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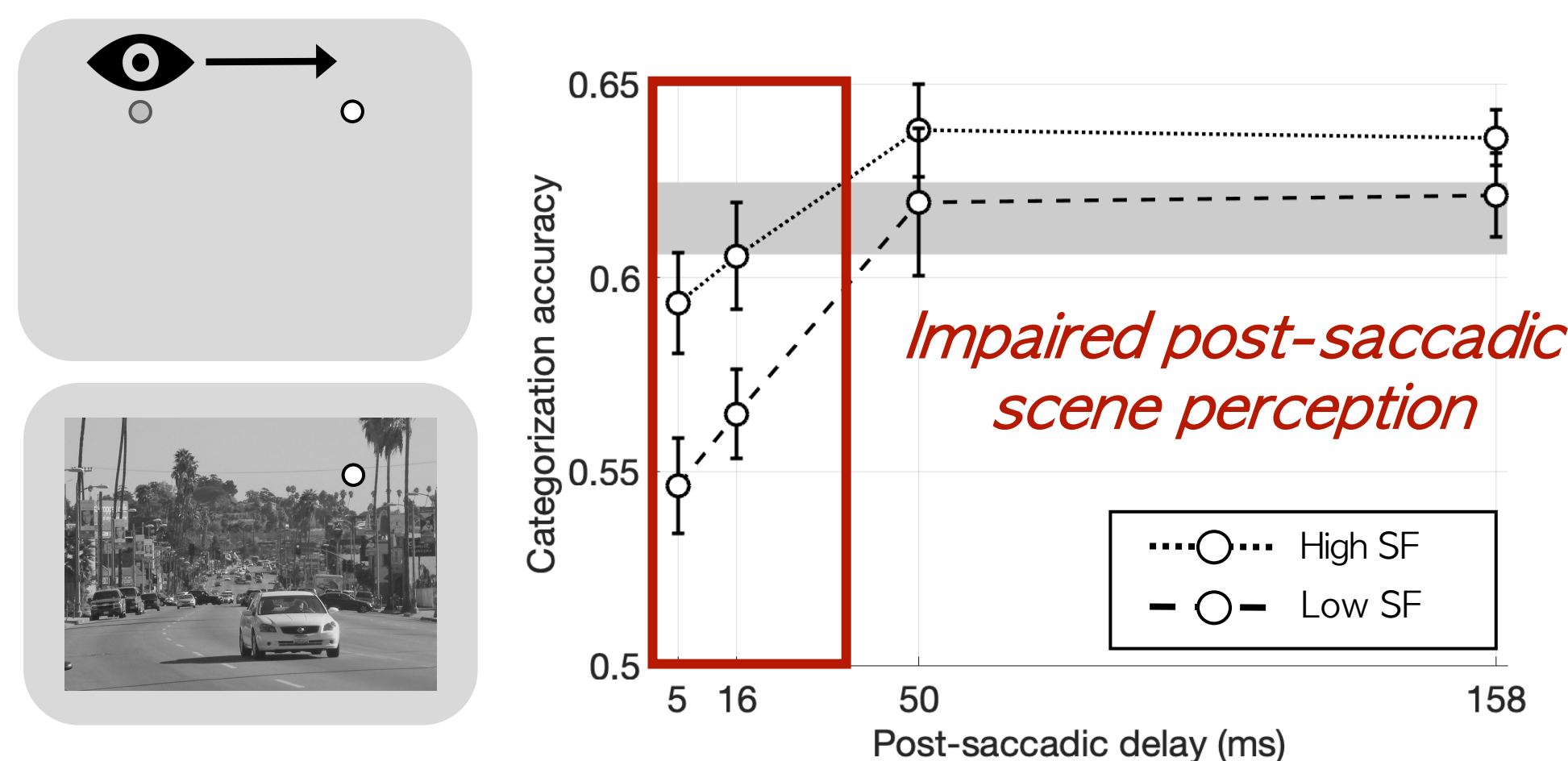
## BACKGROUND

- Ballistic eye movements, known as saccades, drastically change visual inputs projected onto the retina.
- Low-level visual perception (e.g., contrast sensitivity) is impaired around the time of saccadic eye movements<sup>1,2</sup>.

