

When and why rare events are underweighted in choice

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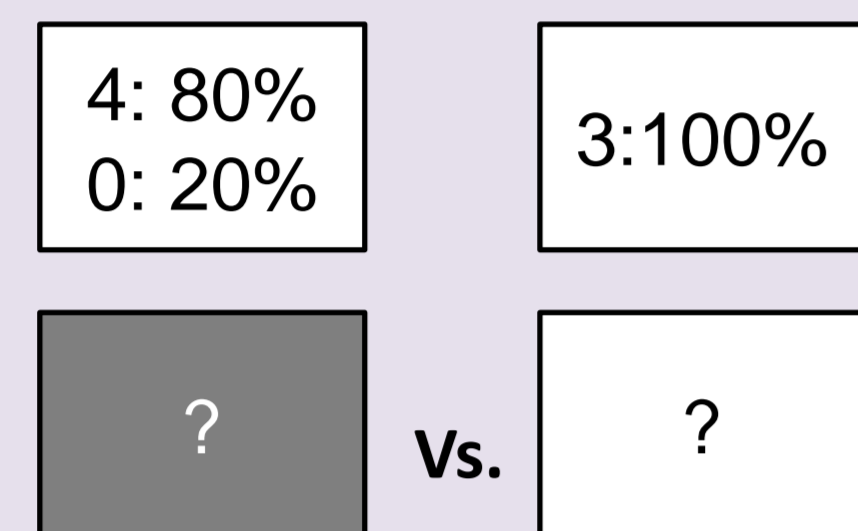
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In a **decision from description**, outcomes and their probabilities are presented explicitly from the outset.

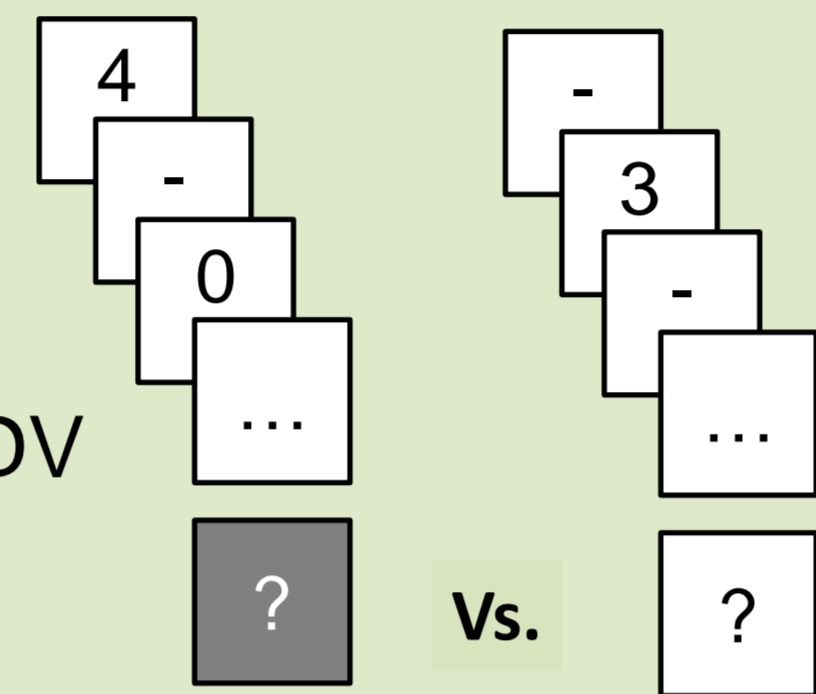
In the **Description** group, the DV was a one-shot choice.



