

# When and why rare events are underweighted in choice

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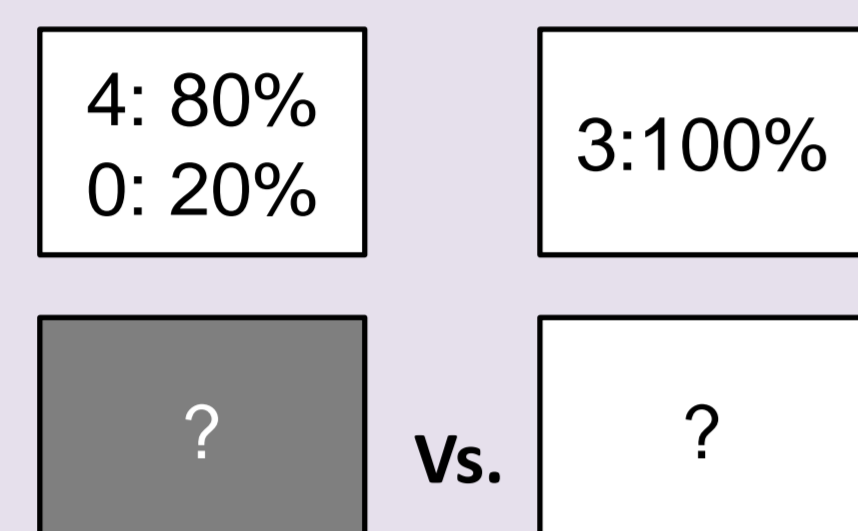
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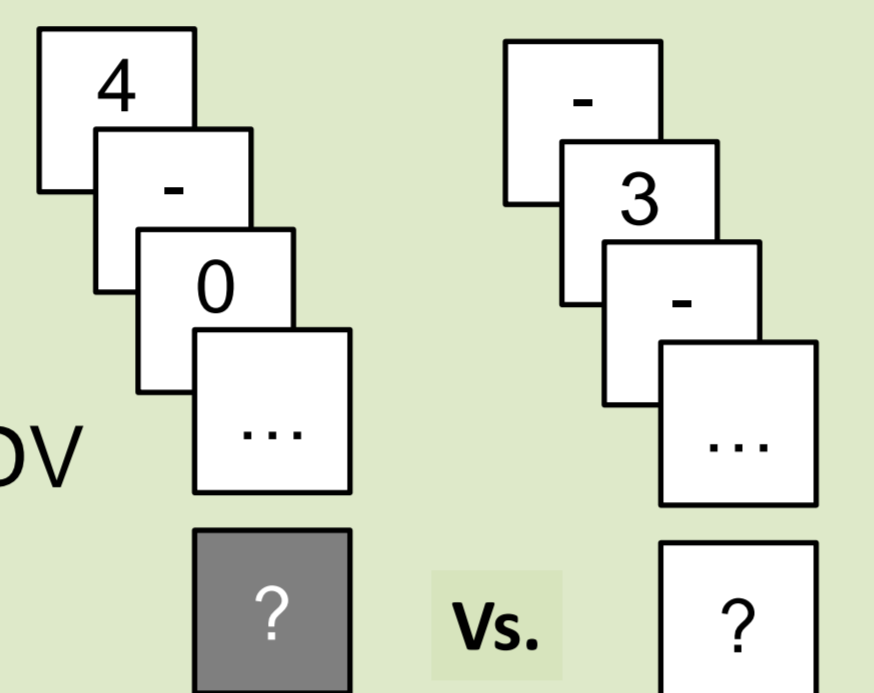
In a **decision from description**, outcomes and their probabilities are presented explicitly from the outset.

In the **Description** group, the DV was a one-shot choice.



