Biases in Visual Memory Reflect Precision not Prototypes

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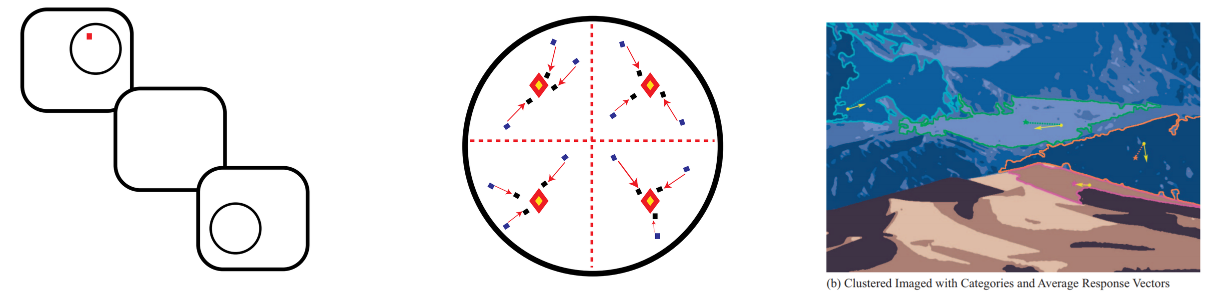
BACKGROUND

Spatial memory task | Prototypes (quadrant centers) | Prototypes (centers of mass)

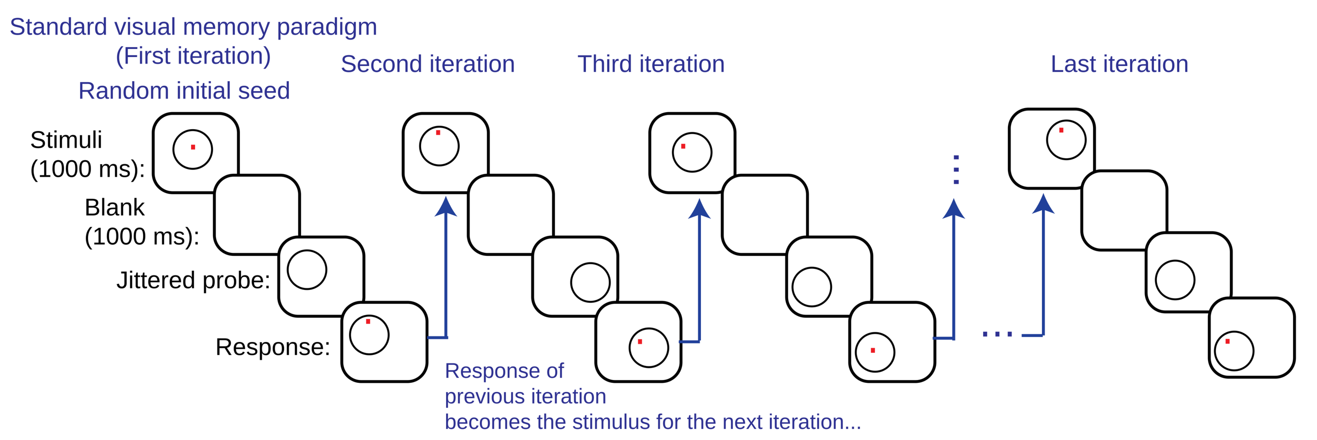


The visual memory system encodes information selectively due to limited resources, resulting in systematic biases

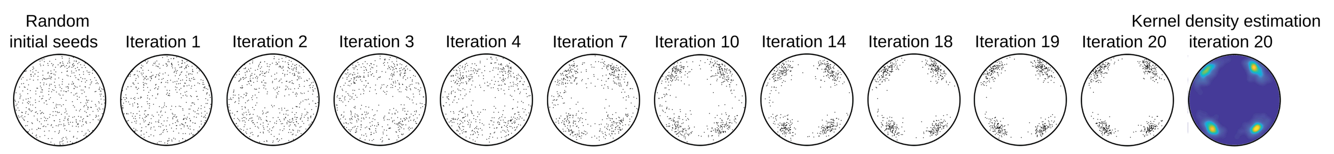
Previous work explains biases in terms of categorical effects, whereby memory is drawn towards category centers

