

Peer Review

Review of: "The Monty Hall Problem: Does Performance Improve After the Acquisition of Some Probability Knowledge?"

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Thank you for sharing your manuscript "*The Monty Hall Problem: Does Performance Improve After the Acquisition of Some Probability Knowledge?*". The paper is clearly written, carefully documented, and engages with the rich interdisciplinary literature on the Monty Hall problem (MHP), spanning probability theory, psychology, and behavioral economics. The explicit distinction between probability assessment (Question 1) and intended behavior (Question 2) is particularly well aligned with prior research and constitutes a solid conceptual starting point.

That said, I believe there are two major design issues, and a potential interaction between them, that substantially limit the interpretability of the results and the strength of the conclusions that can be drawn. I outline these concerns below, along with hopefully constructive suggestions.

Strengths of the manuscript

Before addressing the main concerns, I would like to acknowledge several positive aspects:

Clarity and transparency

The manuscript is well-structured, and Sections 2.1 and 2.2 provide detailed descriptions of the procedure and instructions, so that it would be easy to replicate the study. Tables 1–4 clearly and systematically present the empirical results.

Separation of assessment and decision-making

The distinction between perceived probability advantage and intended choice is well-motivated and consistent with established work on dissociations between belief and action in the MHP.

Engagement with behavioral explanations

The Discussion demonstrates good familiarity with the literature on anticipated regret, loss aversion, status quo bias, and related phenomena.

These strengths make the paper a potentially valuable contribution, but only if the central interpretive issues below can be addressed.

Major concern 1: Under-specification of the problem

(Implications for probability “correctness” and assessment results)

Where this appears:

- Problem statements in Sections 2.1 and 2.2
- Classification of responses in Section 3 (Tables 1 and 2)
- Interpretation of assessment errors in Section 4

Core issue

The canonical Monty Hall solution—according to which switching yields a $2/3$ probability of winning—depends critically on specific assumptions about the host’s behavior, notably that the host always opens a non-prize door and always offers the opportunity to switch, regardless of the contestant’s initial choice. These assumptions are not explicitly stated in the experimental instructions provided to participants.

As a result, the problem as presented is under-determined from a probabilistic standpoint. Participants must implicitly infer or construct a model of the host’s strategy in order to answer Question 1.

Consequences for interpretation

Because the host’s strategy is unspecified, responses indicating that “Both doors have equal probability” or even that “Keep[ing] the first door” yields higher chances of winning cannot be straightforwardly classified as incorrect. Under several reasonable interpretations of the host’s behavior—particularly those aligned with everyday intuitions about game shows—either of those answers is a defensible conclusion, too (see above).

This issue directly affects:

- Claims in Section 4 that only a small minority of participants “answered correctly,”

- The interpretation of the large post-instruction increase in equiprobability responses (Tables 1 and 2),
- Objective 1, which presupposes a well-defined standard of probabilistic correctness.

At a minimum, correctness in this task is model-dependent, and the model is not made explicit to participants.

Major concern 2: Mindset priming confounded with probability instruction

(Implications for causal claims about learning)

Where this appears

- Instructions in Sections 2.1 and 2.2
- Pre–post comparisons throughout Sections 3 and 4

Core issue

The two measurement occasions differ not only in participants’ exposure to probability instruction but also in the cognitive framing of the task:

- On the first occasion, participants are instructed to “trust your intuition.”
- On the second occasion, participants are instructed to “[a]pply what you know about probability.”

This change introduces a confound that makes it impossible to attribute observed differences solely to the acquisition of probability knowledge.

Consequences for interpretation

The Discussion (Section 4) interprets pre–post differences as reflecting a shift from intuition-driven error to analytically driven (but incorrect) probabilistic reasoning. However, given the change in priming, the results are equally compatible with:

- A shift in perceived task demands
- Changes in normative expectations
- Greater reliance on abstract symmetry or equiprobability heuristics when explicitly prompted to “think probabilistically” (interpreting the host’s move similarly to a move by nature from the

candidate's perspective, as exercises in the course might have incorporated decision trees but not game trees)

As a result, causal claims about the effect of probability instruction on assessment (Objective 1) and consistency between assessment and decision-making (Objective 3) are not supported by the current design.

Interaction between under-specification and priming

The two design issues pointed out above potentially even interact, which further complicates interpretation. Because the host's strategy is left unspecified, participants must implicitly construct a model of the host's behavior. The differing instructions ("trust your intuition" vs. "apply what you know about probability") likely influenced *which model participants adopted*. For example, an intuition-based frame may encourage pragmatic or narrative assumptions about the host (who may try to trick the candidate into choosing a door with a goat), whereas a probability-based frame may encourage assumptions of symmetry or randomization. This possible interaction makes it even more important to avoid strong claims about learning effects.

Behavioral explanations and their applicability

(Section 4: Discussion)

While the Discussion draws on a wide range of behavioral concepts, some of the explanations invoked appear only weakly supported by the study design. In particular, the endowment effect and the illusion of control typically presuppose experienced ownership or agency. In the present study, participants did not physically choose a door, did not interact with the task, and did not experience any enacted control over outcomes. As such, these mechanisms are less clearly instantiated here than in paradigms involving real or simulated choice. By contrast, explanations based on status quo bias and anticipated regret remain plausible, as they do not require enacted ownership or control. A more selective discussion of behavioral mechanisms would strengthen the theoretical coherence of Section 4.

Clarification needed: content of probability instruction

Given that the paper's central claims hinge on the effect of acquiring "some probability knowledge," it is important to specify what content was actually covered in the course between the two occasions. For

example:

- Were conditional probabilities explicitly taught?
- Was Bayes' theorem discussed?
- Was equiprobability emphasized as a default heuristic?
- Were any problems structurally similar to the MHP addressed?

Without this information, it is difficult to assess whether post-instruction responses reflect misunderstanding, partial understanding, or reasonable application of recently learned concepts.

Conclusion

In summary, this is a carefully conducted and clearly presented study addressing an important topic. However, the under-specification of the Monty Hall problem, the confounding of probability instruction with differential priming, and the potential interaction between these factors substantially limit the strength of the conclusions about learning and correctness. Unfortunately, with these issues unaddressed, I do not see a good way to move forward with the paper unless the author is ready to re-do the experiment in a clean way. This could mean focusing on the pre-/post-teaching dimension (in case that is enough of a contribution relative to other interventions, like those in references [8] and [11], for example) or on the mindset priming dimension, or even addressing both dimensions (potentially in a 2x2-factorial design). In any case, I believe the manuscript would benefit from:

- A more cautious treatment of probabilistic “correctness,”
- Explicit acknowledgment of framing and interpretation effects,
- A tighter alignment between behavioral explanations and the actual task structure,
- Clearer specification of the instructional content.

I hope these comments are helpful and constructive despite the rather dim conclusion.

Declarations

Potential competing interests: No potential competing interests to declare.