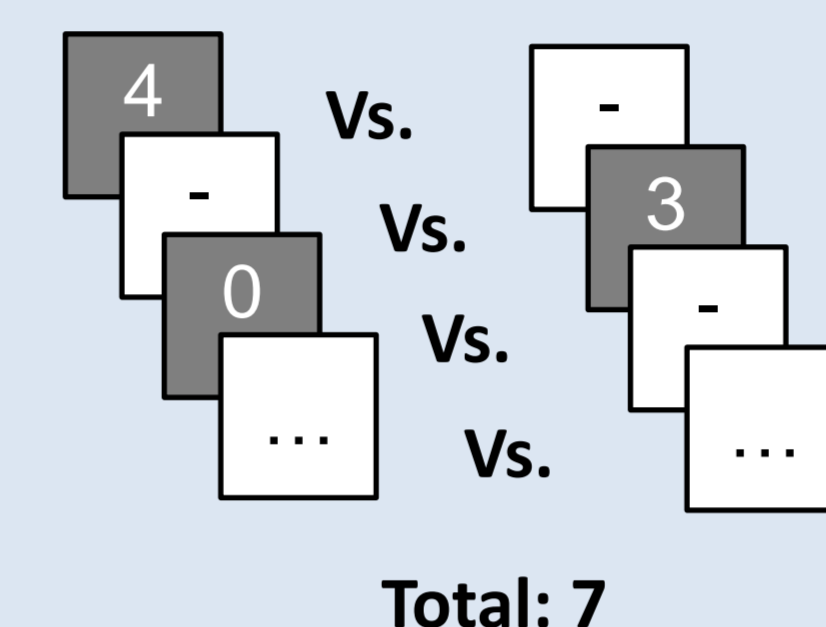
In a **decision from experience**, outcomes and their probabilities are learned sequentially through exploration. Three paradigms exist, which produce nearly equivalent patterns of choice (Hertwig & Erev, 2010). In the current experiment there were 100 trials per gamble.

In the **Sampling** group, samples were non-consequential and the DV was a one-shot choice.

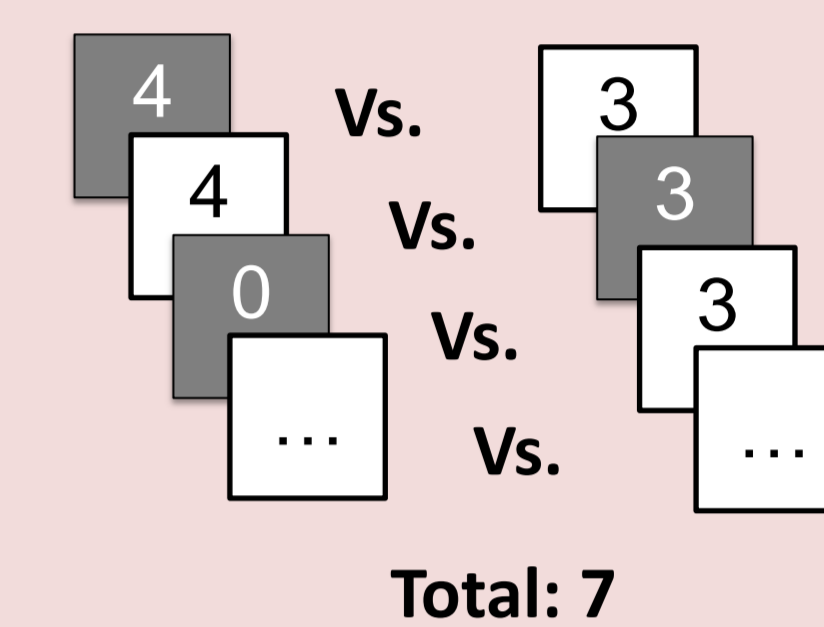


In the two **Feedback** groups, each sample was consequential and the DV was the modal choice over the last 50 trials. Feedback was also manipulated:

In the **Partial Feedback** group, feedback was limited to the selected option.



In the **Full Feedback** group, feedback was also given for foregone options.



Patterns of choice imply that people give **more** weight to rare events when they are described but **less** weight to rare events when they are experienced, relative to their objective probability.

Underweighting in the experience-based choice paradigms has been attributed to various factors, including:

- 1. SAMPLING BIAS:** reliance on small samples that do not accurately reflect the objective probabilities.
- 2. THE "HOT STOVE" EFFECT:** gradual avoidance of options with high variability (i.e., riskier options).
- 3. CHOICE INERTIA:** the tendency to repeat the last choice, irrespective of the obtained outcome.
- 4. THE EXPLORATION-EXPLOITATION CONFLICT:** the dual objective of learning more about the options as well as selecting the ostensibly better option.

**Purpose:** To examine the extent to which these four factors drive people to underweight rare events in experienced-based choice.