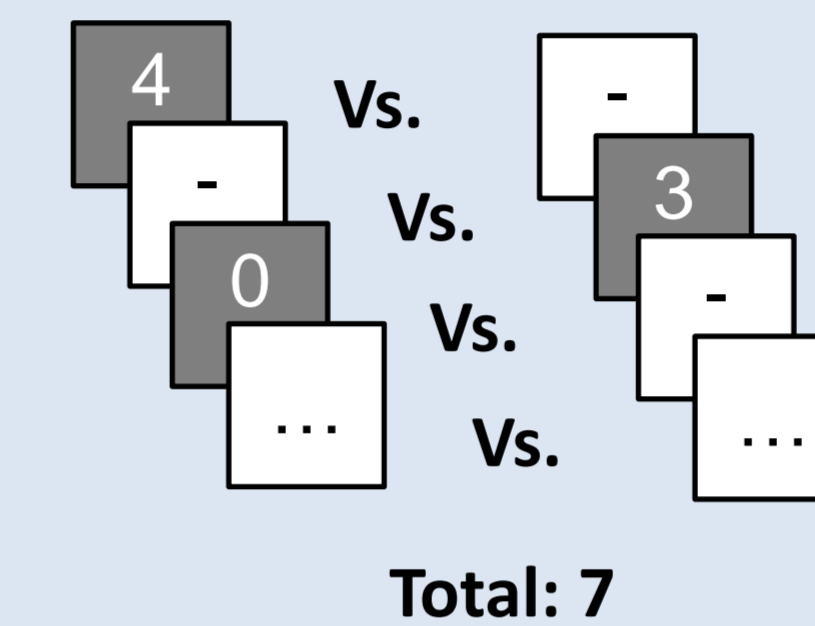
In a **decision from experience**, outcomes and their probabilities are learned sequentially through exploration. Three paradigms exist, which produce nearly equivalent patterns of choice (Hertwig & Erev, 2010). In the current experiment there were 100 trials per gamble.

In the two **Feedback** groups, each sample was consequential and the DV was the final (i.e., 100th) choice made. Feedback was also manipulated:

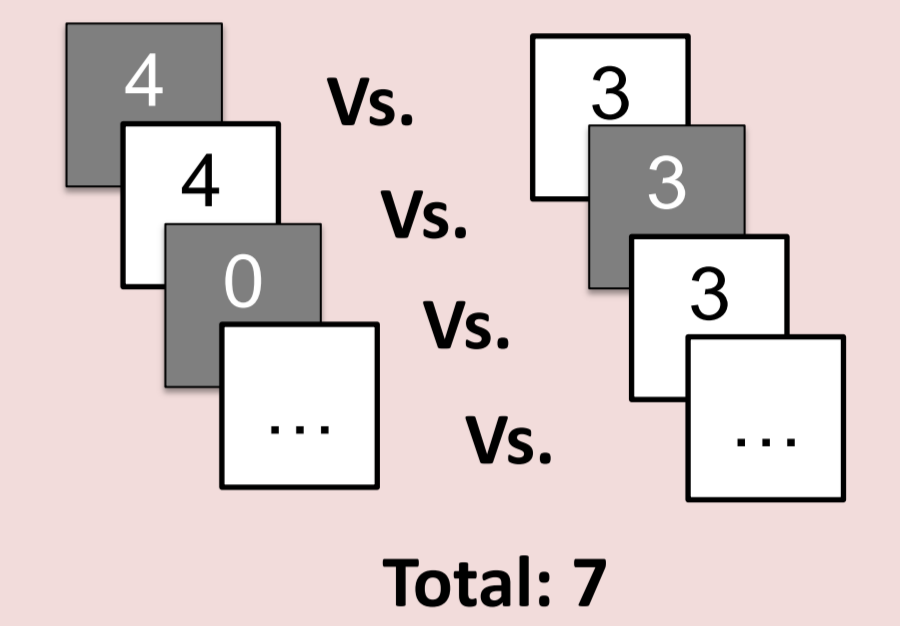
In the **Sampling** group, samples were non-consequential and the DV was a one-shot choice.



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



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



Purpose: To examine when and why people appear to give *less* weight to rare events when they are experienced, relative to their objective probability.

