Fluctuation Scaling in the Air Traffic Controller's Communication Activity

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Abstract

Recent human dynamics studies have proposed several types of mechanism that underlies the uncovered universal patterns across various kinds of human daily activities [1, 2, 3]. However, little is known about the general patterns among human activities under pressure. Air traffic controllers are responsible for the safety and efficiency of air traffic management system, and always work under pressure. Here we investigate controller's communication behavior by extending fluctuation scaling method [4, 5, 6, 7, 8]. Two empirical datasets that were collected during real-time human-in-the-loop simulations and during real operations were analyzed. By defining the number of controlled flights as the size-like parameter, the standard deviations of communication and the averages follow power laws, with scaling exponent $\alpha \approx 0.54$ for the simulation data and $\alpha \approx 0.77$ for the real data. The difference between the exponents suggests that human dynamics under pressure is more likely dominated by the exogenous force.

Keyword: fluctuation scaling, human dynamics, air traffic control

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