The percentage of participants who preferred the option consistent with underweighting of the rare event is shown in Fig. 1 (see Fig. 2 for problems used). The patterns of choice suggest – and a parameter test using SCPT confirm – behaviour consistent with:

- Overweighting in the **Description** group.
- Objective weighting in the **Sampling** group.
- Underweighting in the **Partial & Full Feedback** groups.

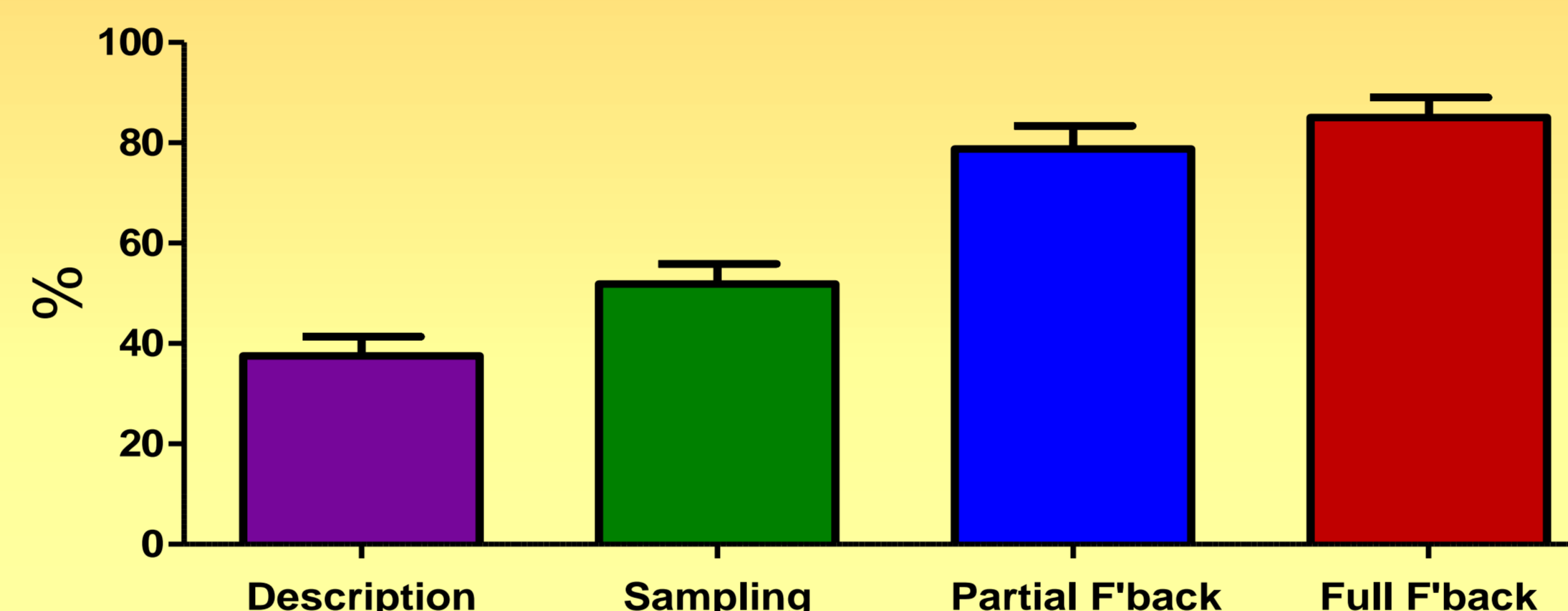


Figure 1. Percentage of participants who preferred the option consistent with underweighting of the rare event (see Fig. 2 for problems used). Error bars are the SEM.

