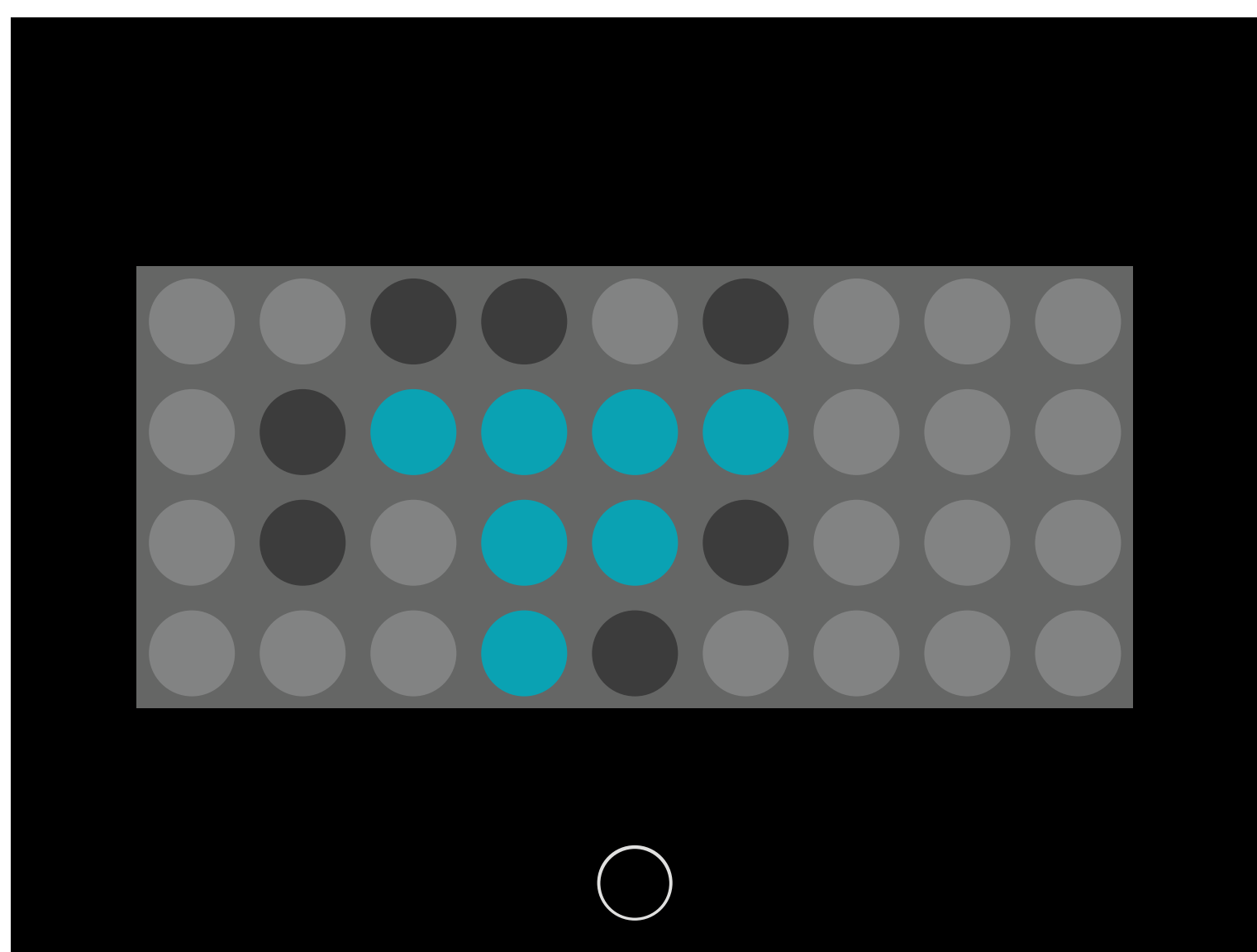


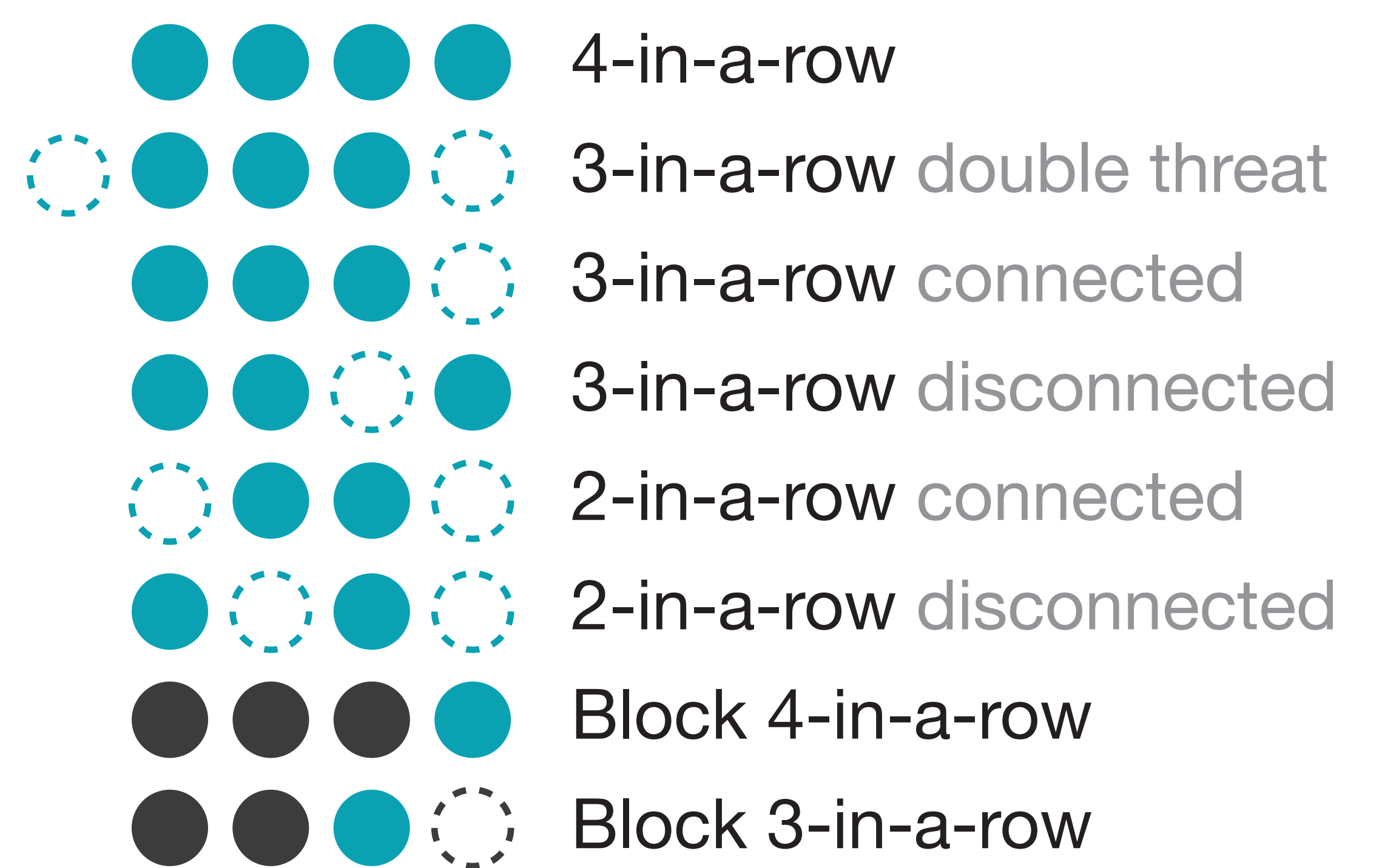
