NIHOLINA, A., JAMES, T.W., & JAMES, K.H.

BACKGROUND

Handwriting influences visual recognition.

Letter recognition in preliterate children increases. 1, 2 Novel symbol recognition in literate adults increases. 3

Handwriting influences functional connectivity.

Functional connectivity during letter perception in preliterate children increases. 4

HYPOTHESES

1) Visual-motor contingency during handwriting:
   (a) ... increases visual recognition for the practiced forms.
   (b) ... increases functional connectivity during
   visual perception of the practiced forms.

2) Training-induced changes in visual recognition are related
to training-induced changes in functional connectivity.

EXPLORATORY QUESTION

3) Are there long-term effects of training that happen after
   training ends?

METHODS

PROCEDURE

TRIAL 1 Training (Pre-Training)
TRIAL 2 Post-Training
TRIAL 3 No training
TRIAL 4 Post-Delay

RECOGNITION TESTING: old/new recognition test

RESULTS

NEUROIMAGING

Participants:
1) Post-Training FC: greater than Pre-Training on the right side of the brain.
2) Post-Delay FC: less than Pre-Training on the left side of the brain.

DISCUSSION

Visual-motor contingency during handwriting facilitated visual recognition and changed functional connectivity during visual perception. These changes were related:

Most relationships were negative: greater functional connectivity predicted lower recognition.

Visual- and motor-related functional connectivity both predicted recognition throughout cortex.


Training-induced functional connectivity and recognition were present after the no-training week.

REFERENCES


Psychological & Brain Sciences, Indiana University