## Research Question (1)

How do saccades influence the perception of complex scene image?

Behavioral experiment summary (N=18)



## Research Question (2)

Do saccades impair the processing of complex scene images without the explicit categorization task?

Do saccades impair low-level or/and high-level visual information of a scene image?

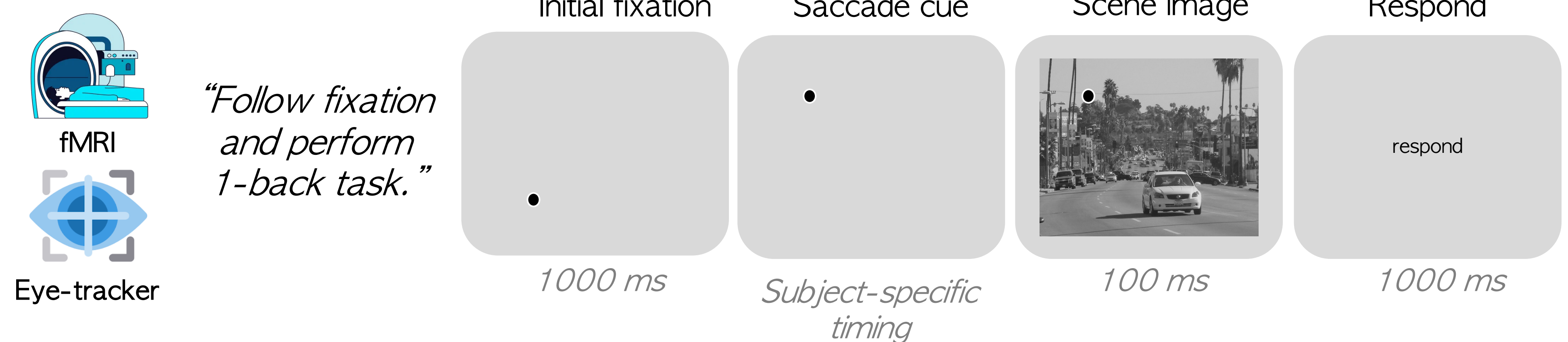
## CONCLUSIONS

- We found behavioral impairment of naturalistic scene perception for the first 50 ms after saccadic eye movements.
- Even without explicit task, high-level scene category information was interrupted in PPA following saccades.
- Impaired low-level spatial frequency was not necessarily responsible for impaired scene category information.
- Saccade disrupts the neural pattern encoding scene content in PPA, even when overall activation levels remain unchanged.

