

Examining the Psychological Significance of the Jumps in the Decision Process through Test-Retest Reliability Analysis

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Abstract

In decision-making, the Levy flights model (LFM), an extension of the diffusion decision model, adopts a heavy-tailed distribution with the pivotal 'alpha' parameter controlling the shape of the tail. This study critically examines the theoretical foundations of alpha, emphasizing that its test-retest reliability is essential to classify it as a cognitive style measure. Our analysis confirms the alpha parameter's test-retest reliability across various occasions and tasks, supporting its role as a trait-like characteristic. The study also explores LFM parameter interrelations, despite low correlation among the other parameters (so representing distinct aspects of data), there is a pattern of moderate correlation between alpha and non-decision time. Investigating the practice effect, our analyses indicate a consistent decrease in non-decision time, threshold, and often alpha across sessions, alongside the drift-rate increase. We also employ Bayesflow for parameter estimation, evaluating its precision with different trial counts. These findings provide valuable guidelines for future LFM research.