

Neurostatistics of Cognitive Functions

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Abstract : This research introduces the Law of Activity Dominancy (LAD), a foundational theory in neuroscience postulating that simultaneous brain-regulated activities cannot share identical brain wave frequencies. The study explores the LAD through comprehensive observational and statistical analyses, illustrating its applicability across all cognitive functions. Utilizing brain wave frequency data across diverse scenarios, the research derives probabilistic models to predict the likelihood of concurrent cognitive activities. The LAD theory's predictive power extends to all neurological conditions, offering insights into Alzheimer's disease, major depressive disorder, epilepsy, schizophrenia, anxiety disorders, OCD, ASD, ADHD etc... By analyzing EEG patterns, the research demonstrates how overlapping brain wave frequencies disrupt specific cognitive and motor functions, aligning with clinical observations. This study also outlines the statistical properties of the LAD, presenting equations to calculate activity probabilities and emphasizing its utility in personalizing cognitive assessments, early disease detection, tailored therapies, optimizing cognitive performance etc... By bridging theoretical neuroscience with practical applications, the research establishes the LAD as a pivotal framework for understanding and enhancing human cognitive functions.

Keywords : Ajay Panchal, cognitive neuroscience, computational neuroscience, theoretical neuroscience

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