

Neural correlates of parametric working memory in frontal and parietal cortex

PSTR043.20

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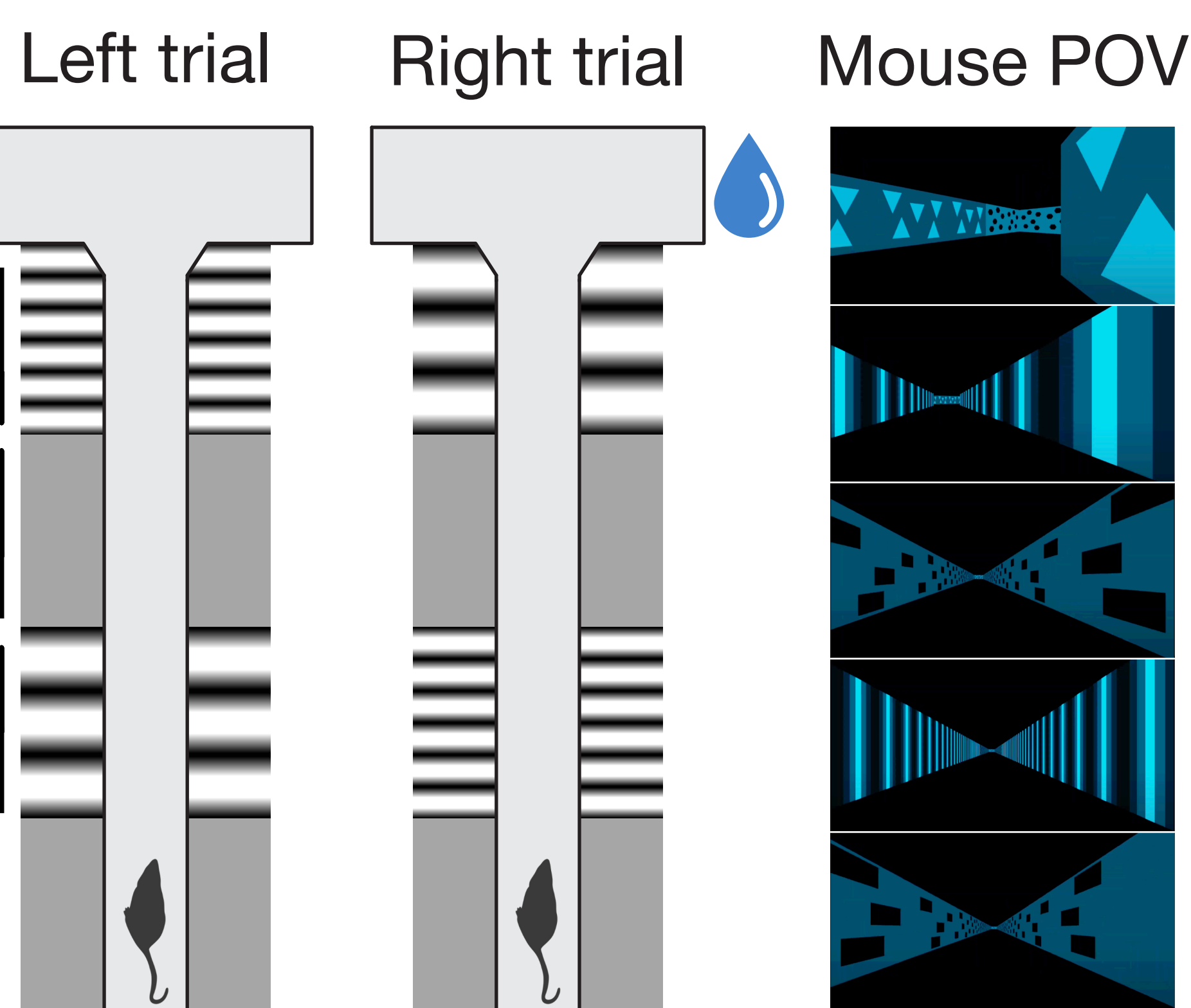
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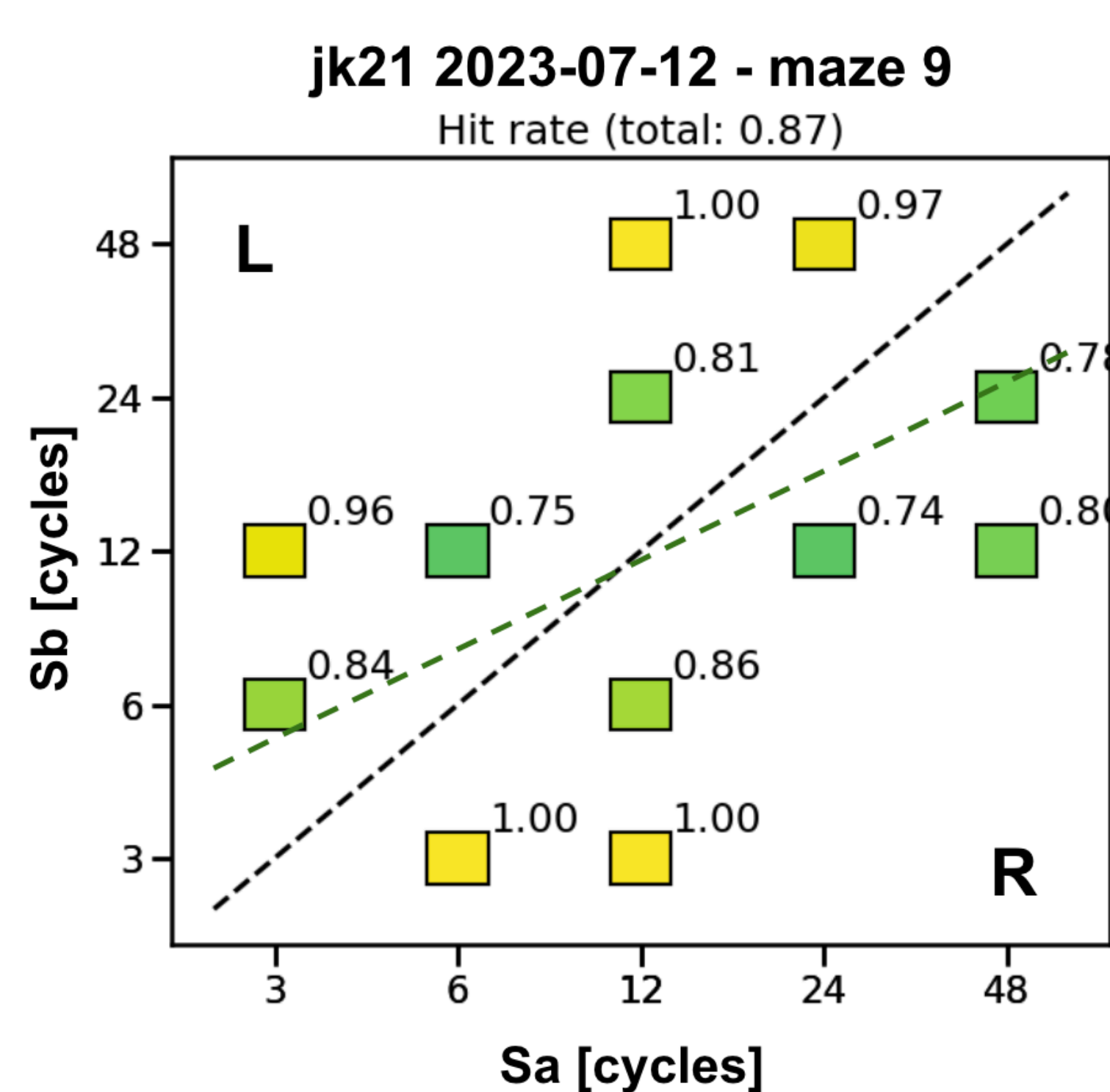
Background

