

# SEMINAR SERIES

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## Is Non-ergodicity A Cause of the Reproducibility Crisis?

Featuring Dr. Madhur Mangalam  
University of Nebraska at Omaha



Friday, Feb. 17 | 12:00 - 1:15 pm | BRB 167

### PRESENTATION ABSTRACT

Biomedical inference about cause and effect hinges on the questionable premise that collected data is ergodic, i.e., statistical measures of variability remain consistent across individuals/time. For example, a population's average running speed could increase over time, but this bears little resemblance to a single person's running performance. Individuals often trade speed for accuracy, but this correlation reverses at the group level. Likewise, the mean firing rates of neuronal clusters do not reflect those of single neurons. Assuming ergodicity in causal analyses when it does not hold obscures genuine individual differences. At stake are generalizable results from diverse samples intended to represent the population. We hypothesize that non-ergodicity—the lack of consistency in statistical measures of variability across individuals/time—plays a causal role in the reproducibility crisis across sciences. We propose using ergodic statistics that encode non-ergodicity in data as a theoretically motivated way to increase reproducibility in biomedical sciences.

### ABOUT DR. MANGALAM

Dr. Mangalam Directs the Multiscale Modeling Lab in the Department of Biomechanics at UNO. Research in Multiscale Modeling Lab is a unique culmination of biomechanics, ecological psychology, movement science, physiology, and statistical biophysics. The lab focuses on human movement / physiological fluctuations as a valuable indicator of health, cognition, and disease. Methodologies include advanced instrumentation and cutting-edge multiscale analytical techniques to uncover the underlying “choreography” of fluctuations associated with complex behaviors and functions. This research promises to identify and model the non-stationary, far-from-equilibrium processes that underlie the creativity and emergence of biological and psychological behavior.

more info at [cobre.unomaha.edu](http://cobre.unomaha.edu)

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