

Introduction

In decision problems with multiple cues of different validities, participants must determine to what extent they consider the available cues.

Decision making strategies involved in this study (from systematic to heuristic):

- **Weighted Additive rule (WADD):** compute the sum of the cues multiplied by their cue validities
- **Equal Weight rule (EQW):** compute the sum of the cues with equal weights
- **Take-the-Best (TTB):** evaluate cues in order of validity; decision based on first cue that differentiates the options
- **Take-the-First (TTF):** evaluate cues in a pre-determined (spatial) order; decision based on first cue that differentiates the options
- **Guess:** choose randomly

Previous studies typically present cues in order of decreasing validity. We manipulated the order of cues in a “stock market” game to assess:

- How structure of information affects decision strategy utilisation, in particular the use of WADD vs more heuristic strategies.
- Whether TTF is distinct from TTB.

Procedure and Method

- Paradigm: “stock market” game, based on the given information choose the stock more profitable (Heck et.al, 2017).
- 88 participants (44 per group)

		First half 96 trials				Second half 96 trials				
		validity	share A	share B	validity	share A	share B	validity	share A	share B
Group 1	Fixed condition	Turnover growth? 0.9	+	-	Dividend increase? 0.6	+	-	Turnover growth? 0.9	+	-
		Profit increase? 0.8	+	-	Profit increase? 0.8	+	-	Profit increase? 0.8	+	-
		Increase No. employees? 0.7	+	-	Increase No. employees? 0.7	+	-	Increase No. employees? 0.7	+	-
		Dividend increase? 0.6	-	+	Turnover growth? 0.9	-	+	Dividend increase? 0.6	-	+
Group 2	Random condition	Dividend increase? 0.6	+	-	Turnover growth? 0.9	+	-	Dividend increase? 0.6	-	+
		Profit increase? 0.8	+	-	Profit increase? 0.8	+	-	Profit increase? 0.8	+	-
		Increase No. employees? 0.7	+	-	Increase No. employees? 0.7	+	-	Increase No. employees? 0.7	+	-
		Turnover growth? 0.9	-	+	Dividend increase? 0.6	-	+	Turnover growth? 0.9	-	+

- Statistical method:
 - a) Hierarchical Bayesian Latent Mixture Models to estimate posterior probability of five strategies at the population level (Lee, 2016).
 - b) Savage-Dickey density ratio test to examine the difference in posterior probability of using WADD (Wagenmakers et.al, 2010).

