Predicting Outcomes in a Sequence of Binary Events: Belief Updating and Gambler's Fallacy Reasoning

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Rao, Kariyushi, and Reid Hastie. "Predicting Outcomes in a Sequence of Binary Events: Belief Updating and Gambler's Fallacy Reasoning." Available at SSRN 3597264 (2020).

Topic

The authors hypothesise that the **Gambler's Fallacy** and **Hot Hand** judgement patterns arise from the observer's mental models of the **sequence-generating mechanism**, moderated by the strength of belief in an **a-priori base rate**. The paper essentially looks into how the predictions of binary outcomes are influenced by the prior information, feedback provided regarding the sequences and the generators (random mechanical generator, intentional goal-based actor or social processes) by conducting various experiments.

Research Questions

1. **Replicate** the results of the authors' analysis in our project.
2. **Validate** the results and measure the parallel-form reliability of the paper.
3. Infer and verify the existence of any **relationships** between the variables across the studies.
4. Explore **additional questions** on the **effects of demographics** such as age, gender, education and qualitative strategies on the predictions made.
5. Account for demographics as **confounds** in the original analysis.
6. If time permits, we will also **collect new data** using a small sample size and check if there are any differences from the published results.

Dataset

Study 1	Study 2	Study 3
No information about any of the generators' base rates	Stationary base rate of .50 for all three generators	Specified the same distribution of possible base rates for all three generators

Part A	Part B
Continuous probability scale	Binary choice

- 3 groups
- 18 sequences of 8 binary outcomes per participant
- 1351 participants

Dataset

Important Variables

1. Sequence generator (random, actor, social process)
2. A-priori base rates
3. Streak lengths [2, 7]
4. Binary vs continuous predictions
5. Demographics (age, sex, education, financial literacy, etc.)

Methodology

1. Original hypothesis testing using t-tests, ANOVA, etc. (replication)
2. Permutation tests and bootstrapping for validating results (both, original and new)
3. Correlations and heatmaps to find relationships
4. Studying the effect of various demographic variables using ANCOVA and maybe stratification and account for demographics as confounds
5. If time permits, use original setup/questionnaire with the addition of a few questions (to account for confounds like effect of previous sequences) to collect our own data

Thank You