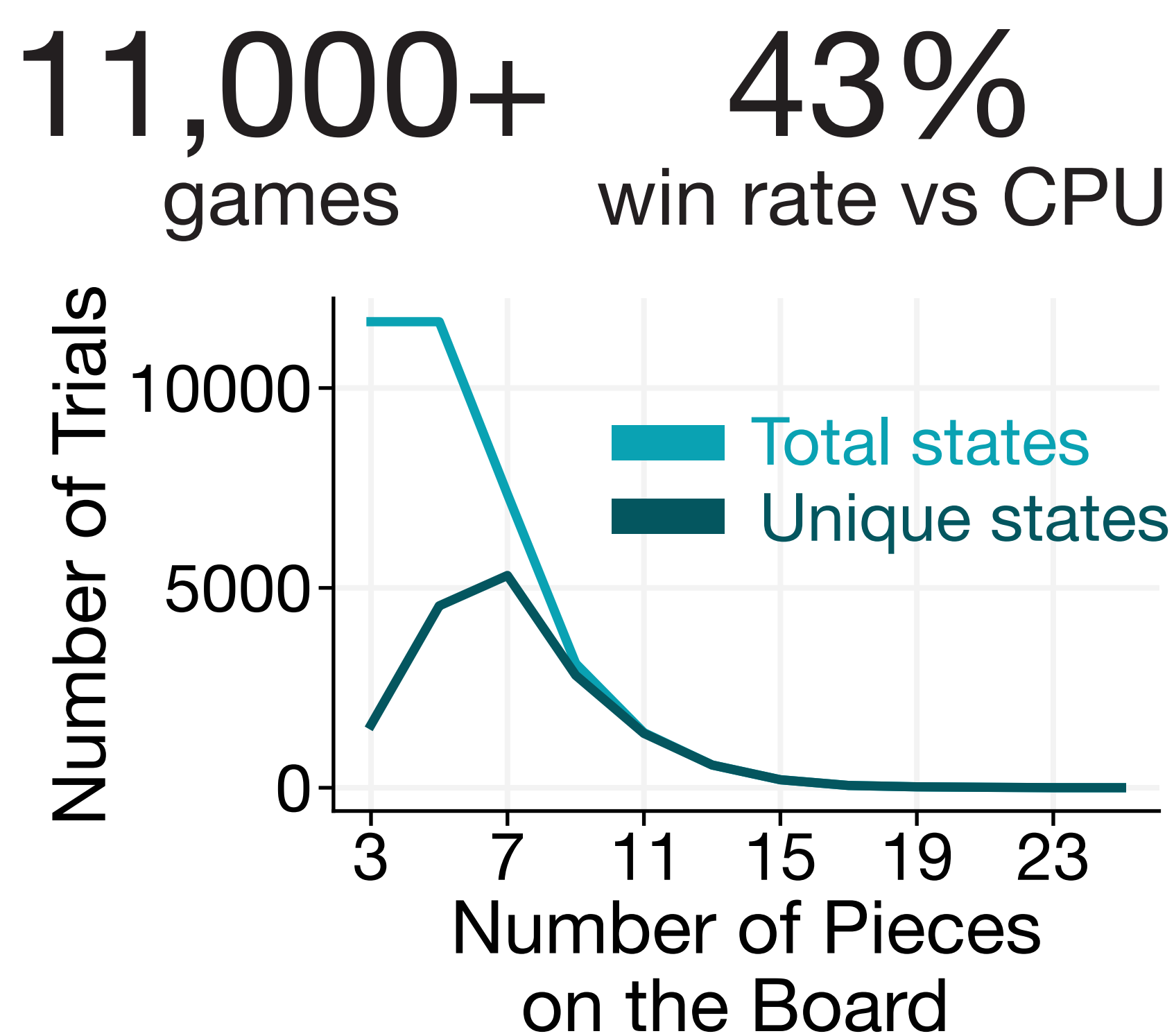
Overview