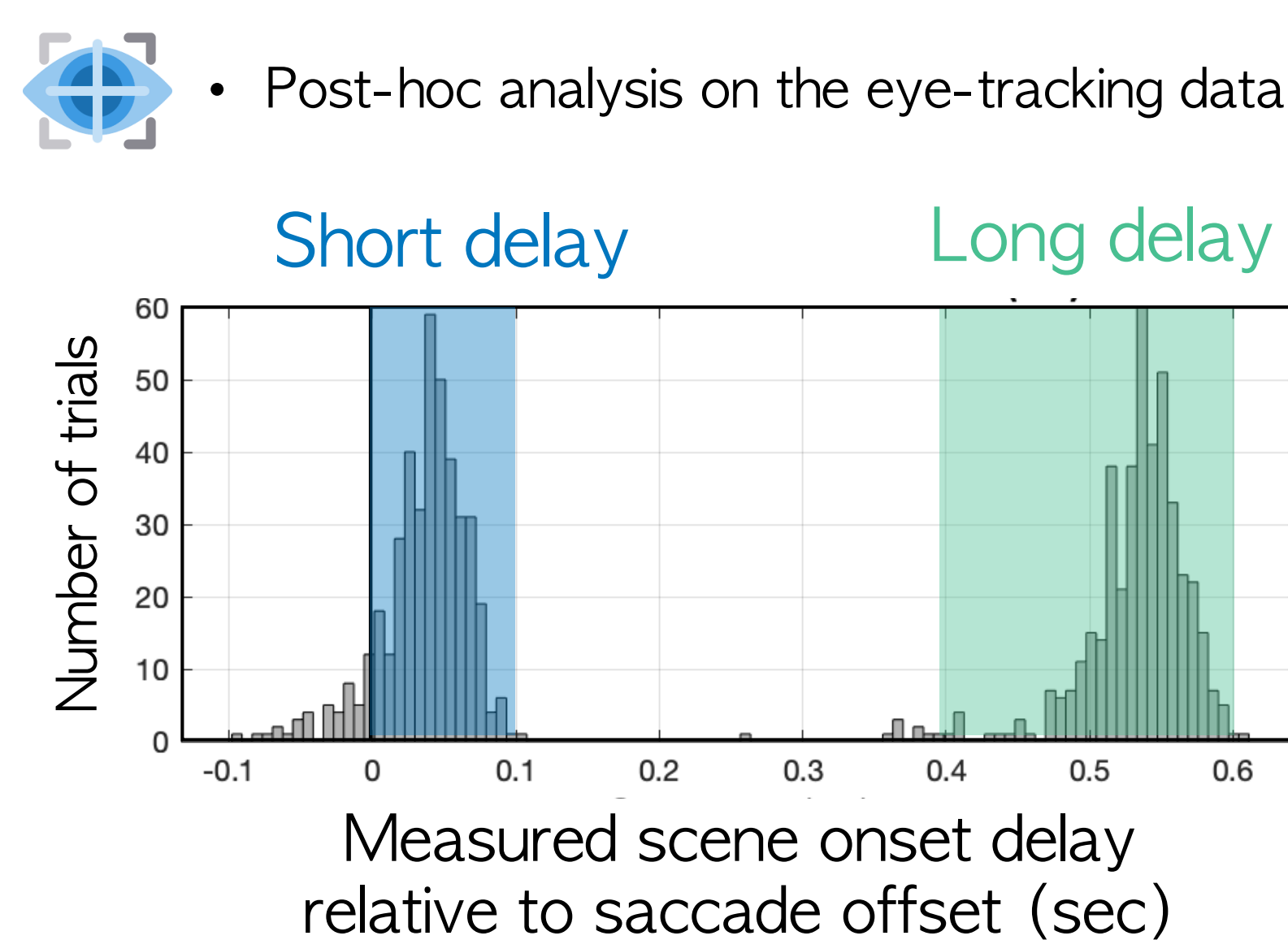
## References

- Burr, D. C., Morrone, M. C., & Ross, J. (1994). Selective suppression of the magnocellular visual pathway during saccadic eye movements. *Nature*, 371(6497), 511-513.
- Ross, J., Morrone, M. C., Goldberg, M. E., & Burr, D. C. (2001). Changes in visual perception at the time of saccades. *Trends in neurosciences*, 24(2), 113-121.
- Golomb, J. D., & Kanwisher, N. (2012). Higher level visual cortex represents retinotopic, not spatiotopic, object location. *Cerebral Cortex*, 22(12), 2794-2810.