EXPERIMENTAL APPROACH

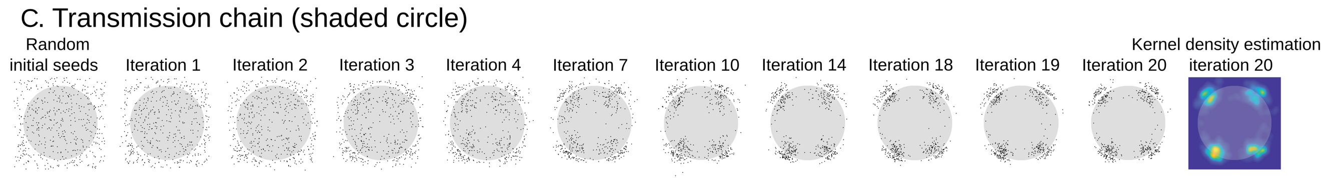
A. The paradigm



B. Transmission chain (bounded circle)



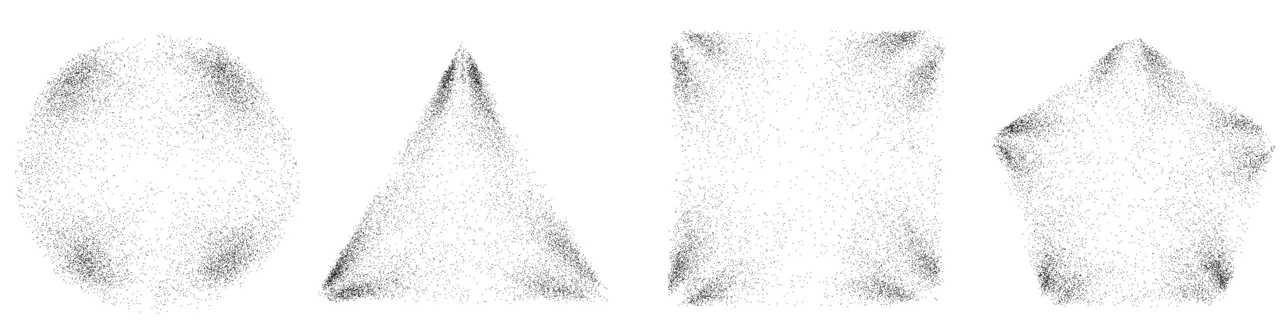
C. Transmission chain (shaded circle)



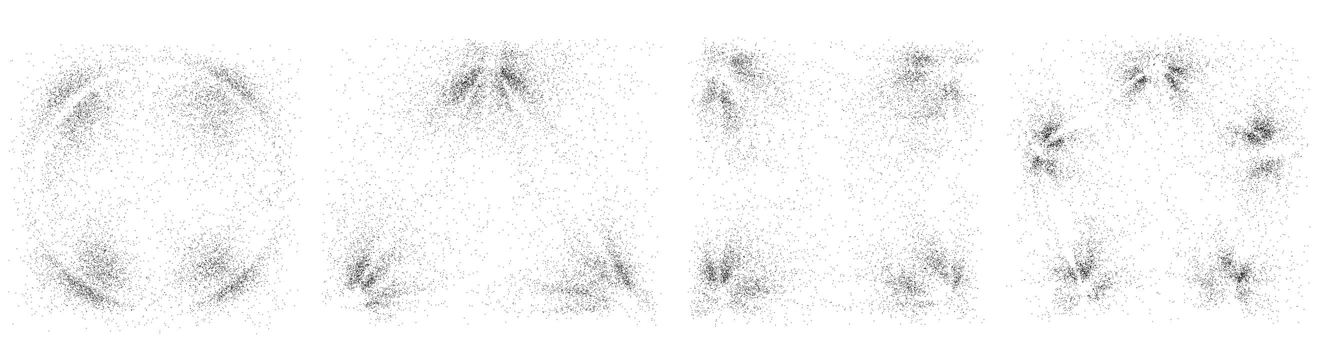
Transmission chains converge to stationary distributions within twenty iterations of the "telephone game" procedure

