

# Any way the brain blows? What is the nature of decision noise in random exploration?

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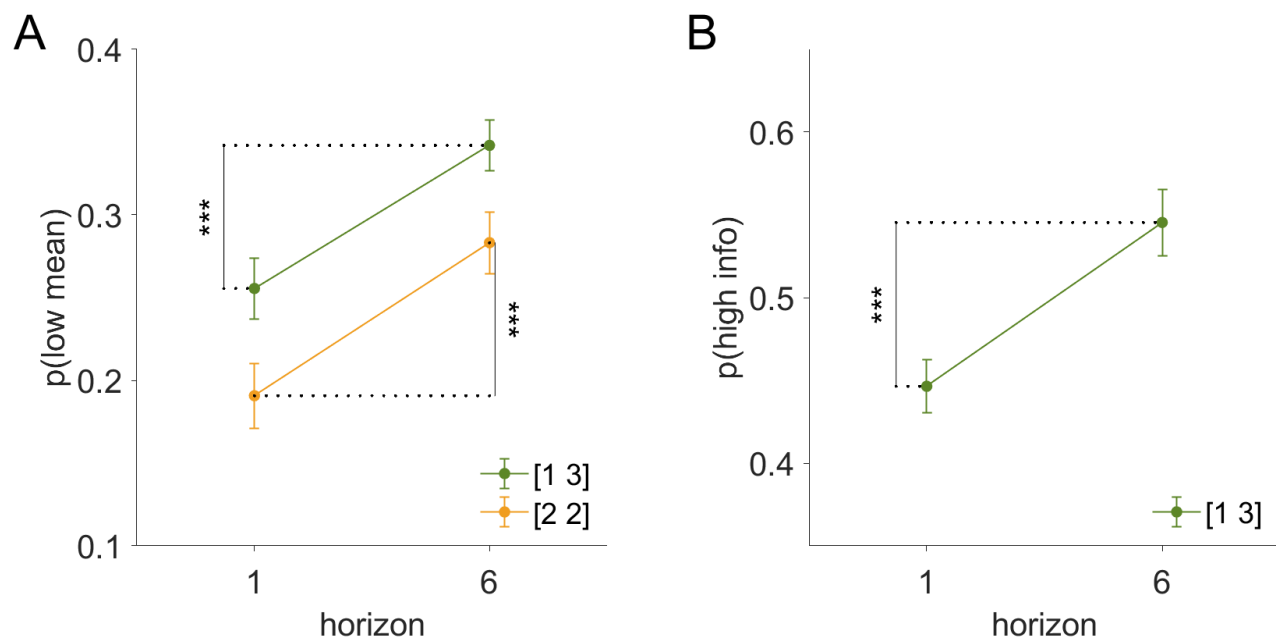


Figure S1: Replication of previous findings with data from all participants (i.e. no exclusions). Both  $p(\text{low mean})$  (A) and  $p(\text{high info})$  (B) increase with horizon suggesting that people use both random and directed exploration in this task.

