Supplementary Figures: The nature of decision noise in random exploration

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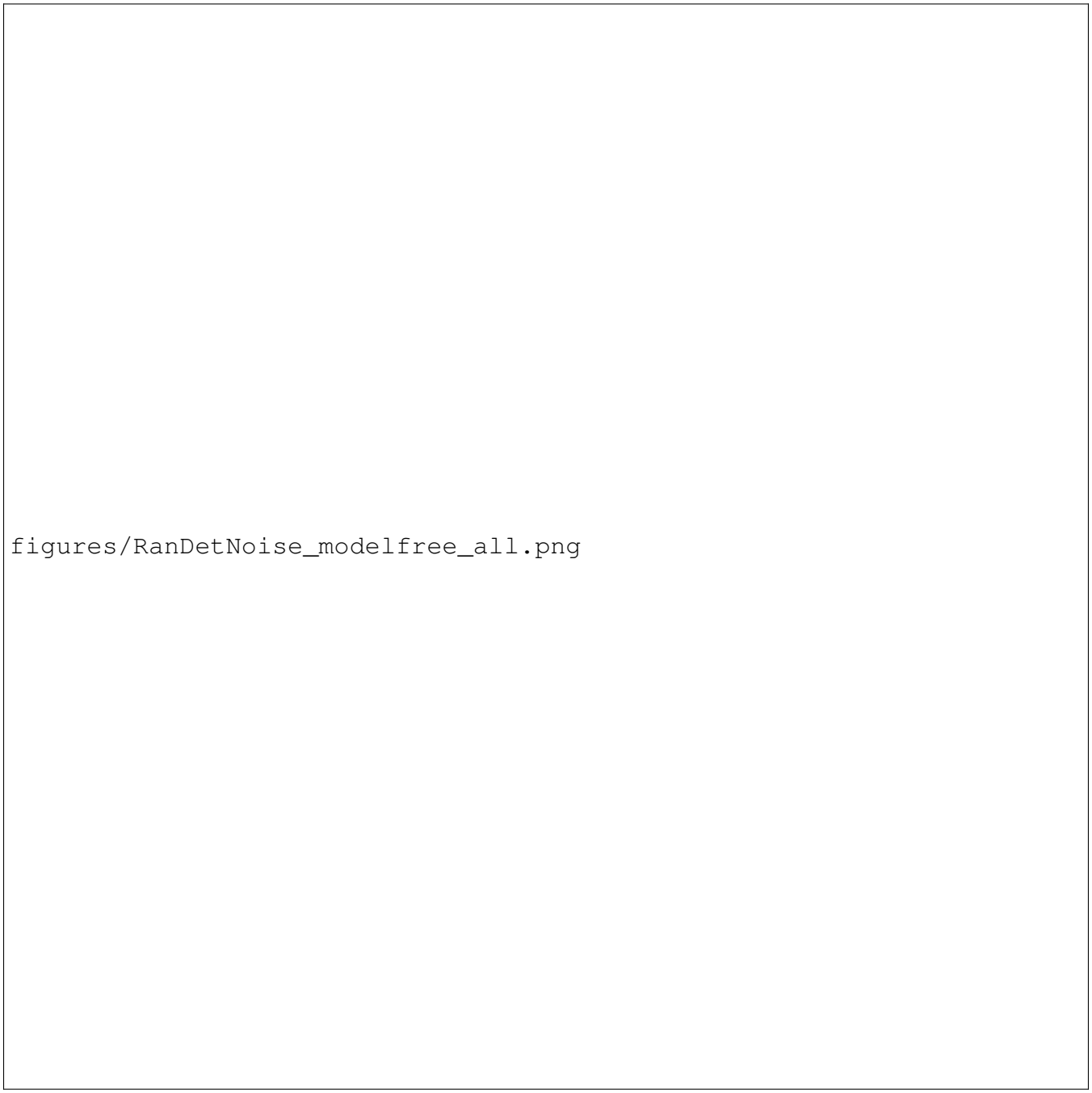

Figure S1: Replication of previous findings with data from all participants (i.e. no exclusions). Both $p(\text{low mean})$ (A) and $p(\text{high info})$ (B) increase with horizon suggesting that people use both random and directed exploration in this task.