SPATIAL MEMORY BIASES: SHAPES

A. Transmission chain of bounded shapes: superposition of points across all iterations



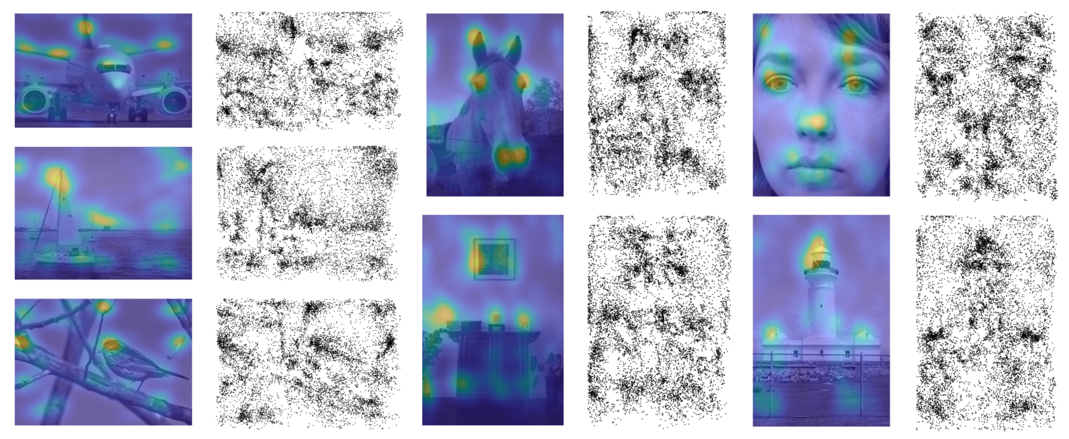
B. Transmission chain of shaded shapes: superposition of points across all iterations



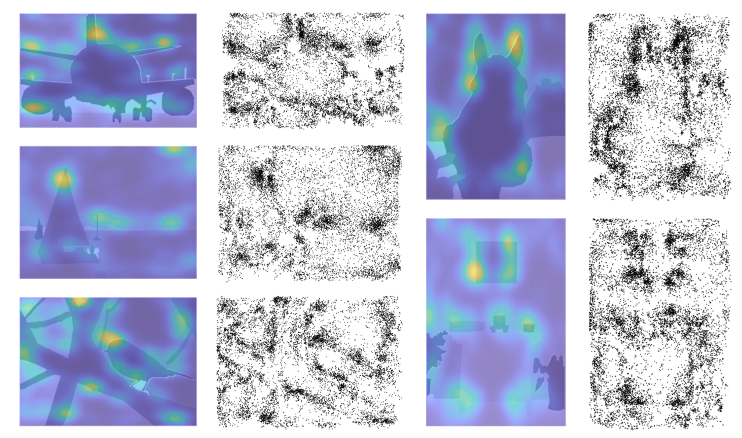
Our approach paints an intricately detailed picture, revealing memory anchors near the edges and vertices

