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Human movement stochastic variability leads to diagnostic biomarkers In Autism Spectrum Disorders (ASD) DI WU, Physics, Indiana Univ - Bloomington, Bloomington, IN, ELIZABETH B. TORRES, Dept. of Psychology, Rutgers Univ., New Brunswick, NJ, JORGE V. JOSE, Physics, Indiana Univ - Bloomington, Bloomington, IN; Cell and Integrative Physiology, Indiana Univ. School of Medicine, Indianapolis, IN — ASD is a spectrum of neurodevelopmental disorders. The high heterogeneity of the symptoms associated with the disorder impedes efficient diagnoses based on human observations. Recent advances with high-resolution MEM wearable sensors enable accurate movement measurements that may escape the naked eye. It calls for objective metrics to extract physiological relevant information from the rapidly accumulating data. In this talk we'll discuss the statistical analysis of movement data continuously collected with high-resolution sensors at 240Hz. We calculated statistical properties of speed fluctuations within the millisecond time range that closely correlate with the subjects' cognitive abilities. We computed the periodicity and synchronicity of the speed fluctuations' from their power spectrum and ensemble averaged two-point cross-correlation function. We built a two-parameter phase space from the temporal statistical analyses of the nearest neighbor fluctuations that provided a quantitative biomarker for ASD and adult normal subjects and further classified ASD severity. We also found age related developmental statistical signatures and potential ASD parental links in our movement dynamical studies. Our results may have direct clinical applications.

Di Wu
Physics, Indiana Univ - Bloomington, Bloomington, IN

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