Results

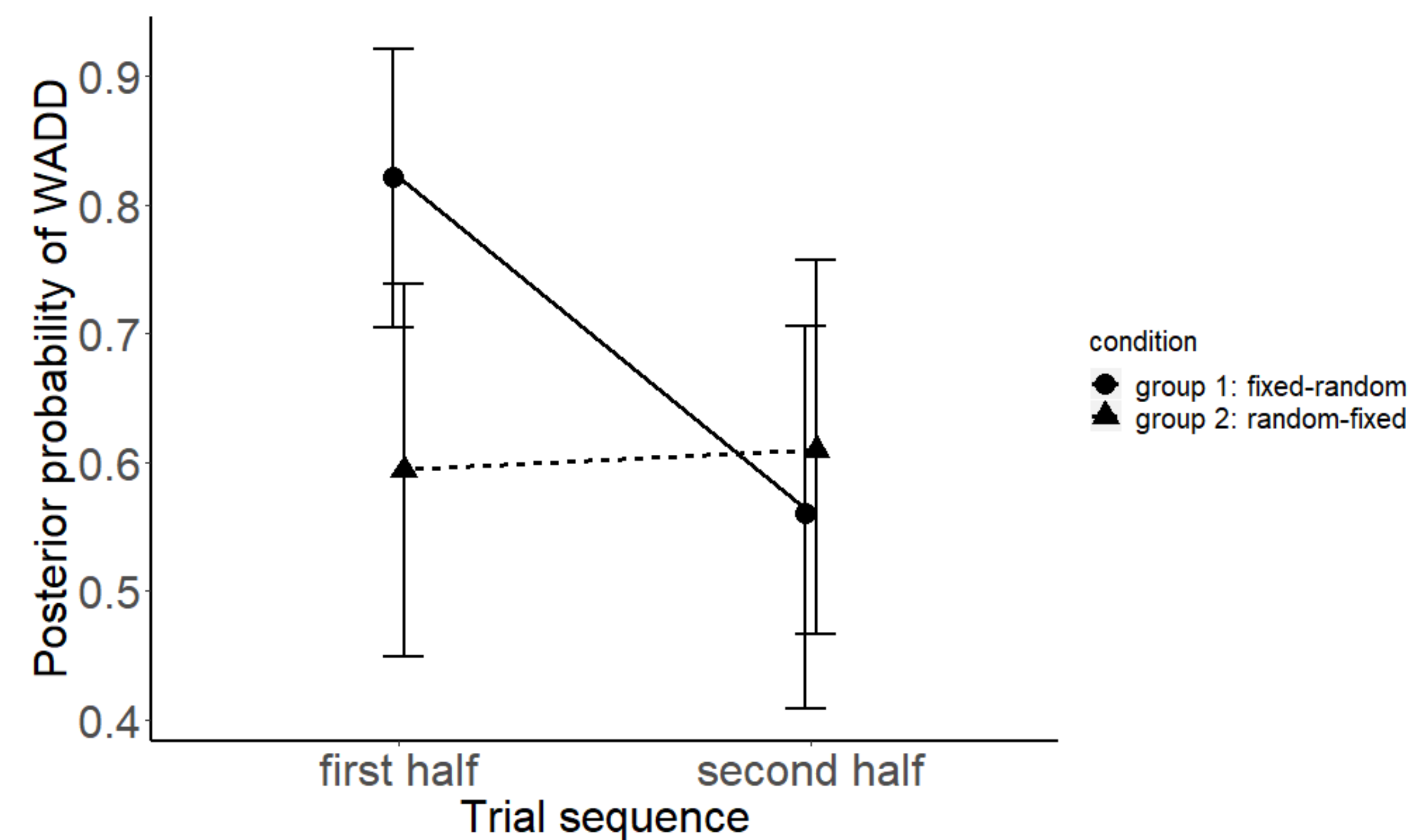


Figure 1. The mean posterior probability of WADD in two groups. Compare first half of trials in two groups: a fixed cue order prompted more systematic strategy-WADD more so than a random cue order, $BF_{10}=5.88$, 95% highest density interval (HDI): -0.425 ~ -0.027. Participants who received a fixed cue order before a random cue order adjusted their cue utilisation strategy based on the order of cues and adopted less systematic strategies, $BF_{10}=4.52$, HDI: -0.410 ~ -0.005. However, those who received a random cue order first did not, $BF=0.51$, HDI: -0.164 ~ 0.243. The results suggest that the utilisation of multiple cues depends not only on the structure of these cues, but also on how this structure changes over time.