SPATIAL MEMORY BIASES: NATURAL IMAGES

A. Transmission chain results for natural images



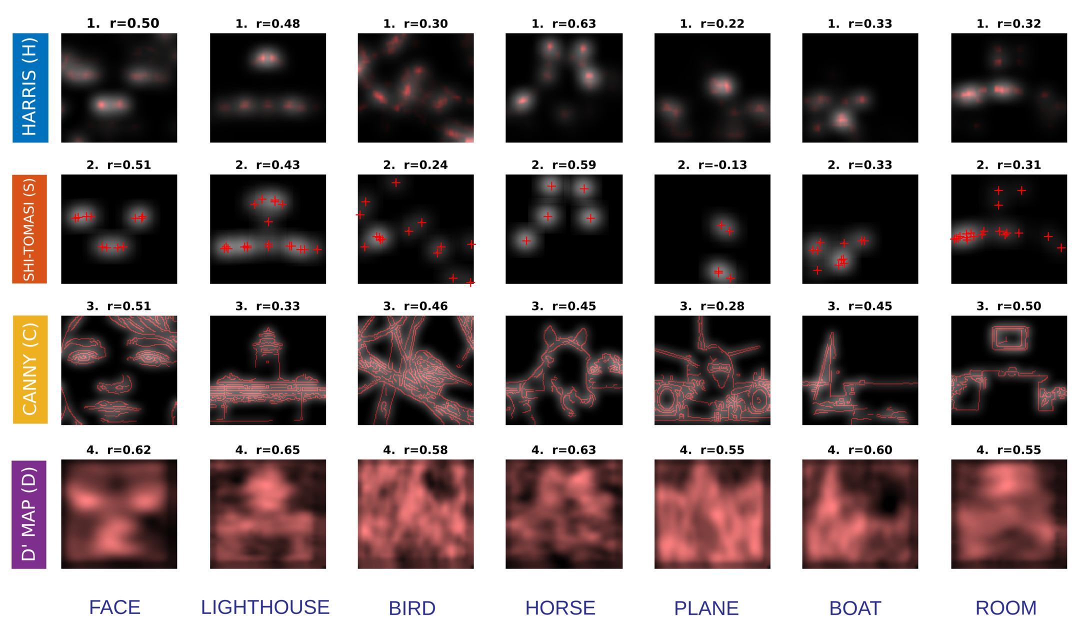
B. Chain results for segmented images



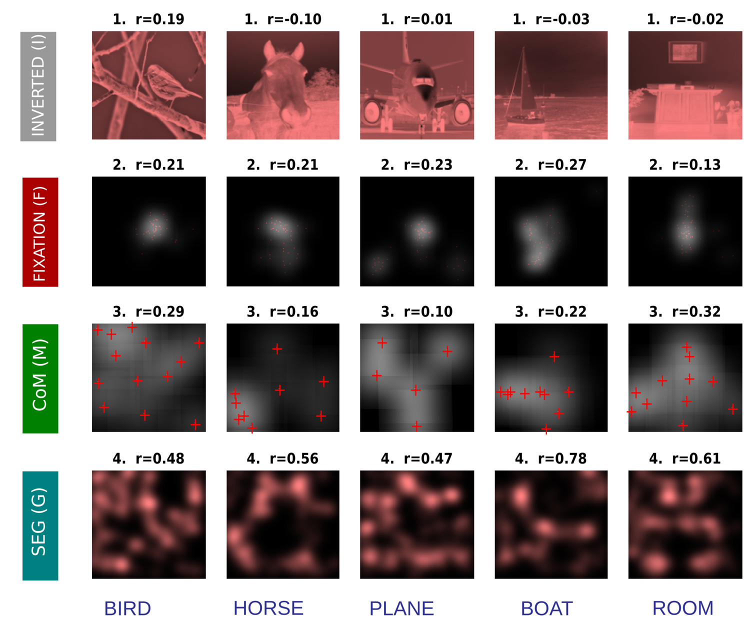
Our approach also reveals intricate and complex patterns of memory biases in the case of natural images

MODEL COMPARISONS

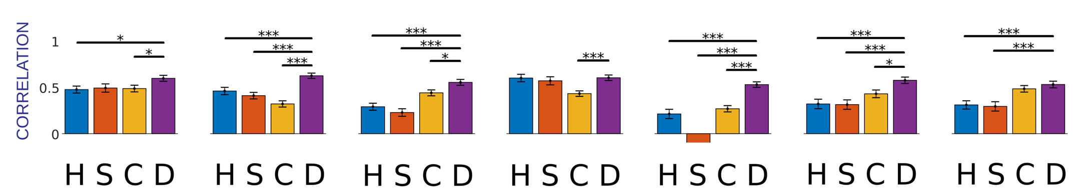
A. Gradient-based edge and corner features, and discrimination d' maps



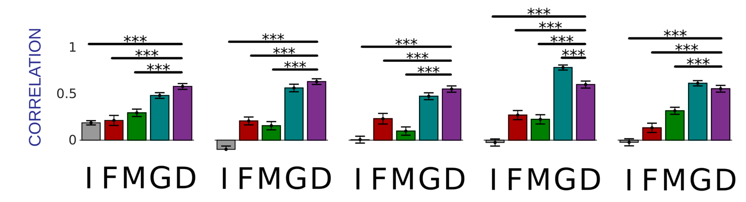
B. Baseline, Fixations, CoMs, segmentation KDEs



C. Comparing feature predictions of memory KDEs for natural images



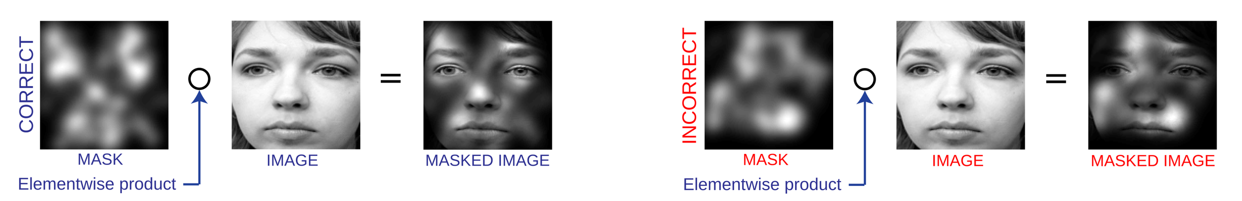
D. Comparing fixations, CoMs, seg. KDEs and d'