- How the brain maintains and compares continuous values in working memory remains poorly understood.
- To study these processes, parametric working memory tasks have been developed in non-human primates (Romo et al. 1999) and more recently in rats (Fassihi et al. 2014, Akrami et al. 2018).
- We developed a novel parametric working memory task for head-fixed mice in virtual reality.

Rule: $S_a < S_b$ Left



Choice zone
Sb zone (0.5 m)
Delay zone (0.5 m)
Sa zone (0.5 m)

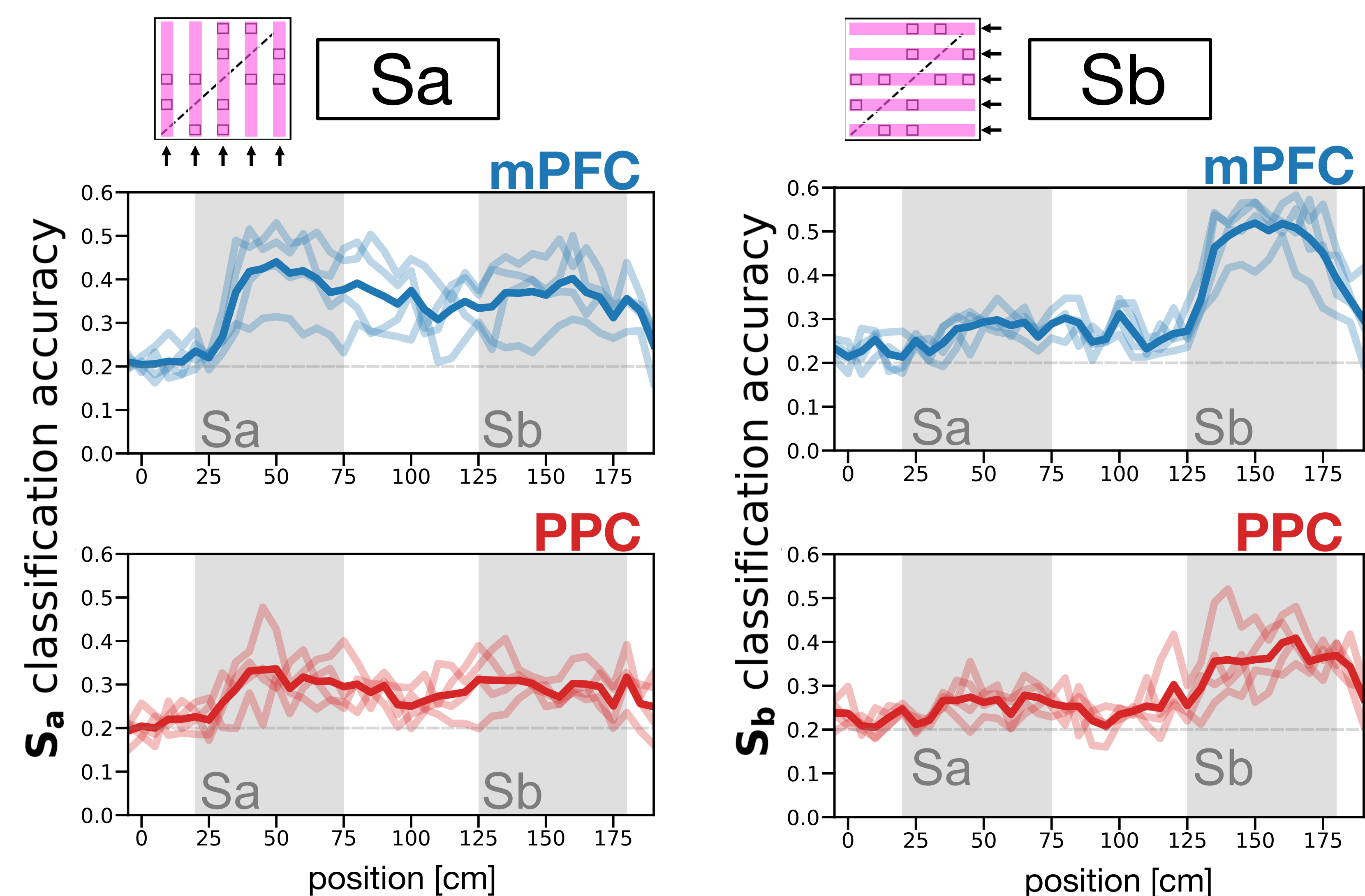


The spatial frequencies of S_a and S_b are drawn from the same set:

{3, 6, 12, 24, 48}

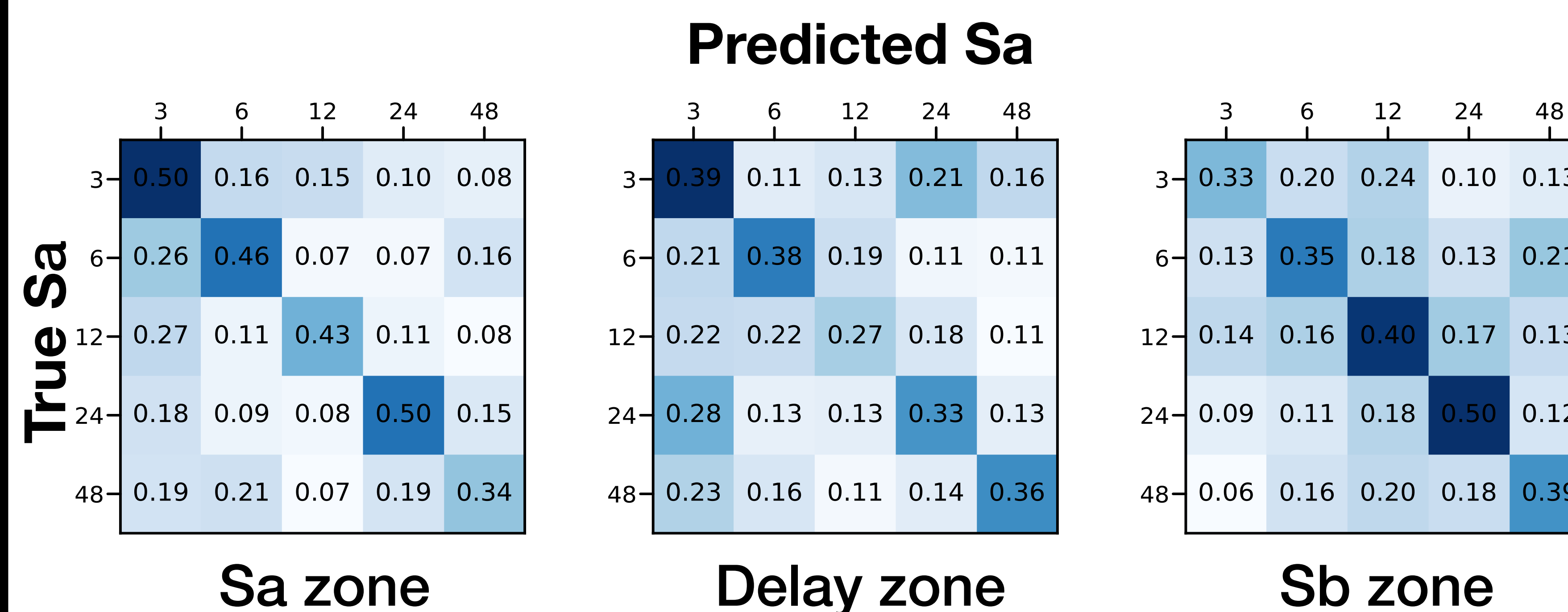
Mice must maintain a memory of S_a during the delay period in order to compare it with S_b .