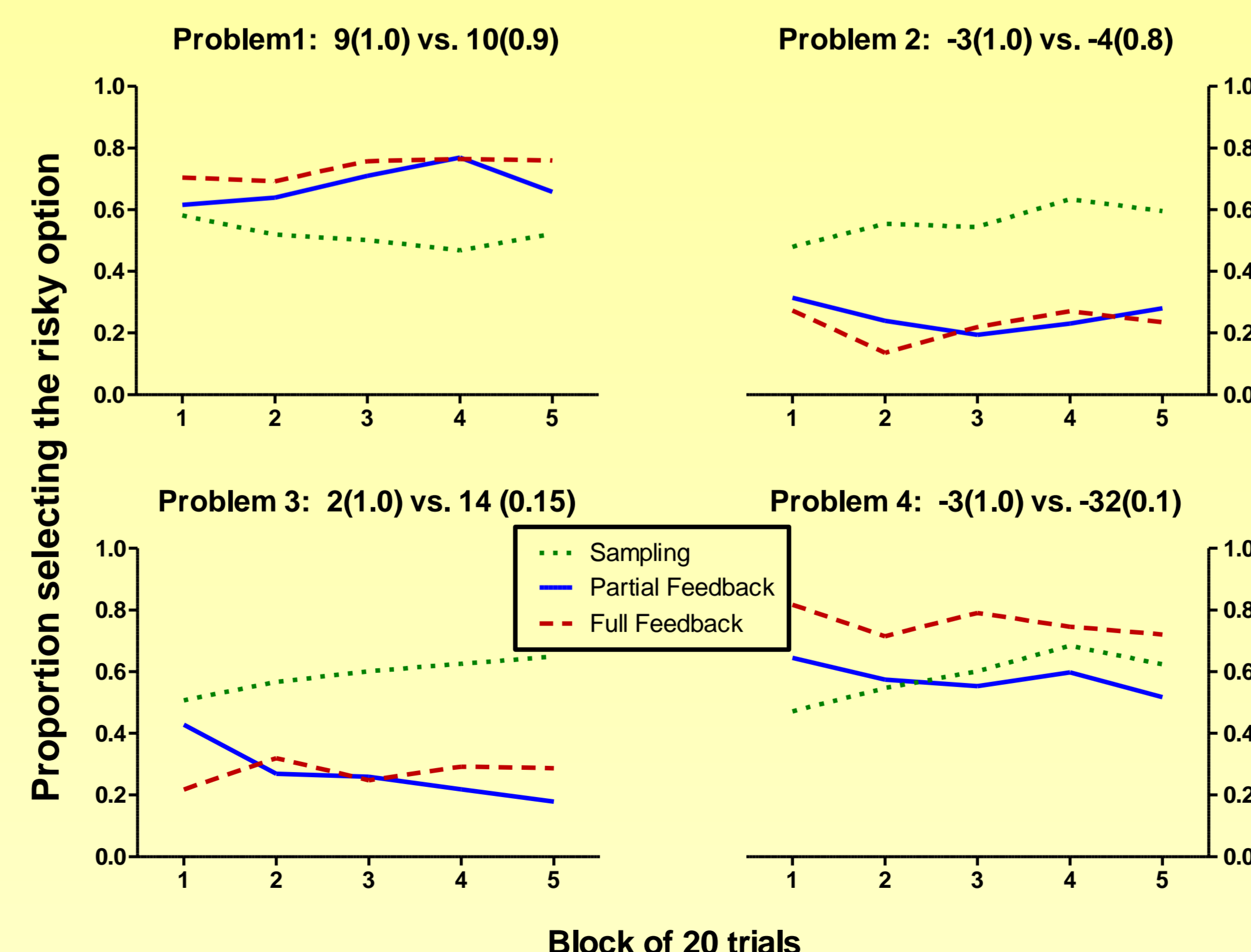


Figure 2. Proportion of risky choices in the **Sampling**, **Partial Feedback** and **Full Feedback** groups for each problem in blocks of 20 trials.

These findings cast doubt over the assertion that sequential experience of outcomes is sufficient to cause underweighting.

Similar patterns of choice in the two **Feedback** groups suggests that crucial for the underweighting of rare events is the presence of *repeated, consequential choice* and not the EXPLORATION-EXPLOITATION CONFLICT.

There were fewer risky choices made in the **Partial Feedback** group than in the **Full Feedback** group (Fig. 2), suggesting that the "HOT STOVE" EFFECT mediates the magnitude of underweighting.

One heuristic potentially responsible for the persistence of choice underweighting is "choice escalation":

1. Initial preferences invariably favour the option with the best modal outcome (due to SAMPLING BIAS).
2. Subsequent CHOICE INERTIA causes decision makers to prefer repeating the last choice, regardless of outcome.

**Conclusion:** In a context of repeated, consequential choice, people underweight rare events even when samples are representative because of "choice escalation": initial preferences favour the option with the best modal outcome (overlooking rare events) and subsequent choice inertia fortifies this preference.

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