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.

In L. K. Samuelson, S. L. Frank, M. Toneva, A. Mackey, & E. Hazeltine (Eds.), *Proceedings of the 46th Annual Conference of the Cognitive Science Society.*