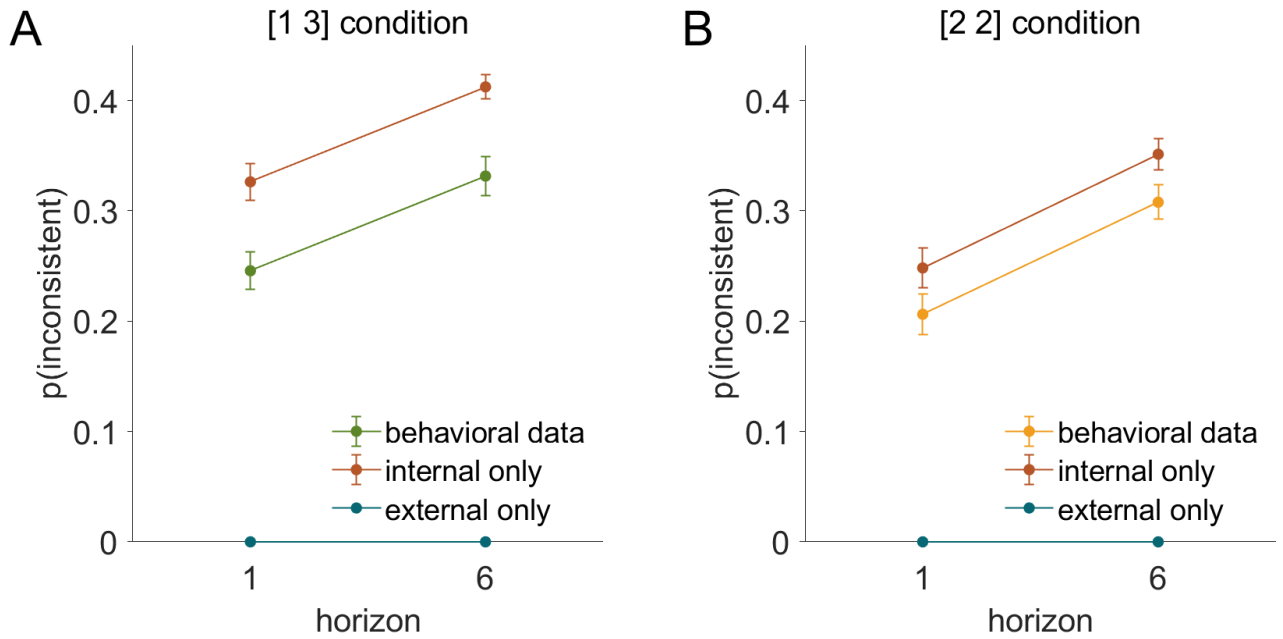


Figure S2: Model-free analysis with data from all participants (i.e. no exclusions) suggests that both external and internal noise contribute to the choice variability in random exploration. For both the [1 3] (A) and [2 2] (B) condition, people show greater choice inconsistency in horizon 6 than horizon 1. However, the extent to which their choices are inconsistent lies between what is predicted by purely external and internal noise, suggesting that both noise sources influence the decision.

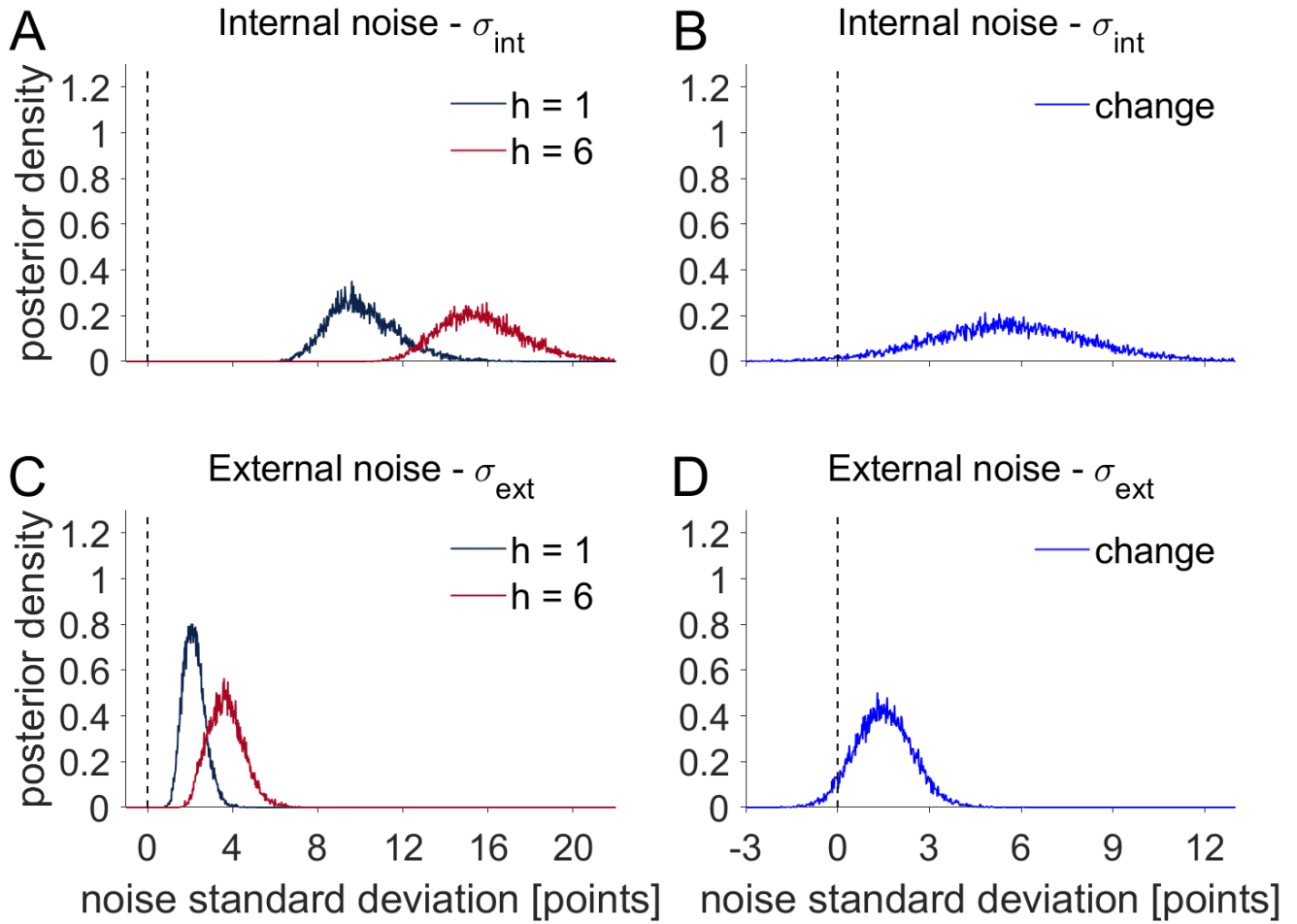


Figure S3: Model based analysis with data from all participants (i.e. no exclusions) showing the posterior distributions over the group-level mean of the standard deviations of internal and external noise. Both internal (A, B) and external (C,D) noises are nonzero (A, C) and change with horizon (B, D). However, internal noise has both a greater magnitude overall (A, C) and a greater change with horizon (B, D) than external noise.