- 1 What neural mechanisms underlie complex planning?
- 2 We trained a monkey to play a board game, Four-in-a-Row, against a computer opponent
- 3 Monkey behavior is well-predicted by a heuristic model
- 4 Some neurons in DMPFC, DLPFC, and Caudate respond to heuristic features

Task

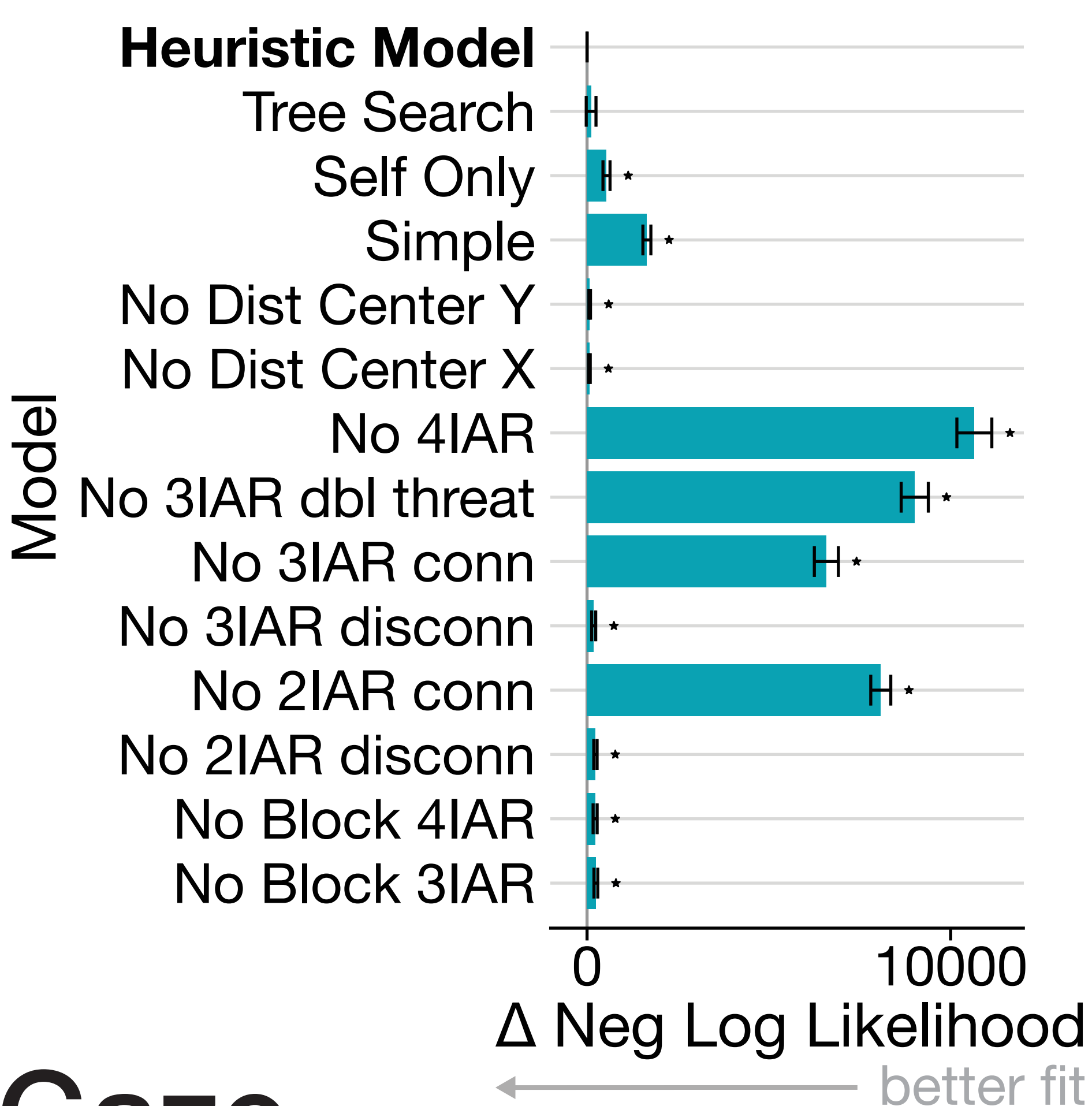


Goal: be the first to place four pieces in a row

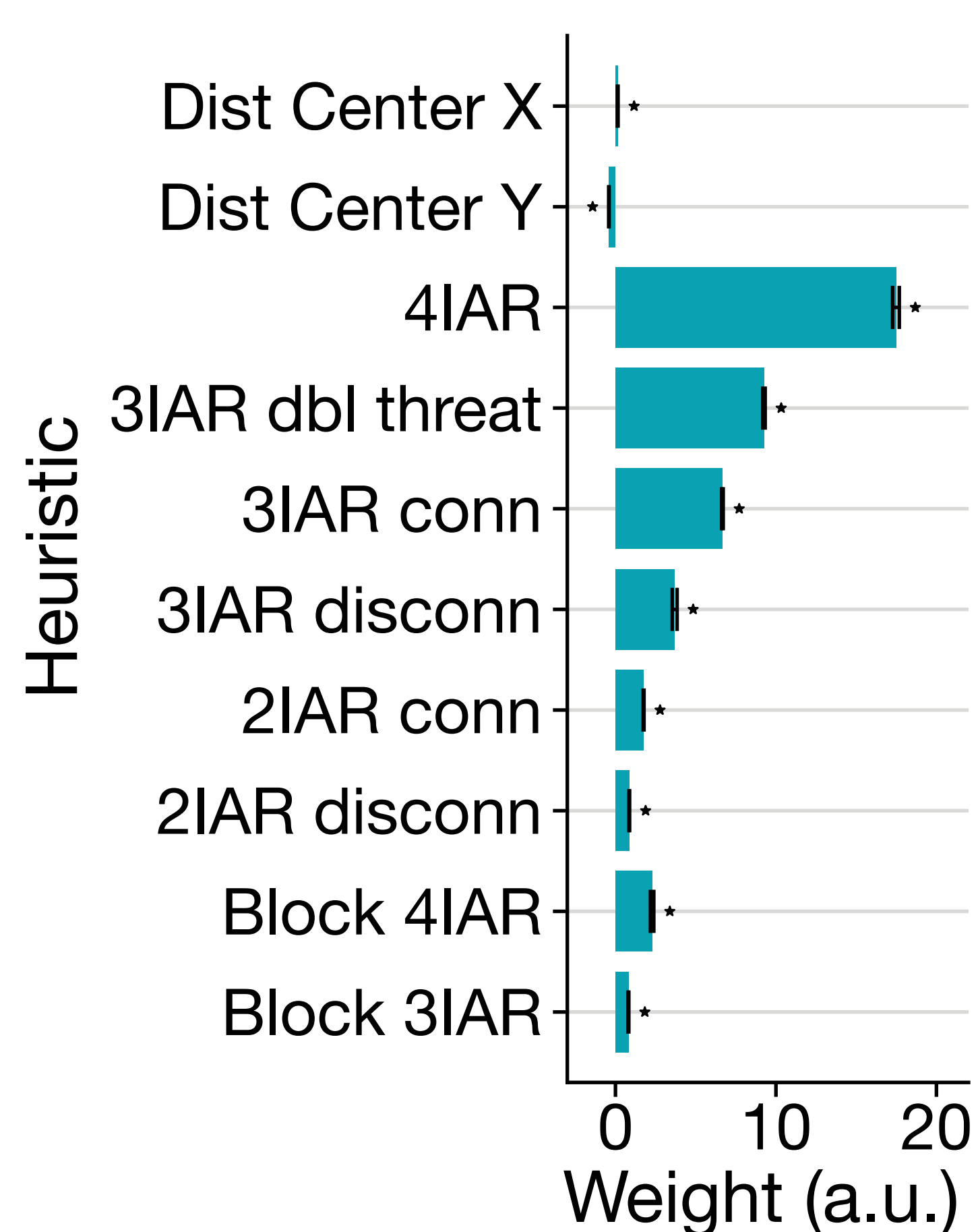


Gameplay