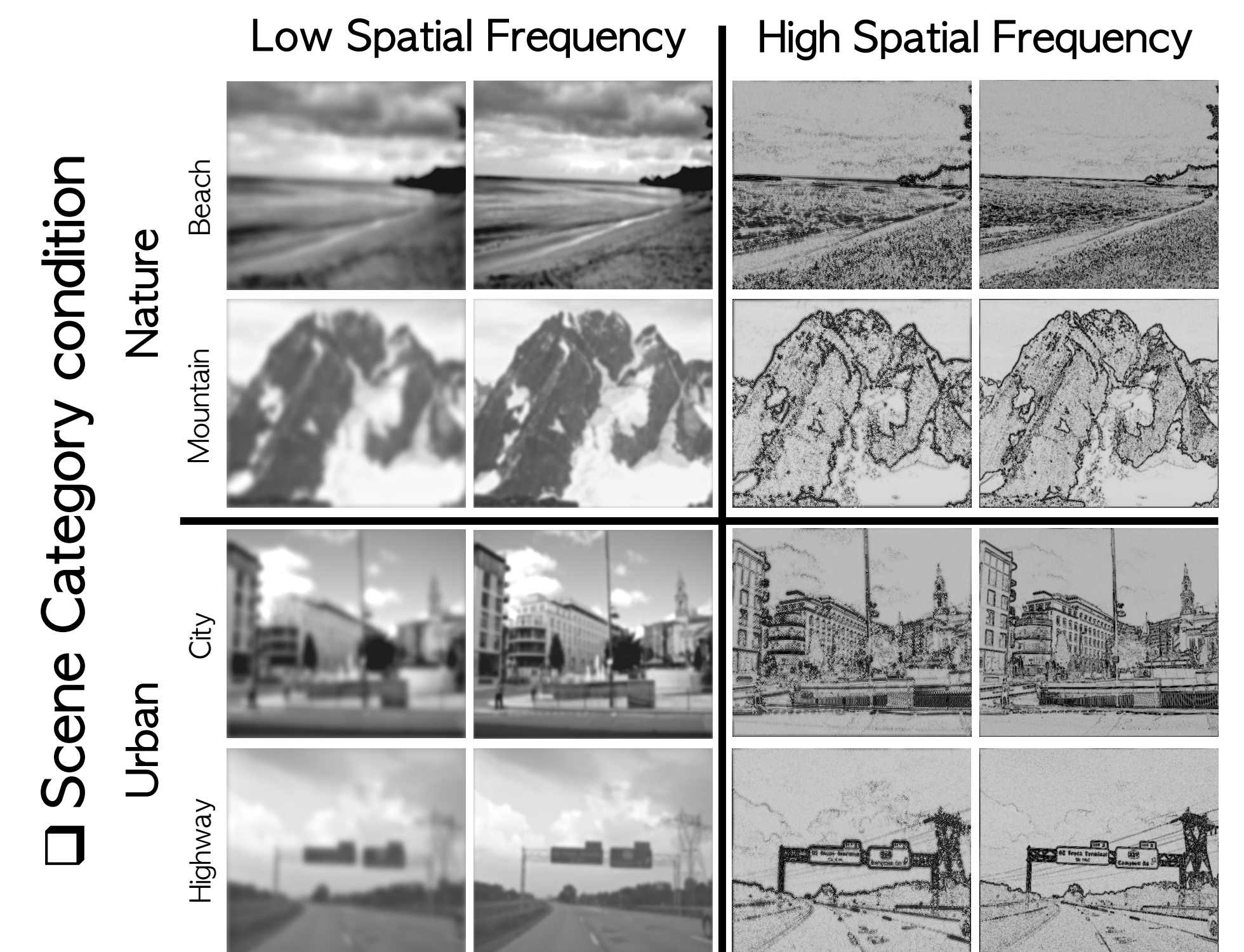
## DESIGN



### Post-saccadic delay condition

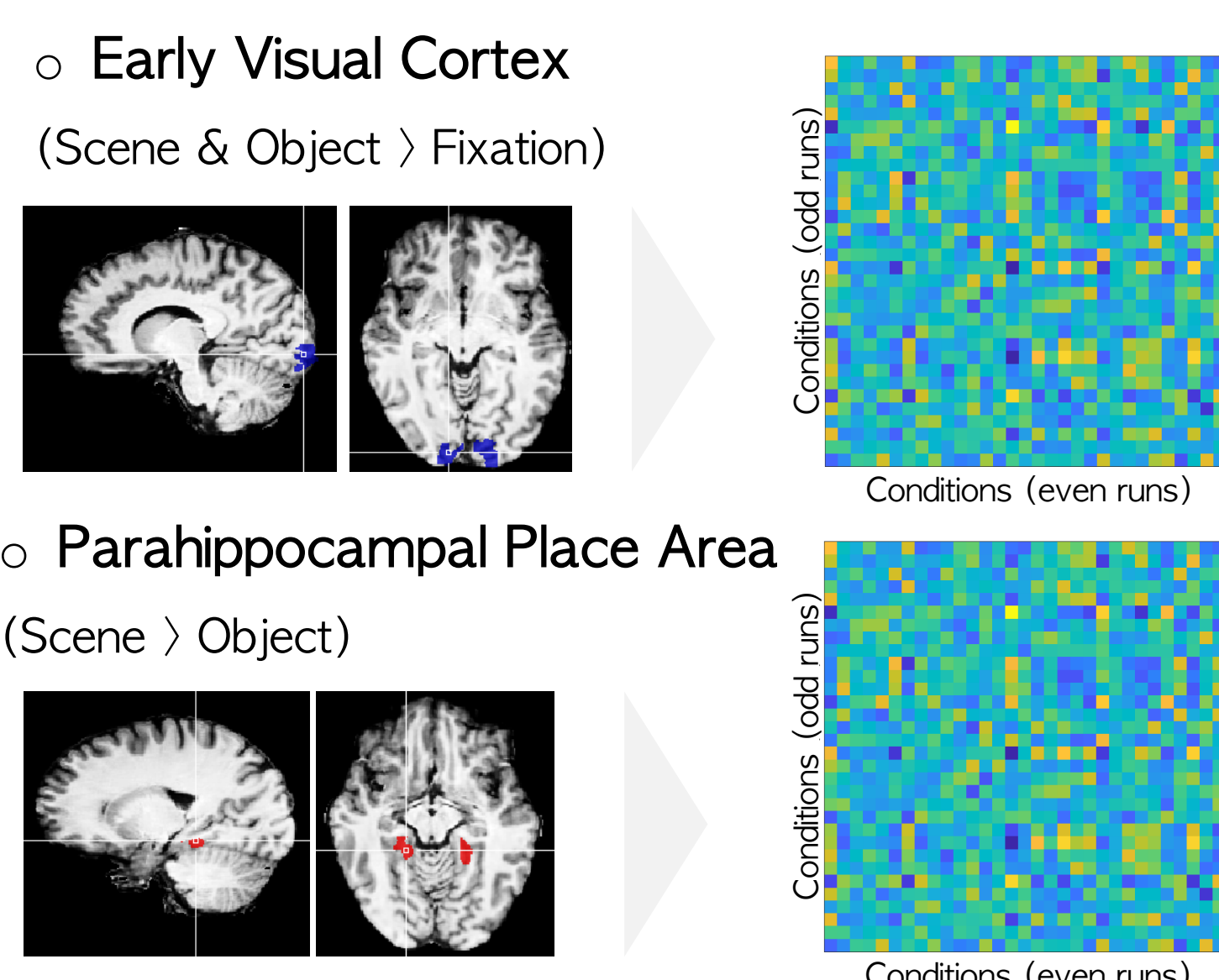


### Spatial Frequency condition



## RSA-based decoding analysis<sup>3</sup>

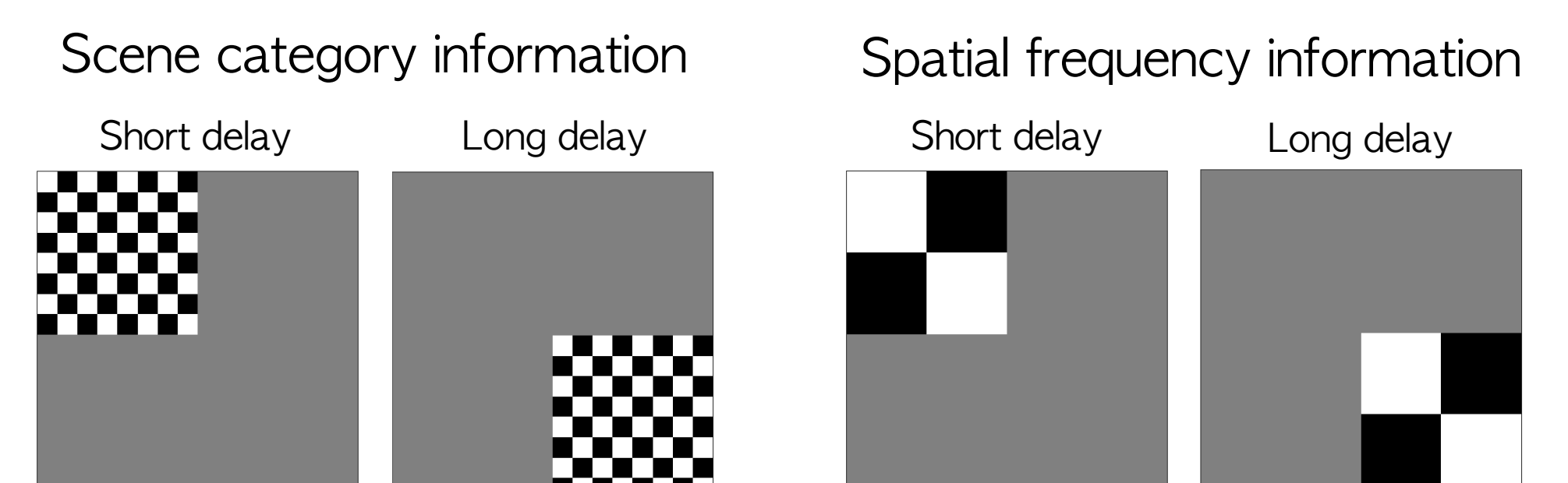