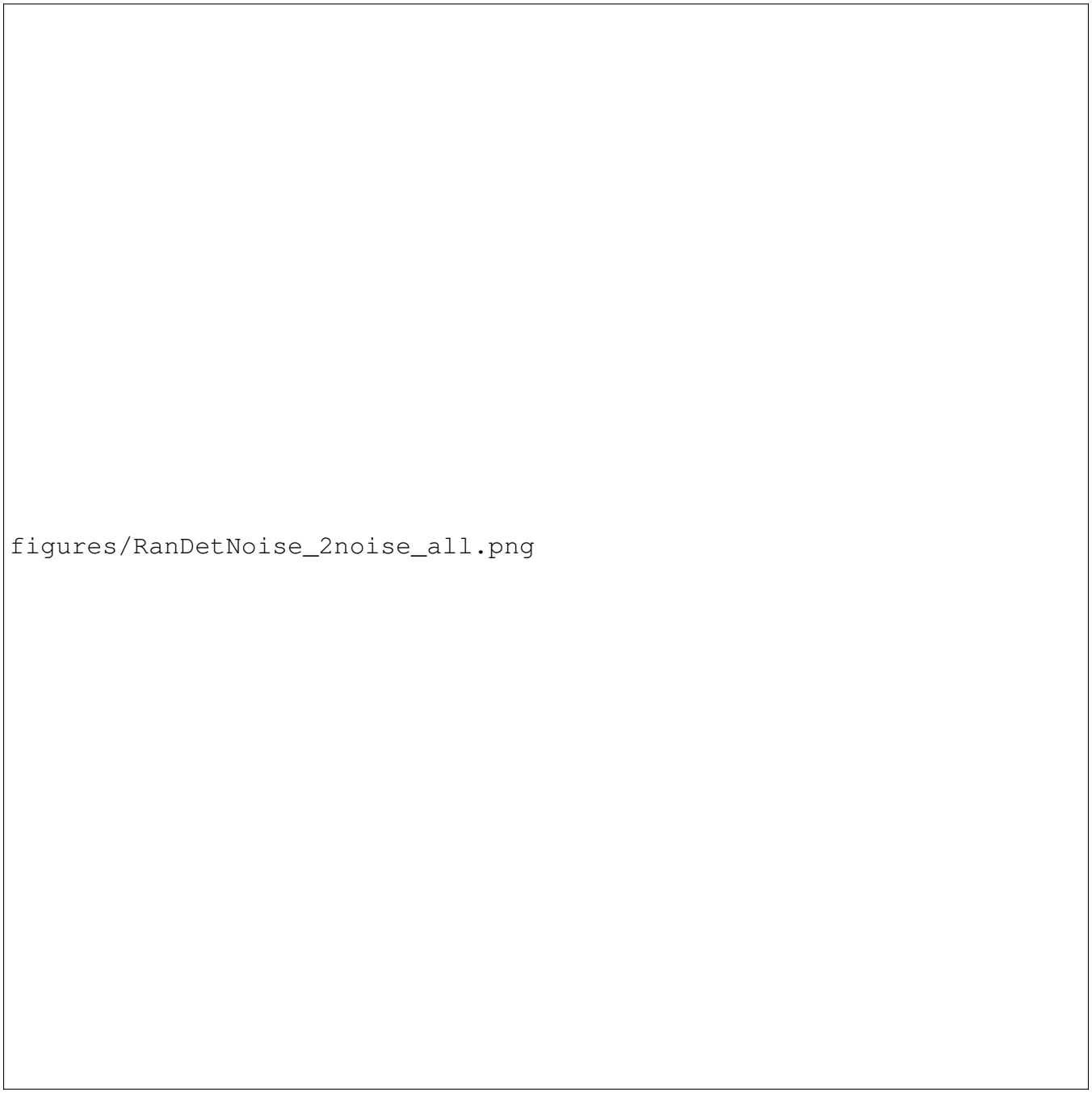

Figure S2: Model-free analysis with data from all participants (i.e. no exclusions) suggests that both deterministic and random noise contribute to the choice variability in random exploration. For both the [1 3] (A) and [2 2] (B) condition, people show greater choice inconsistency in horizon 6 than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