Heuristic model best predicts monkey moves

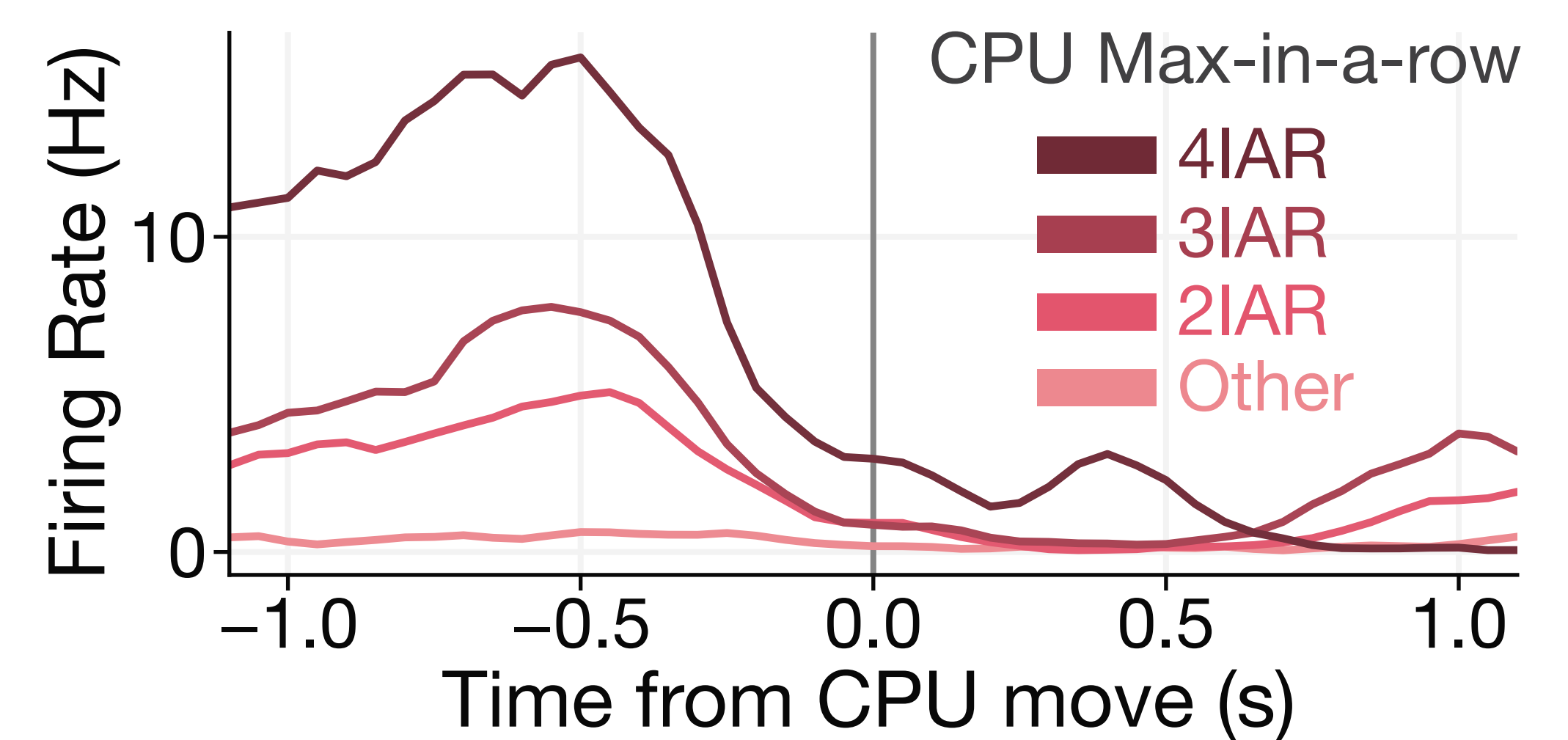


Model shows sensible ordering of heuristic weights

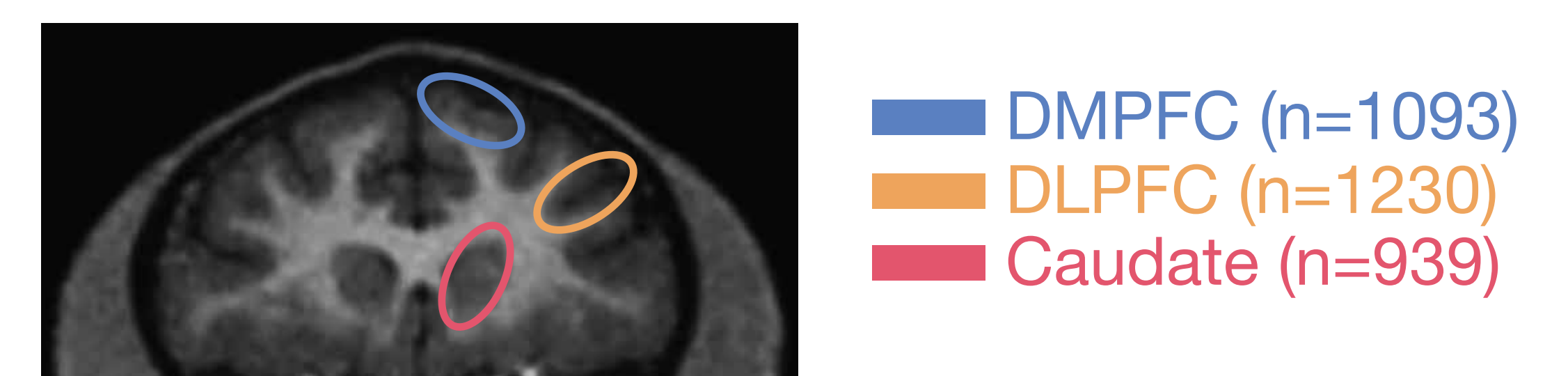


Neurons

Single neurons in Caudate show