Across a number of simple binary choices, more participants in the **Partial** and **Full Feedback** groups preferred the option consistent with underweighting of the rare event (Fig. 1).

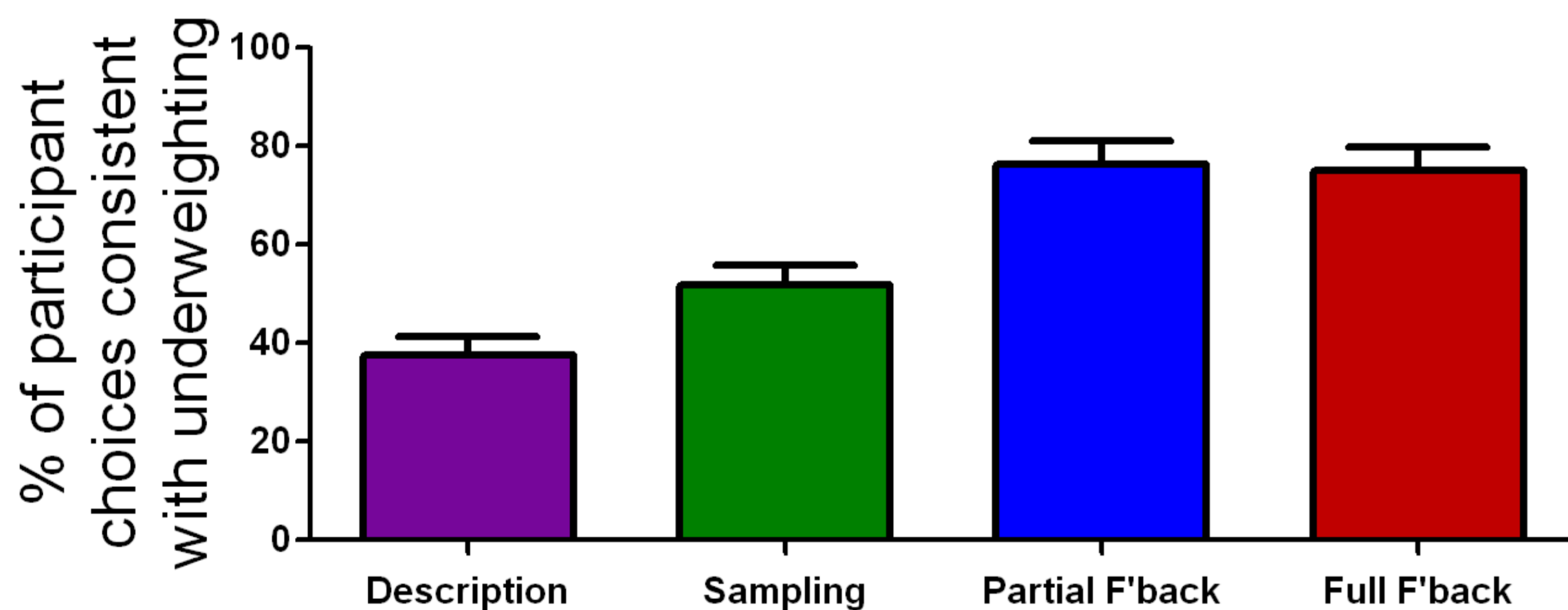


Figure 1. Percentage of participants who preferred the option consistent with underweighting of the rare event (see Fig. 3 for problems used). Error bars are the SEM.

Indeed, when the data were fit to Prospect Theory across a range of parameter values we found choice behaviour consistent with overweighting in the **Description** group but underweighting in the **Partial** and **Full Feedback** groups (Fig. 2).

