

P87: EEG evidence for mirror neuron system integrity in Down syndrome

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Introduction: Understanding and imitating other people's actions is crucial for social cognition. These skills appear to be supported by the human mirror neuron system. There is contradictory evidence regarding social skills in people with Down Syndrome (DS) and in consequence, regarding the integrity of the mirror neuron system. Although having good social and imitation skills, there is evidence for impairments in interpreting social situations and recognizing emotions.

Objectives: To determine whether there are impairments in the mirroring activity of adults with DS when compared to individuals without DS, by calculating the variation of the suppression of the EEG mu activity.

Materials and Methods: EEG data was obtained from 16 adults with DS and 9 adults without DS. The acquisition was made using a MindMedia Nexus 10 amplifier. EEG was registered in the following conditions in CZ, according to Oberman et. al. (2005): Baseline (static white cross); (2) non-biological motion; (3) self-hand movement; (4) observing a hand movement in a display. Each condition lasted for 90 seconds. Mu rhythm suppression was calculated by calculating the ratio between the power of mu rhythms of the experimental conditions and the power conditions used as reference. Data was analyzed using a mixed ANOVA for repeated measures.

Results and Discussion: There were no significant differences in the mu rhythm suppression between adults with and without DS ($F(1,23)=0.440$; $p=0.514$). Both had an increase in the suppression of the mu rhythms in the observation conditions and during the execution of hand movement in relation to the non-biological motion condition. The DS group displayed greater suppression of mu rhythms during the execution of hand movement than in the observation.

Conclusion: Adults with DS appear to have an intact mirror neuron system. Rehabilitation methods for this population should be based on observation learning methods.

References

1. Virji-Babul, N., Moiseev, A., Cheung, T., Weeks, D., Cheyne, D., & Ribary, U. (2008). Changes in mu rhythm during action observation and execution in adults with Down syndrome: Implications for action representation. *Neuroscience Letters*, 436(2), 177–180.
2. Oberman, L.M., Hubbard, E.M., McCleery, J.P., Altschuler, E. L., Ramachandran, V.S., & Pineda, J. A. (2005). EEG evidence for mirror neuron dysfunction in autism spectrum disorders. *Cognitive Brain Research*, 24(2), 190–198.