mPFC population activity contains information about the identity of S_a and S_b

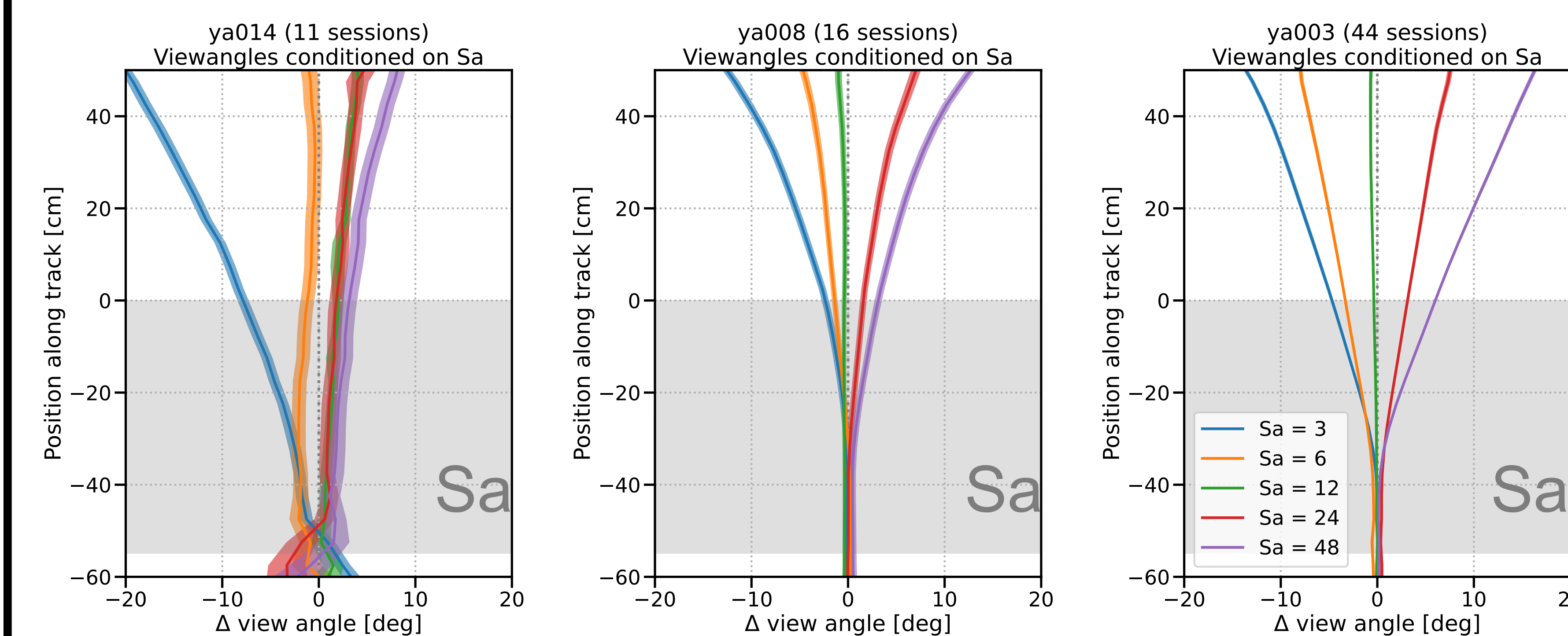


linear SVM classifier, accuracy measured via 10-fold cross-validation
1 mouse, 4 sessions

S_a classification confusion matrices for different task epochs



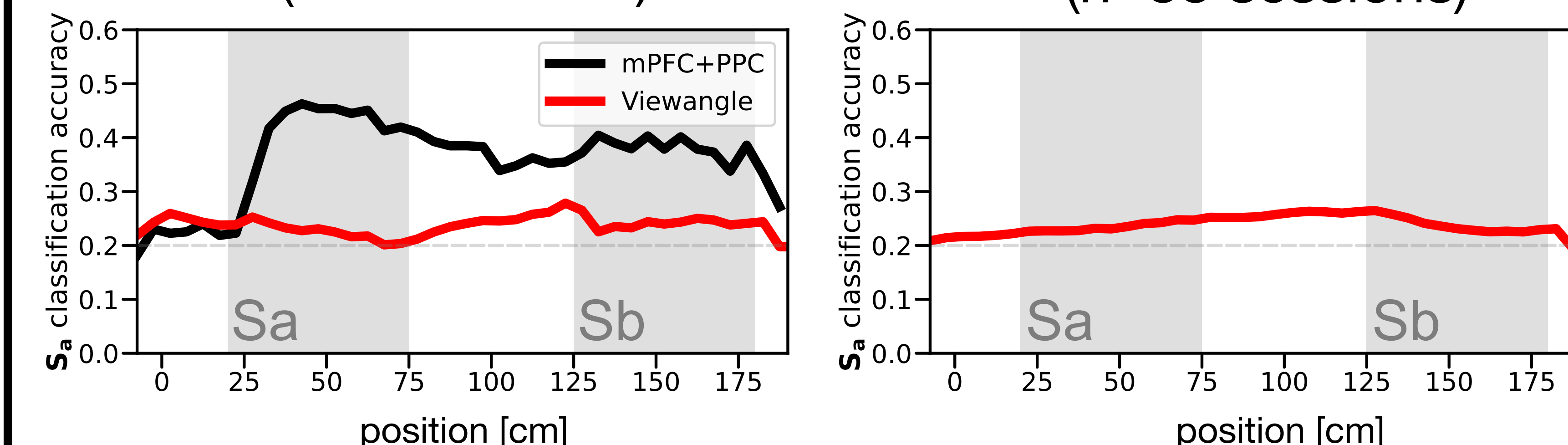
Heading direction is correlated with S_a identity



But provides little predictive power on individual sessions

ya014 mean accuracy (n=4 sessions)

