Experimental investigation of sensitivity to patterns in decisions from sampling

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Doron Cohen & Kinneret Teodorescu

Technion – Israel Institute of Technology

Summary

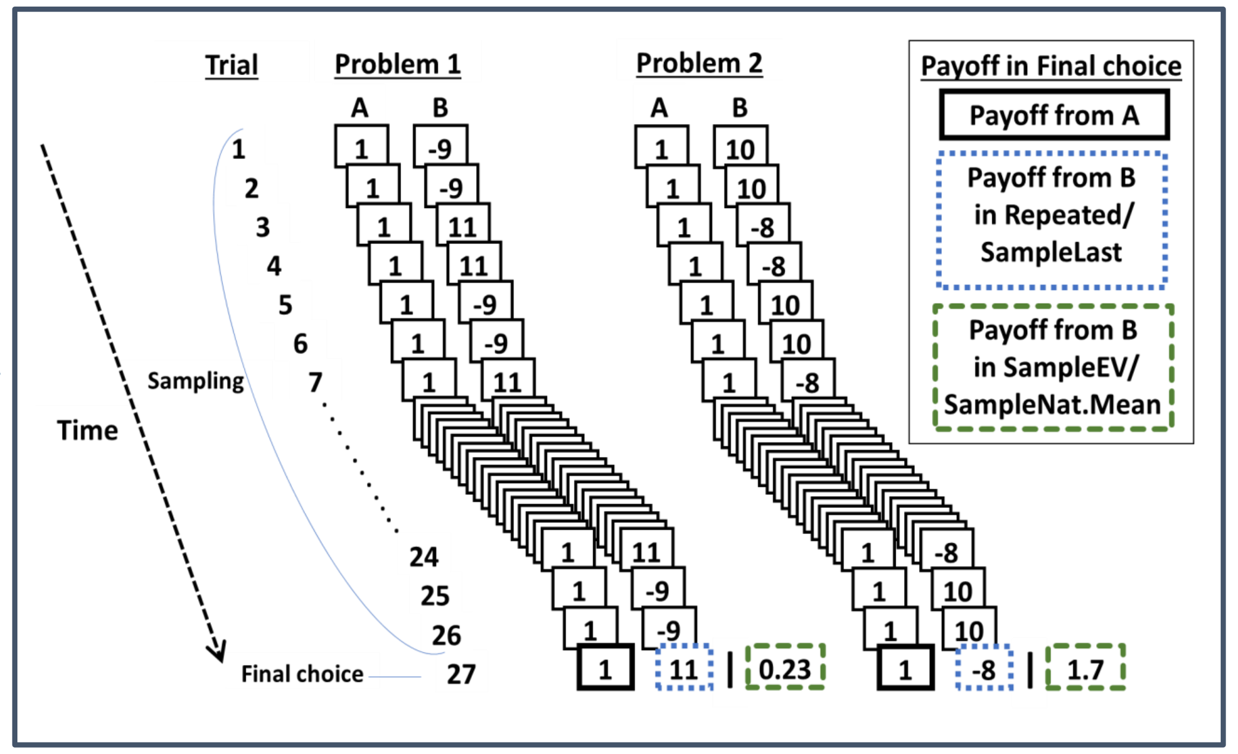
- A common implicit assumption in Decisions from Experience (DfE) studies is that participants understand and believe the task's underlying static nature. This assumption implies that arbitrary patterns of outcomes are uninformative and thus are ignored by participants.
- Yet, recent studies in the repeated choice paradigm show that people are sensitive to patterns of outcomes even when the environment is static and true patterns do not exist (Plonsky, Teodorescu & Erev, 2015).
- The underlying mechanism of decisions from sampling was argued to be distinct from repeated choices (e.g. Hills & Hertwig, 2012), yet some findings suggest fundamental similarities (e.g. Gonzalez & Dutt, 2011).
- **The current paper is the first to examine whether decisions from sampling are also sensitive to perceived patterns of outcomes as repeated consequential choices.**
- To clarify the impact of perceived patterns on behavior in the sampling paradigm, we focus on a non-ambiguous pattern embedded within the choice environment.
- The results show participants consistently followed the pattern even though there was no incentive to do so (i.e. during free sampling), when it implied deviation from maximization (i.e. when participants were incentivized to ignore the pattern) and when experience suggests it should be ignored (i.e. feedback indicated following the pattern is sub-optimal).

Method

Figure 1. Task design.