anticipation of opponent heuristics

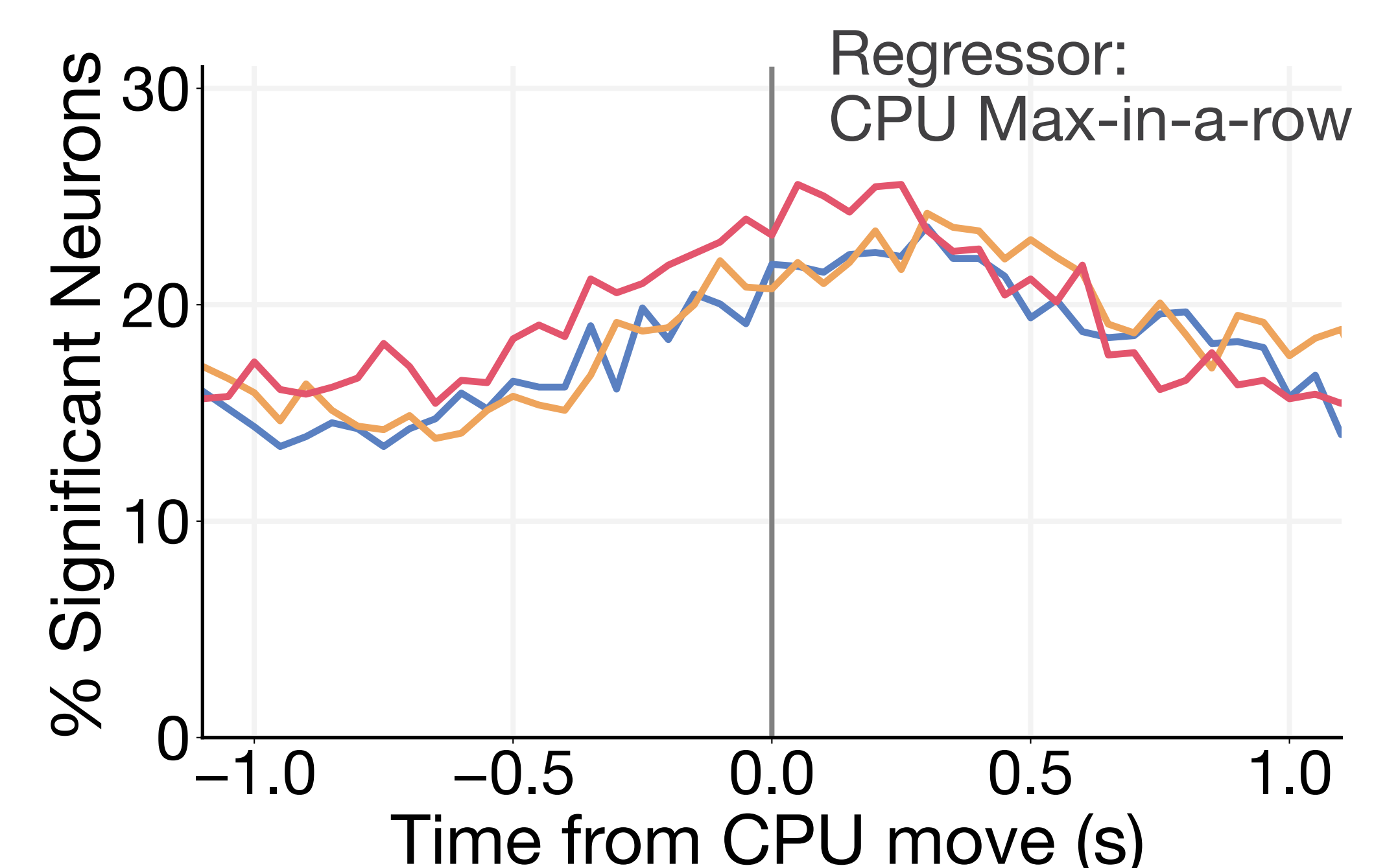
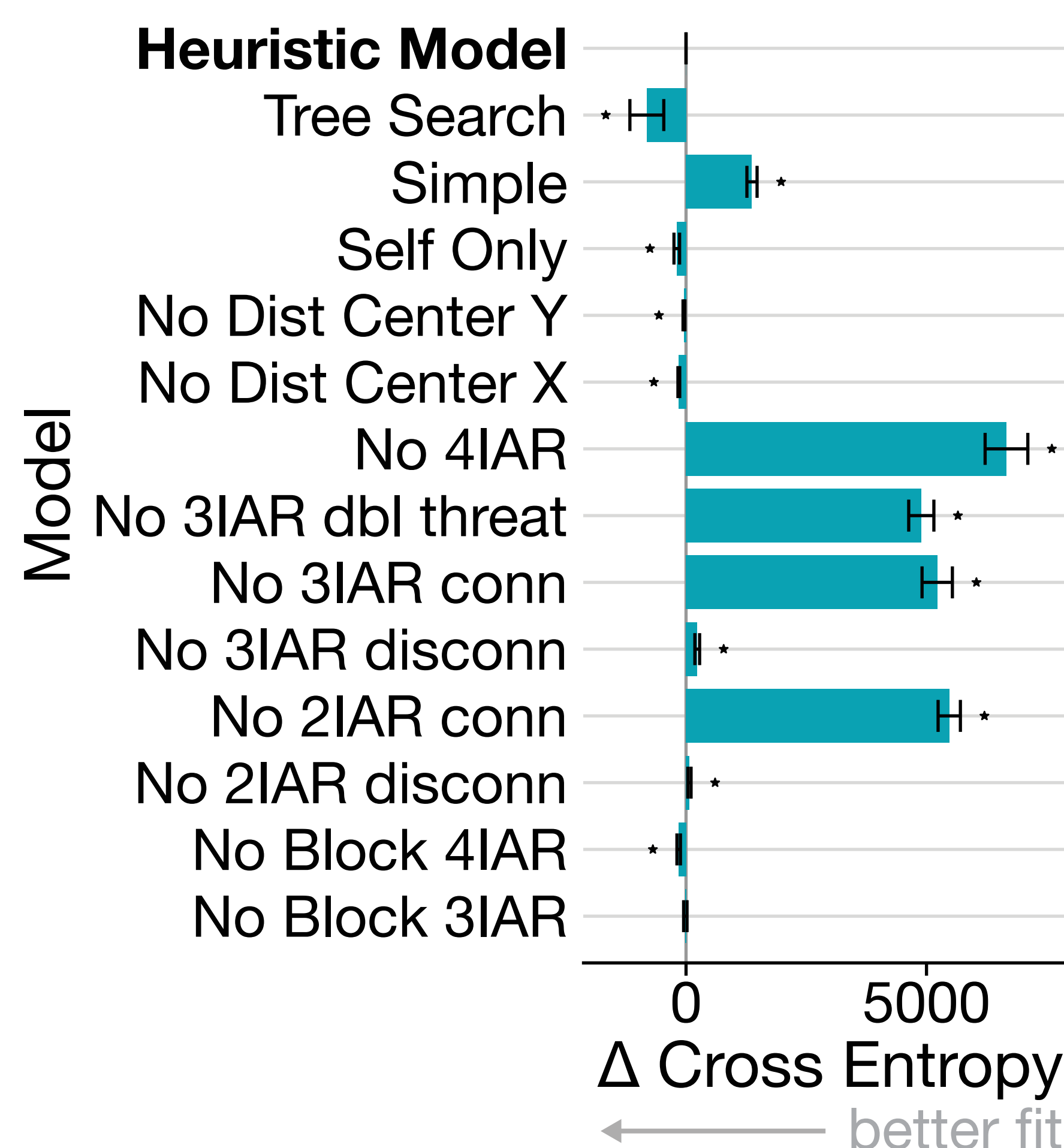
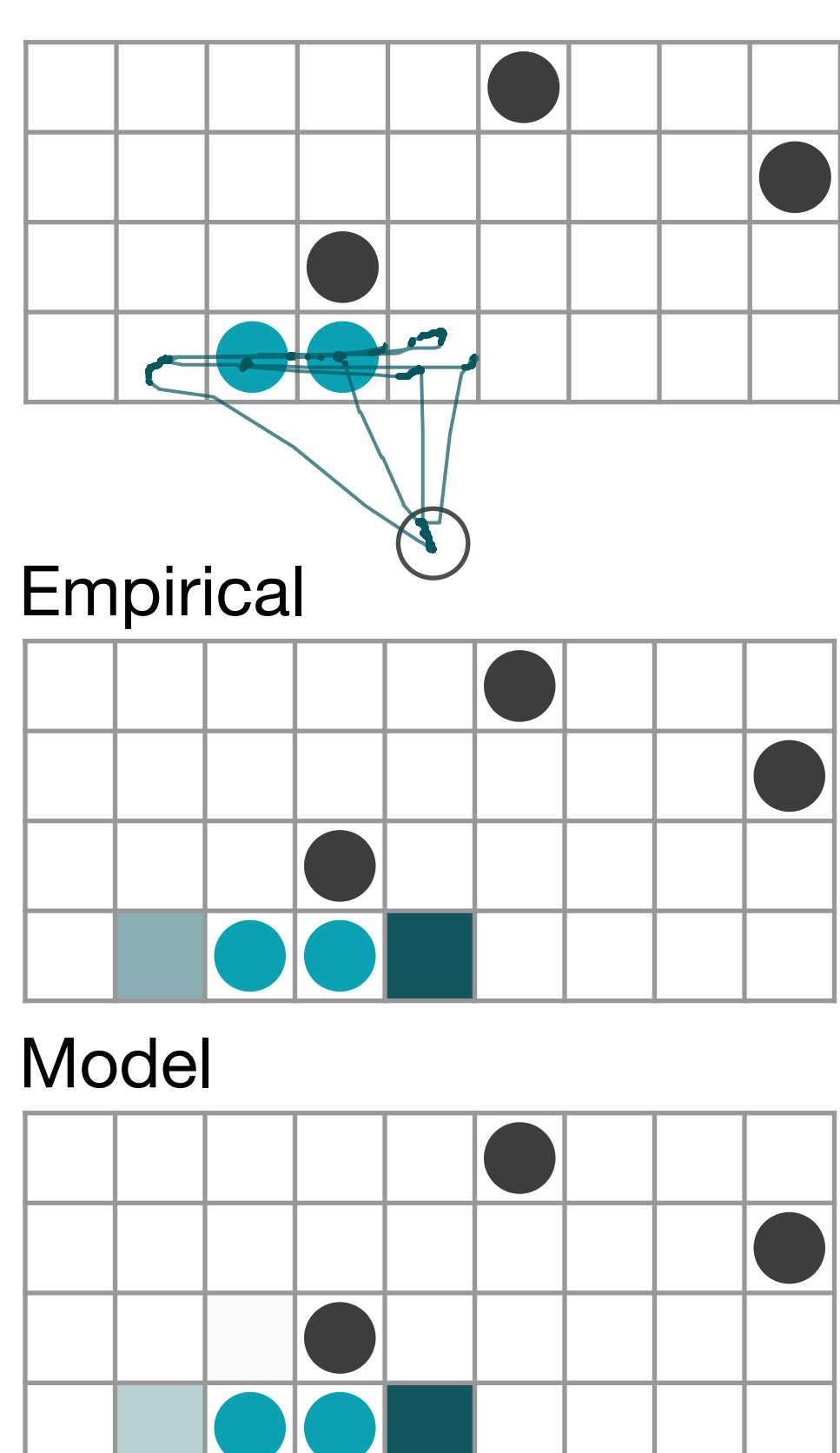


Several neurons in DMPFC, DLPFC, and Caudate respond to heuristic features



Gaze

Our model, trained only to predict moves, also predicts gaze



References

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- [3] Seo, H., Cai, X., Donahue, C. H., & Lee, D. (2014). Neural correlates of strategic reasoning during competitive games. *Science*.
- [4] Huang, J., Velarde, I., Ma, W. J., & Baldassano, C. (2023). Schema-based predictive eye movements support sequential memory encoding. *Elife*.