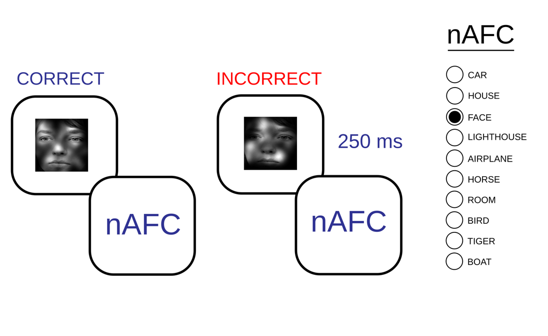
Memory biases cannot be accounted for by low-level gradient-based features in images. They are best predicted by measures of change sensitivity (discrimination maps)

SEMANTIC CORNERS

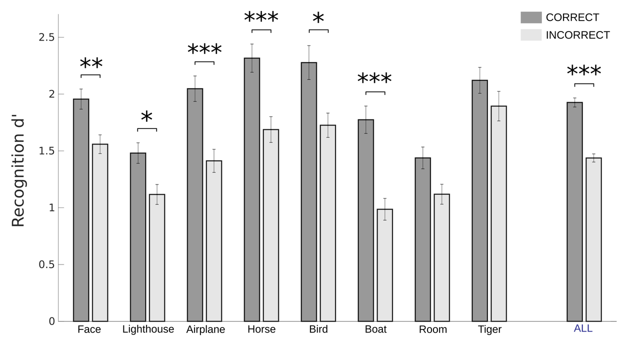
A. Recognition experiment image masking procedure