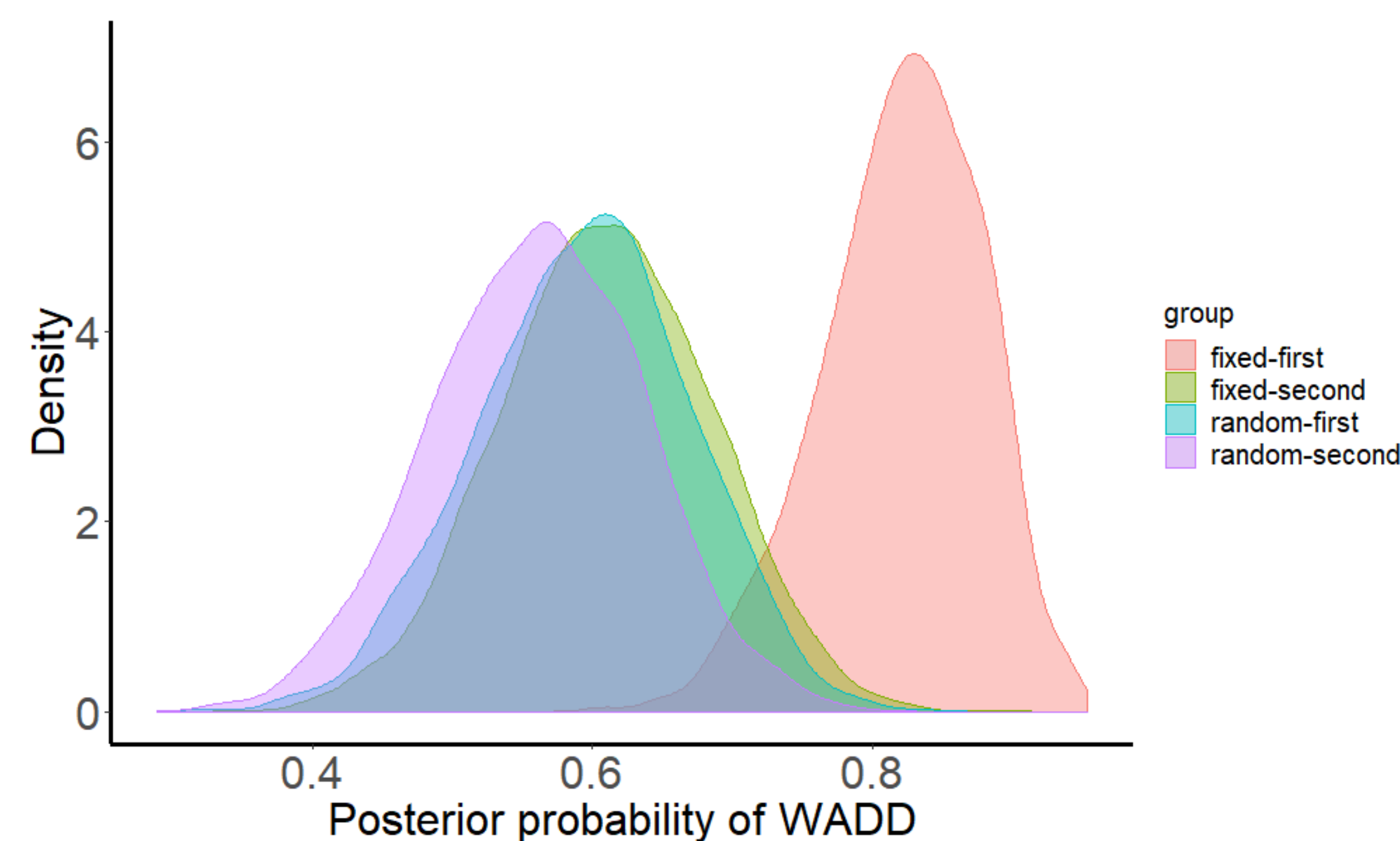


Figure 2. The posterior probability distribution of WADD in two groups.