Step 1. Construct *representational similarity matrix* for each region of interest.



Step 2. Calculate *scene category* or *spatial frequency* information for short and long delay conditions from each RSM

Neural representation =  $\blacksquare - \square$

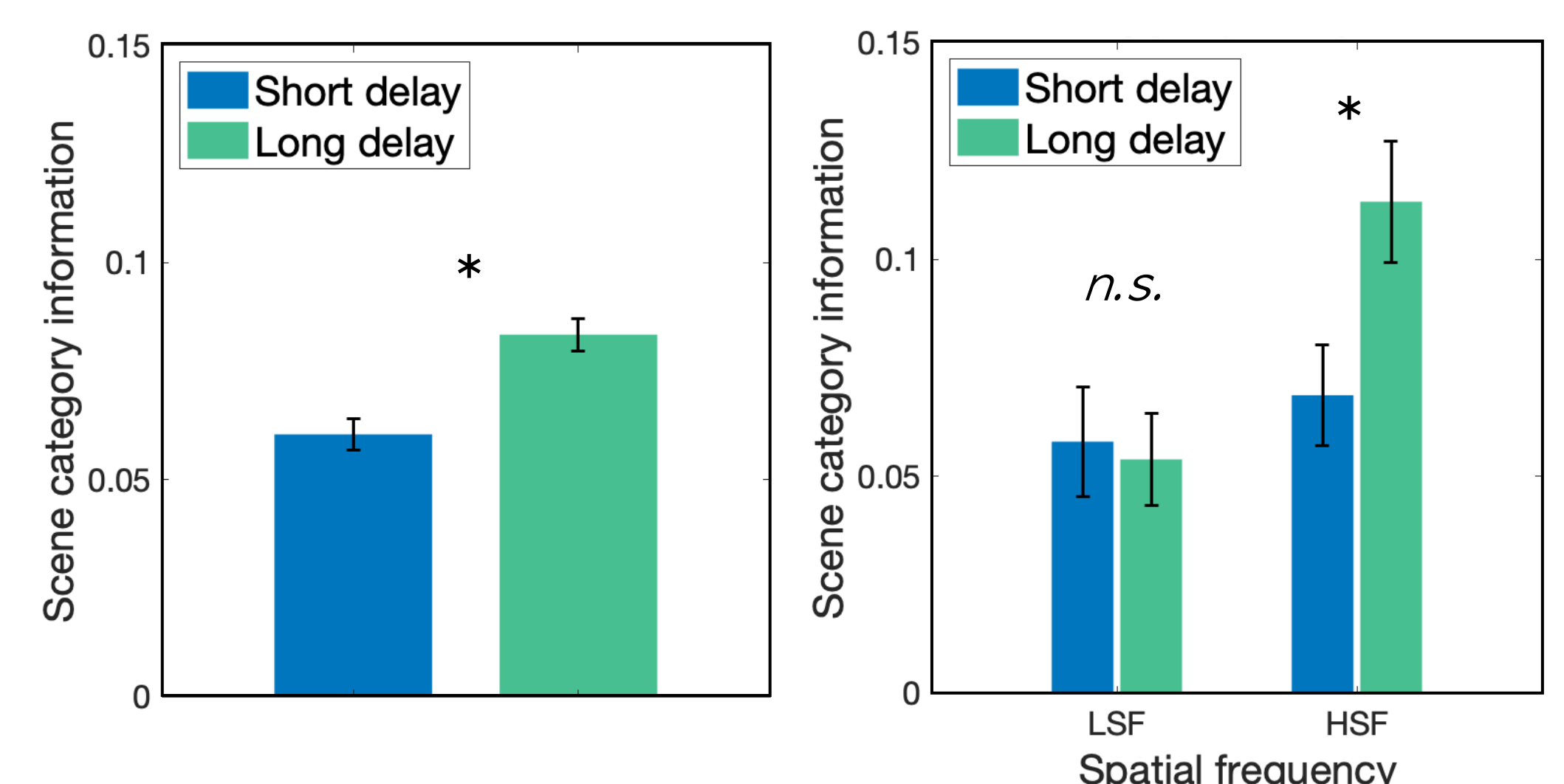
- $\blacksquare$  Correlation between SAME conditions
- $\square$  Correlation between DIFFERENT conditions
- $\blacksquare$  Correlation not used to calculate information