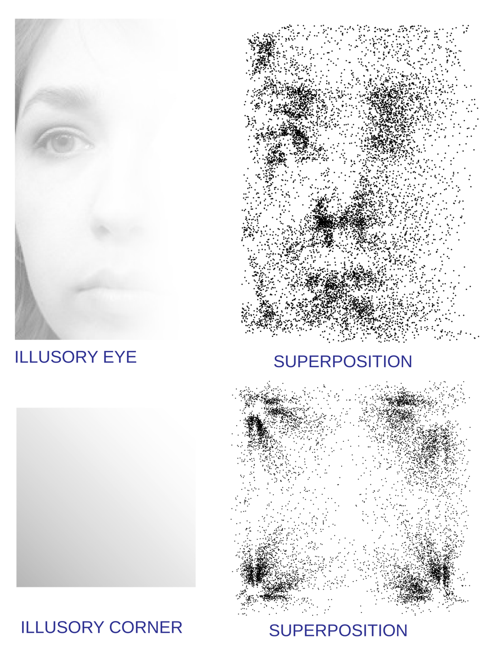
B. Recognition experiment design



C. Recognition experiment results



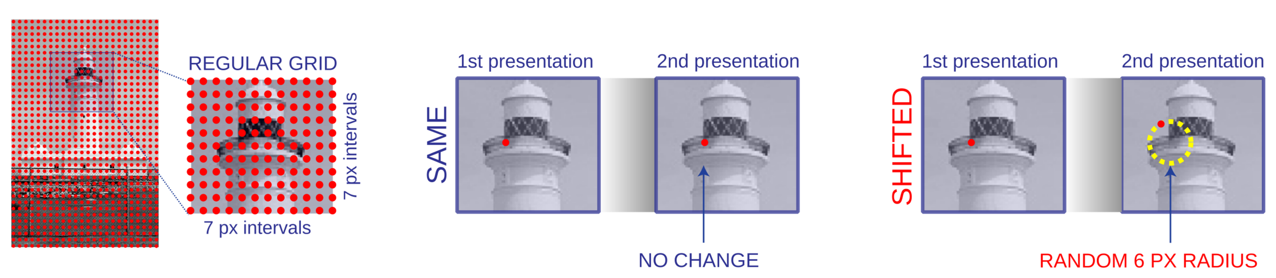
D. Illusory corners



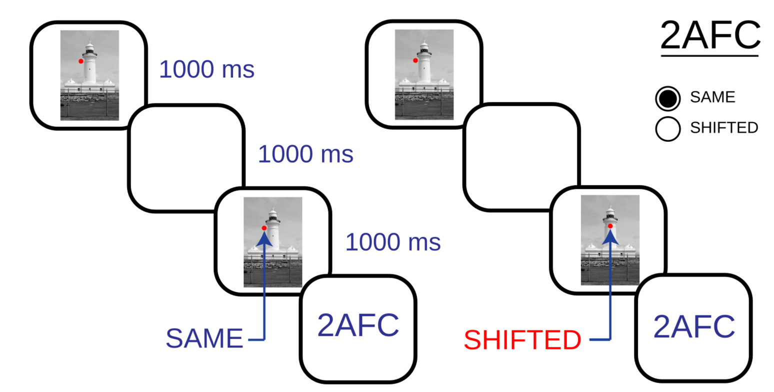
Our results suggest that memory biases are concentrated in regions that are semantically meaningful. They also appear around implied (illusory) semantic corners

PRECISION

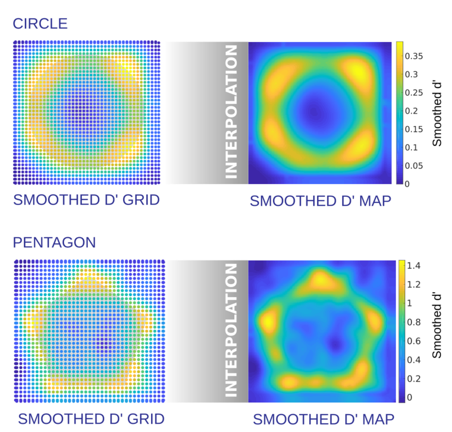
A. Discrimination experiment: grid and experimental conditions



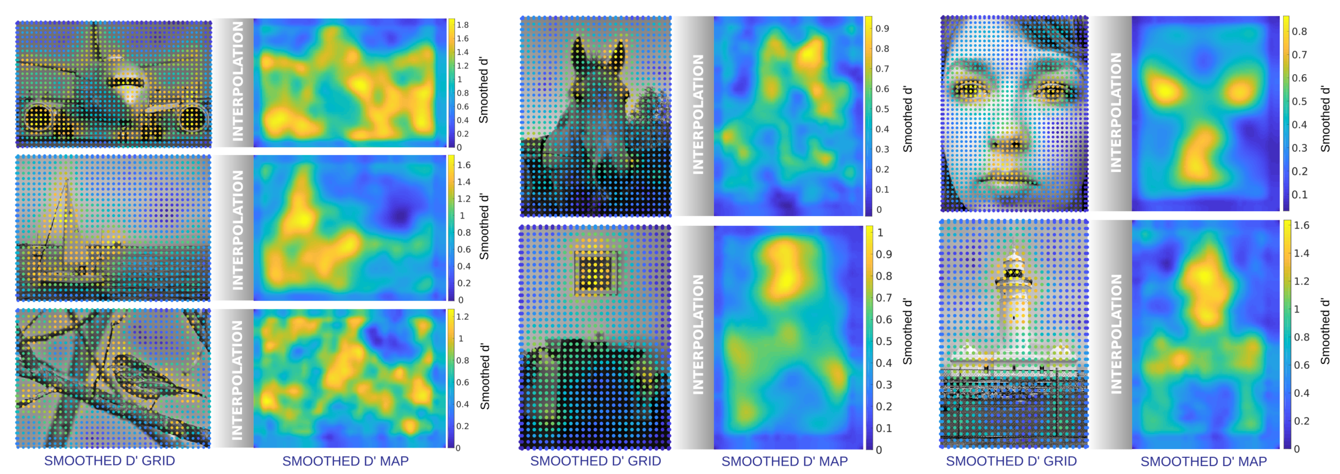
B. Discrimination experiment design



C. Discrimination results: shapes



D. Discrimination results: natural images



E.Transmission chain results for natural images

Memory biases are best predicted by measures of change sensitivity, suggesting that biases are due to variable encoding precision, and not priors or "perceptual attractors" (category prototypes)

ACKNOWLEDGMENTS

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