Participants faced two choice problems for 27 trials each. Each problem presented a fixed sequence of outcomes. Participants were randomly allocated to one of four conditions:

- "**Repeated**": Each choice implies real financial consequences.
- "**SampleLast**": Sampling for 26 trials, only the outcome on 27th trial of the sequence is consequential (blue square).
- "**SampleEV**" and "**SampleNat.Mean**": Sampling for 26 trials, only the average outcome on 27th trial is consequential (green square). That is, the sequence should be ignored.



Results

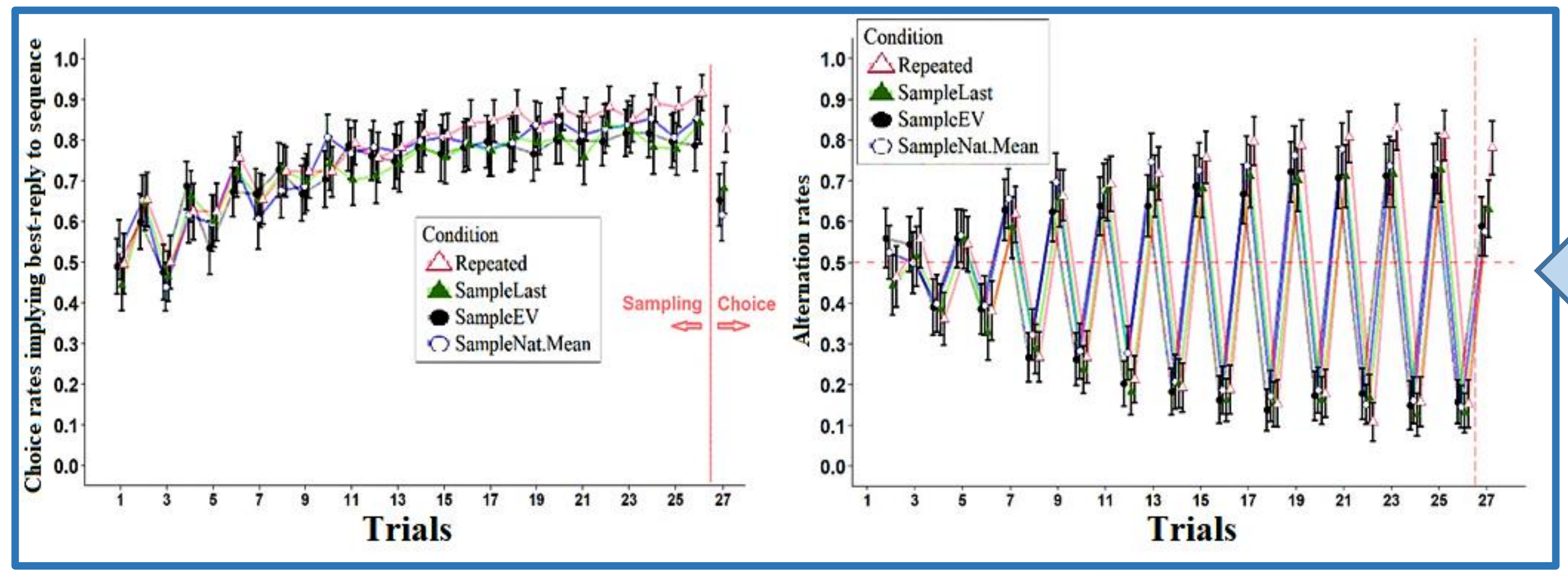
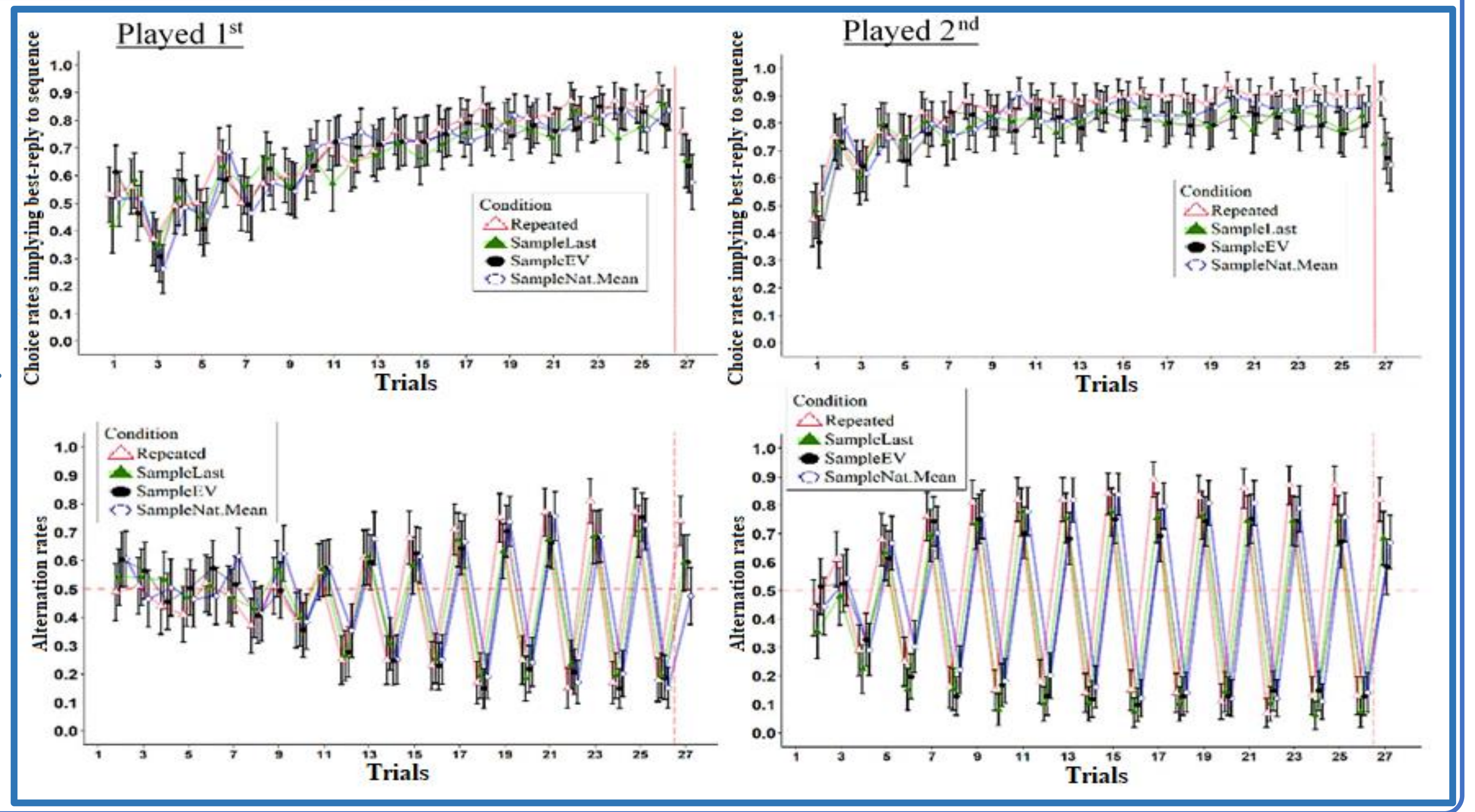