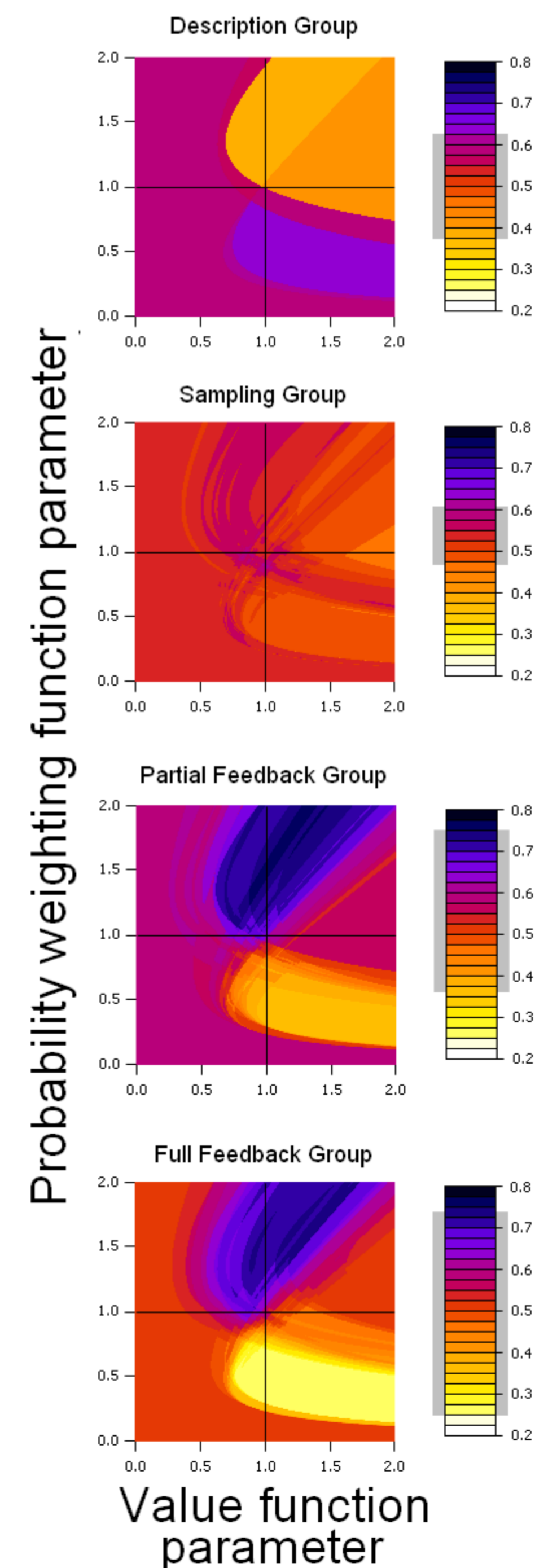


Figure 2. Contour plots showing the proportion of correct predictions when the data from the **Description**, **Sampling**, **Partial Feedback** and **Full Feedback** groups were fitted to Prospect Theory across a range of different parameter values.

These findings cast doubt over the assertion that sequential experience of outcomes is sufficient to cause underweighting. It seems that previous observations of underweighting in the **Sampling** paradigm are due to *SAMPLING BIASES*, which were not present here.

The similar patterns of choice in the **Partial** and **Full Feedback** groups suggests that crucial for the underweighting of rare events is the presence of *repeated, consequential choice* rather than the *EXPLORATION-EXPLOITATION CONFLICT*.

There were fewer risky choices made in the **Partial Feedback** group than in the **Full Feedback** group (Fig. 3), suggesting that the *“HOT STOVE” EFFECT* can also influence the magnitude of underweighting.

Conclusion: Our experiment demonstrates clearly that the **Sampling** and **Feedback** paradigms differ in terms of (i) choices made, (ii) the best-fitting probability weighting parameter values in Prospect Theory, and (iii) participants' sampling experience across trials. Thus, repeated, consequential choices, unique to the Feedback paradigm, is a key driver of underweighting.