## RESULTS (N=17)

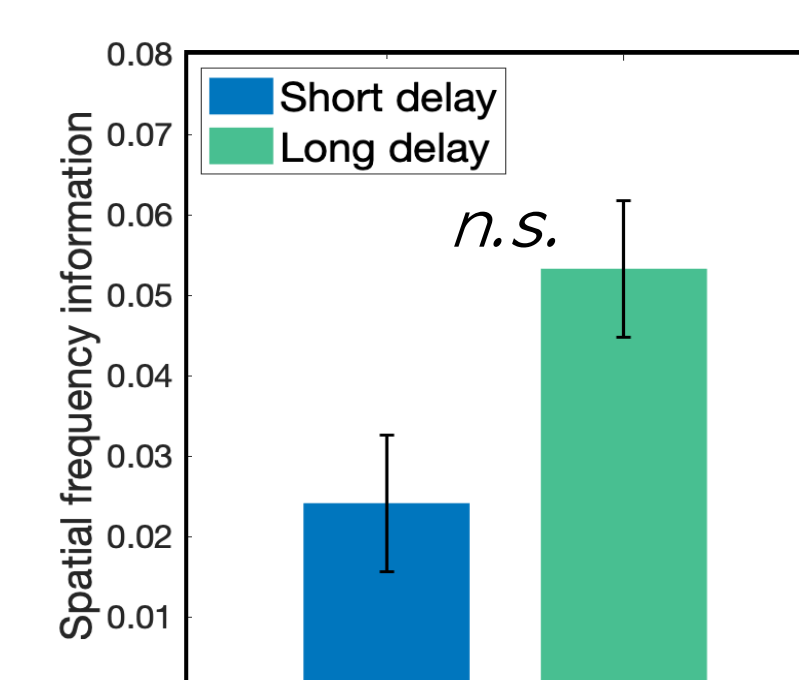
### 1) How do saccades influence scene category information in scene-selective cortex (PPA)?

- Impaired scene category representation in short post-saccadic delay trials than long.
- Post-saccadic impairment for scene images with high spatial frequency, but not with low spatial frequency.



### 2) How do saccades influence low-level spatial frequency information in early visual cortex?

- No significant effect of post-saccadic delay on low-level spatial frequency representation.



### 3) Is the effect of saccade on neural representation driven by reduced overall activation?

- No effect of post-saccadic delay on overall activation level in both PPA and EVC