Figure 2. Pattern accuracy.

Left panel: Pattern-accuracy rates in each trial, aggregated across the two problems. Right panel: Alternation rates between alternatives as a function of trials, across the two problems.

Figure 3. Order effects.

Top panels: Pattern-accuracy rates aggregate across the two problems when faced first (left) and second (right). Bottom panels: Alternation rates between alternatives aggregate across the two problems when faced first (left) and second (right).



Discussion

Our results suggest that the large differences in incentives between the four conditions were superseded by the underlying pattern of outcomes – participants closely followed the underlying pattern even when it implied increased effort and led to deviation from maximization.

Possible explanations:

- Participants did not read, understand or believe the experimental instructions. Yet this explanation is not in line with the attention check and order effects.
- Participants wanted to signal to the experimenters they identified the pattern (Plonsky & Teodorescu, 2020). Yet this assumes participants found this signaling more appealing than avoiding additional efforts and earning higher monetary gains.
- Following sequences induces internal rewards (i.e. driven by intrinsic motivation, e.g. Lotem & Halpern, 2012).

Implications for DfE research:

- Our results are consistent with recent studies emphasizing the similarities between sampling and repeated choice tasks (Gonzalez & Dutt, 2011).
- Our findings challenge the interpretation of alternation rates as a proxy for exploration. Our results suggest that high alternation rates can also imply an attempt to exploit perceived patterns.
- Learning models can increase their ecological validity by accounting for temporal dynamics: A process tuned to finding *when* (i.e. on which trials) an option is better rather than finding *which* option is better overall (i.e. across all experienced trials).

References

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kinnerett@technion.ac.il