Gait Analysis in Autism: A Potential Diagnostic Tool

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The Theory

- Autism – anomalous ‘clock genes’. Neurobiological cascade of development affects temporal synchrony. (4)
- Cerebellum, Purkinje cell and Basal Ganglia structural anomalies. (3)
- Coordination and timing of motor control
- Inhibition of motoric activity/action selection.
- Basal ganglia

Participants

- 13 (to date) male subjects High Functioning Autism = no comorbid Learning Disabilities (LD), Autism Diagnostic Observation Schedule (ADOS) – Typically Developing (TD) Controls age-matched to 6 months for under 18s.

3-D Motion Capture VICON Technology

- 12 VICON Cameras and 20 markers.
- Participants walk diagonally, 4x4m room, 10+ trials
- Biomechanical data by VICON Nexus software, recording at 250Hz.
- Variability measured by Coefficient of Variation (CoV).
- 12 CoV values per subject: Left, Right and L&R values for each of the four stages of the gait cycle.

Results

Mann-Whitney U tests compared CoV and Mean values of each HFA participant with TD subjects.
11/12 measures significantly different at p<0.05 (6 to p<0.01).
1 of 12 approaching significance (p=0.058).

No correlation between ADOS and gait; all HFA to avoid comorbid LD; minimal distinction expected. No difference between groups for Mean timing.

Conclusions

- Participants with HFA demonstrate greater gait timing variability.
- HFA aren’t faster or slower on average, but show higher temporal variability
- Implicates involvement of the cerebellum. Support for the clock gene theories of autism as an aetiologcal explanation for the anomalous neurobiological trajectory of development.
- Further evidence for temporal synchrony anomalies in autism. Potential Diagnostic Tool

References


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