Scaffolded Reaching Experience is Related to Decreased EEG Coherence in Infants

Yasmin Ali, Sandy Gonzalez, Christopher Clifford, Bethany Reeb-Sutherland, & Eliza Nelson
Department of Psychology, Florida International University

Background
- Previous research finds that providing non-reaching 3-month-old infants with scaffolded reaching experience using Velcro covered mittens (i.e., "sticky mittens") facilitates grasping and enhanced object manipulation1.
- Using electroencephalography (EEG) research also indicates that changes in motor skills (e.g., crawling2 or walking3) is linked to changes in EEG coherence (a measure of synaptic connectivity between neural regions) 4,5,6.
- To date the neural mechanisms underlying the behavioral changes seen pre- to post-"sticky mittens" training are unknown.

**Aim:** Investigate the neural correlates underlying the sticky mittens experience using EEG coherence.

Methods
- **Participants:** 8 non-reaching, typically developing 3-month-old infants. EEG data was collected using a 64-channel Geodesic Sensor Net (Electrical Geodesics Inc., Eugene, OR). See Figure 1 for study design.
- **Reaching Task:** Participants completed a 4 step reaching task7 to exclude participants who could reach independently at Visit 1, and to observe possible reaching at Visit 2.
- **Baseline EEG Coherence:** 1 minute baseline where experimenter blows on a pinwheel while participant observes. Higher coherence (closer to 1.0) indicates greater synaptic connectivity between regions, lower coherence (closer to 0) indicates greater neural efficiency or regional differentiation (see Figure 2) 2,5,6.
- **Reaching Experience:** Infants were randomly assigned to different reaching groups: active training (AT, Figures 3 and 4) or passive training (PT, Figure 5).

Conclusions and Future Directions
- **AT Group** had decreased synaptic connectivity between frontal and central regions from pre- to post-"sticky mittens" training, indicating greater neural efficiency or regional differentiation.
- **PT Group** maintained the same relative level of EEG coherence from pre- to post-training.
- **AT Group** had decreased synaptic connectivity between frontal and central regions compared to the PT group at post-training.

**Future Directions:** Analyze additional EEG measures such as mu-desynchronization and Nc amplitude in relation to cascading motor and social changes7 previously seen from "sticky mittens" use. Data collection is on going.

References and Acknowledgements

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For more information about our studies visit:

hands.fiu.edu and lsbdt.fiu.edu

Correspondence to: Yasmin Ali (yali008@fiu.edu)