

Mixed strategy Nash equilibrium as a non-equilibrium steady state

evidences in Matching Pennies and
Rock-Paper-Scissors game experiments

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Abstract

Basing on laboratory experiments, I will illustrate the following two points:

- We were able to substantiate the generally existence of persistent social **cycles** in the **two elementary games** having unique **mixed strategy Nash equilibrium**. In long-run, the distributions are steady and the systems are seemingly being in equilibrium states. However, the persistent cycles indicate that, the steady states are actually non-equilibrium steady states.
- **Non-equilibrium steady state** is a fundamental concept in **non-equilibrium statistical physics**, in which **fluctuation relation** is expected. We were able to substantiate that, variety actual motions of social state meet the fluctuation theorem exactly, which also indicate the Nash equilibrium being non-equilibrium.

Outline

- Concepts
- Experiments
- Theories
- Measurements
- Results
- Microscope fundament
- Implications
- Prospects