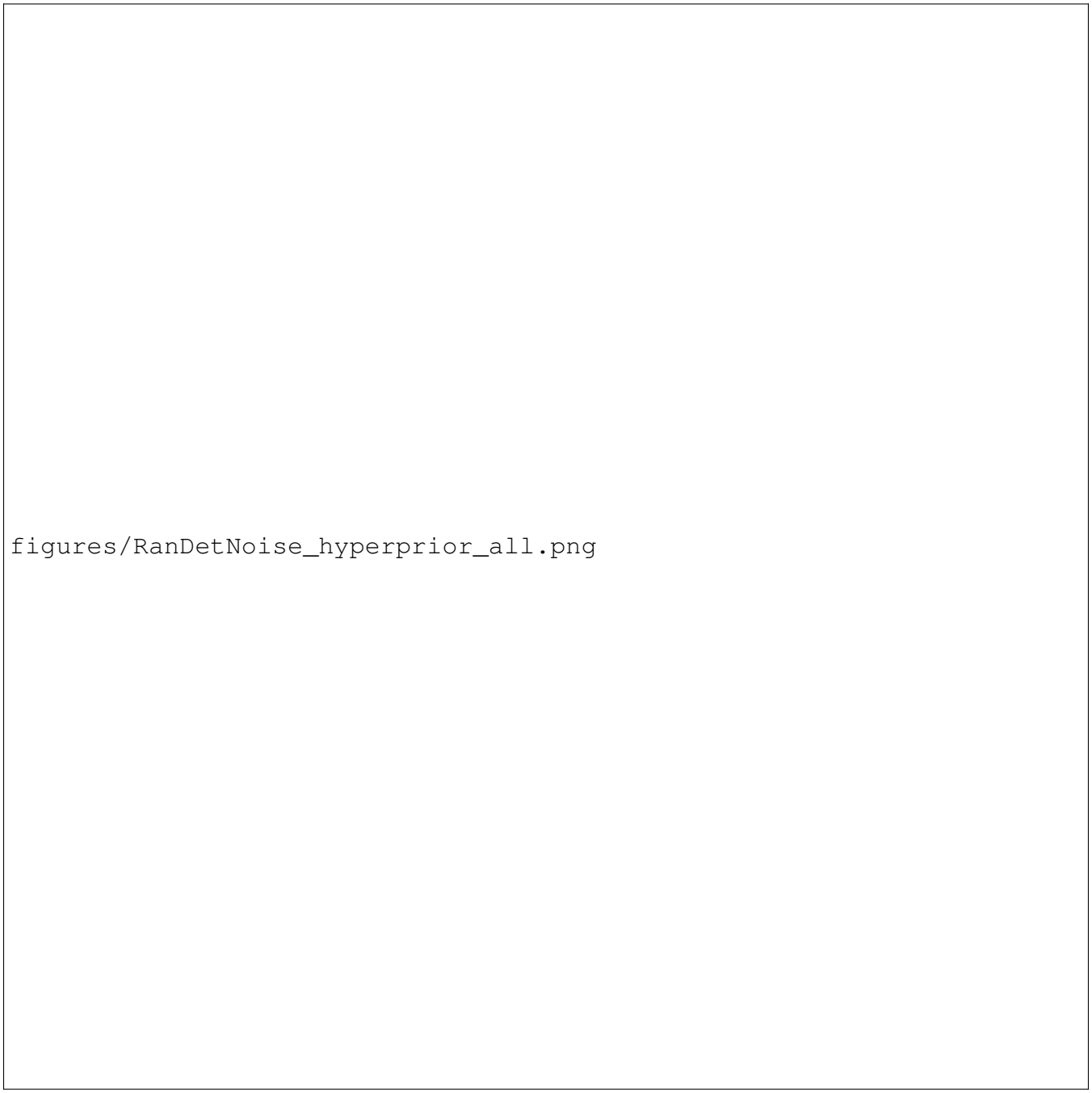

Figure S3: Model based analysis with data from all participants (i.e. no exclusions) showing the posterior distributions over the group-level mean of the standard deviations of random and deterministic noise. Both random (A, B) and deterministic (C,D) noises are nonzero (A, C) and change with horizon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

Model	Deterministic noise	Random noise
A	Horizon dependent	Horizon dependent
B	Fixed	Horizon dependent
C	Horizon dependent	Fixed
D	Fixed	Fixed
E	Horizon dependent	None
F	None	Horizon dependent

Table S1: Model description for figure S4.

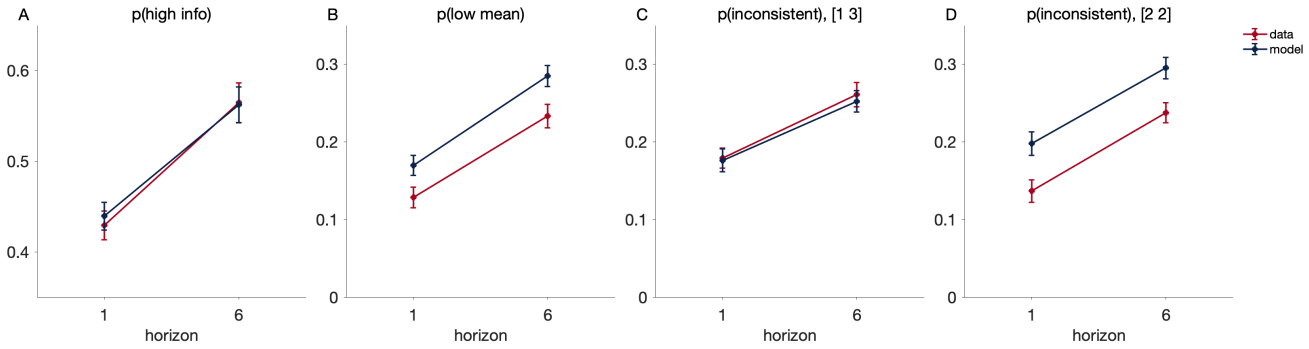

Figure S4: Model comparison: model A - both deterministic and random noise are horizon dependent, model B - only random noise is horizon dependent, model C - only deterministic noise is horizon dependent, model D - neither random nor deterministic noise is horizon dependent, model E - only deterministic noise is assumed to be present, model F - only random noise is assumed to be present.