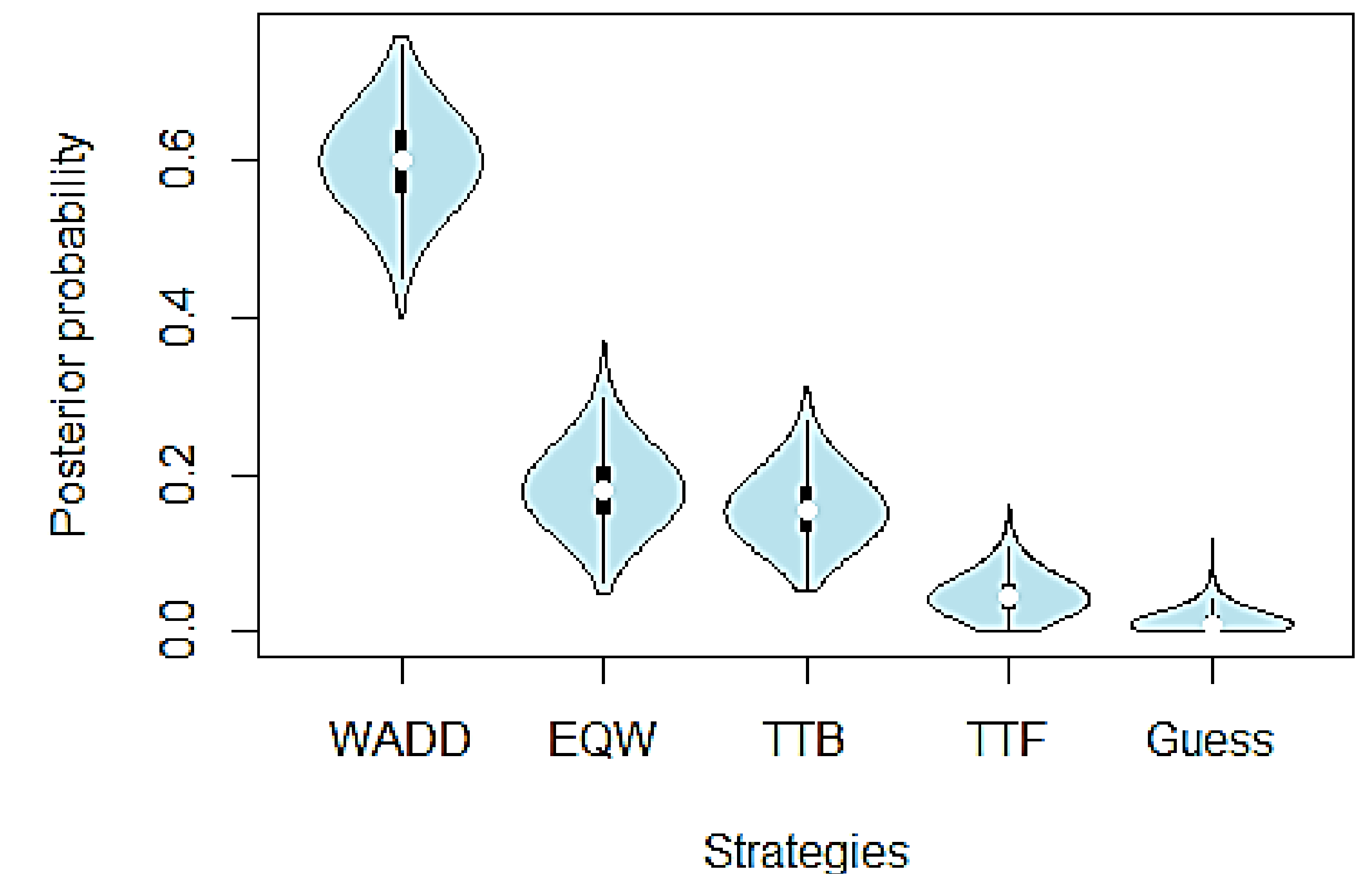


Figure 3. Posterior probability for five strategies in random condition. The mean posterior probability of using TTF is 0.04. Thus, there was little evidence for the Take-the-First strategy.

Discussion

The way information is structured affects the strategies used for decision making. The random order condition increased the difficulty of using WADD compared with the fixed condition and people were less likely to use the most systematic strategy. However, this effect depended on prior experience. Use of WADD remained less likely if participants experienced the cues in a random order first. In this case, they stuck with their less systematic strategy (i.e. EQW and TTB). Participants were unlikely to use TTF.

References

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- Lee, M. D. (2016). Bayesian outcome-based strategy classification. *Behavior Research Methods*, 48(1), 29-41.
- Wagenmakers, E. J., Lodewyckx, T., Kuriyal, H., & Grasman, R. (2010). Bayesian hypothesis testing for psychologists: A tutorial on the Savage-Dickey method. *Cognitive psychology*, 60(3), 158-189.