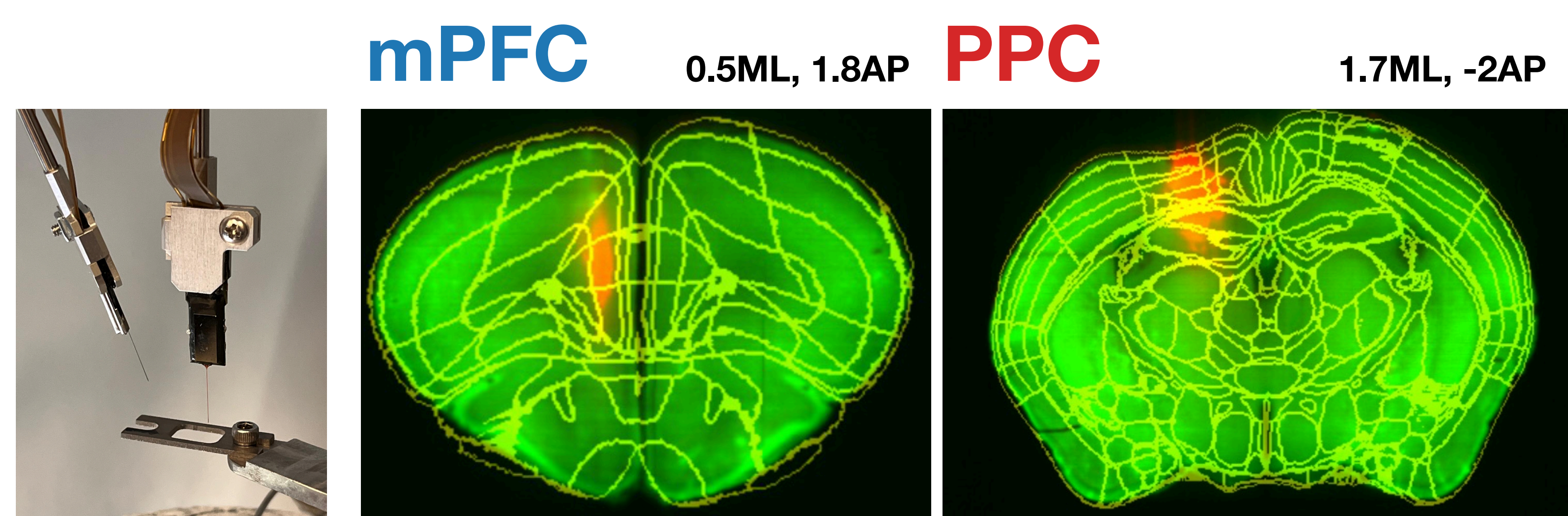
Mean accuracy across mice (n=88 sessions)



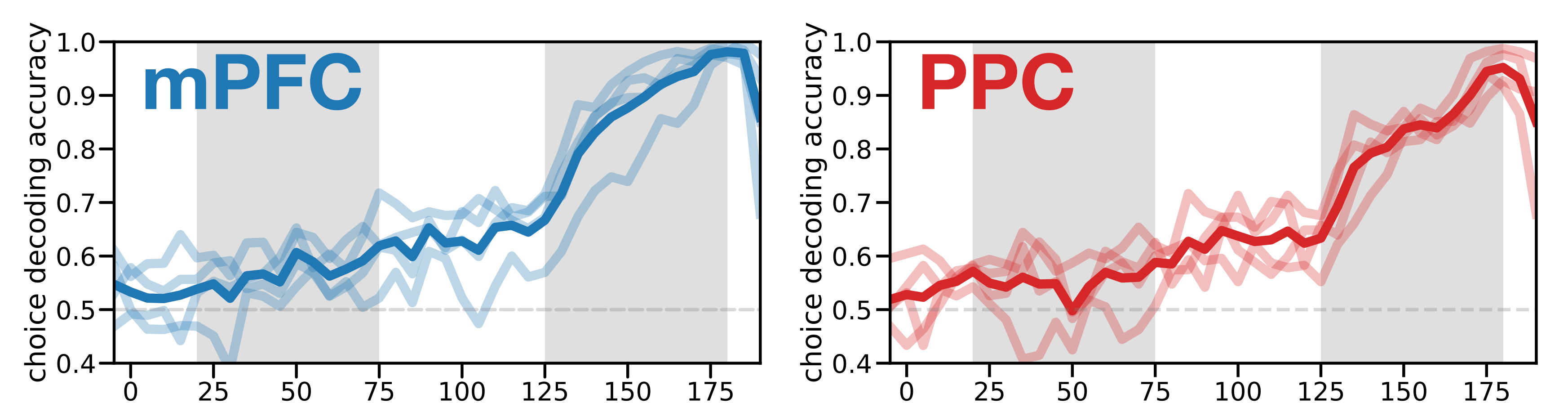
Conclusions / next steps

- A novel parametric working memory task to study delayed comparison in mice.
- mPFC maintains information about the first stimulus, S_a , throughout the trial.
- Next steps: optogenetic inactivation of mPFC and PPC during task performance. More recording sessions. Geometry of choice construction from S_a and S_b .

Simultaneous recordings targeting medial prefrontal cortex and posterior parietal cortex



Choice decoding



logistic classifier, accuracy measured via 10-fold cross-validation
1 mouse, 4 sessions

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