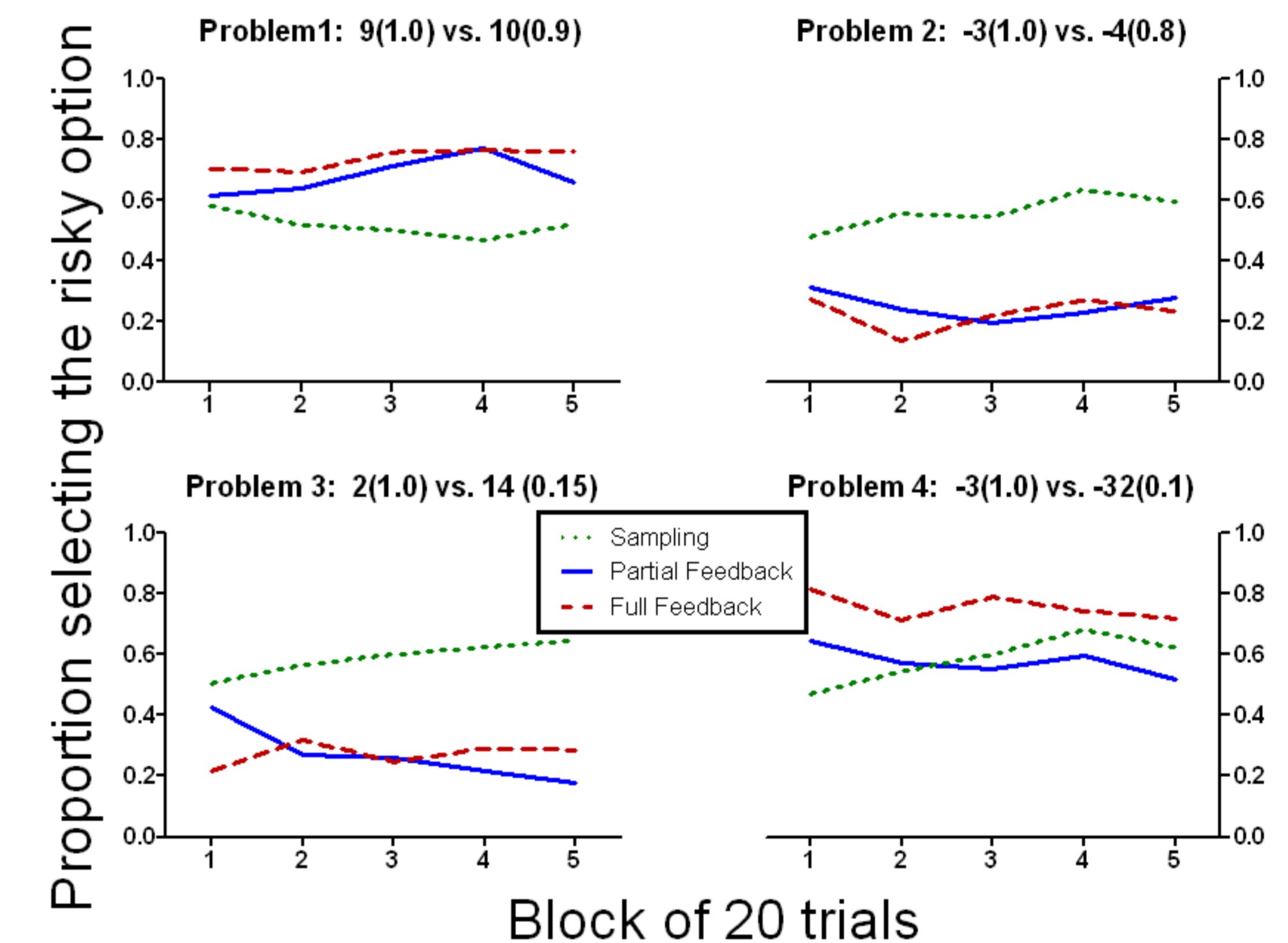


Figure 3. Proportion of risky choices in the **Sampling**, **Partial Feedback** and **Full Feedback** groups for each problem in blocks of 20 trials.