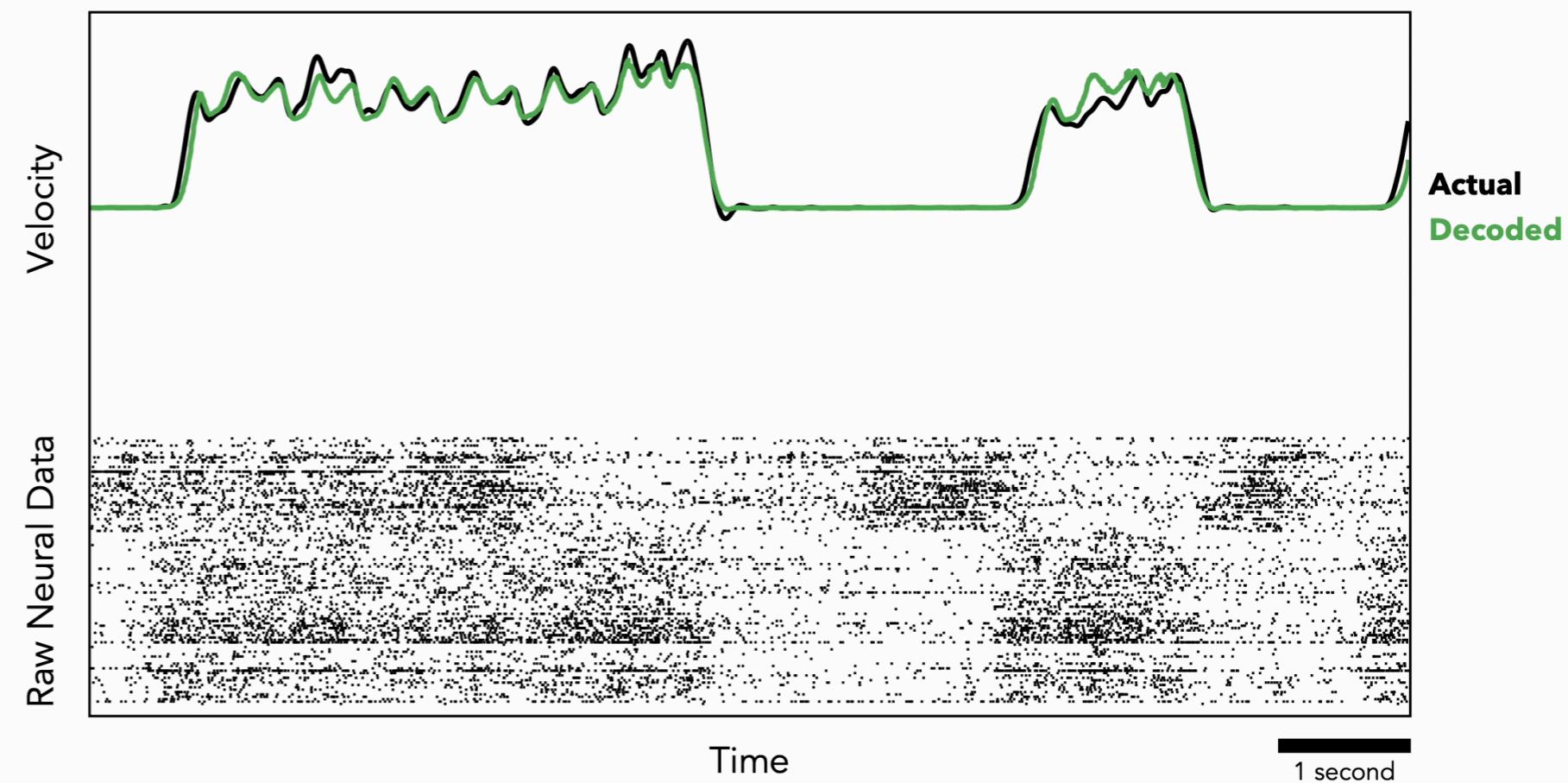
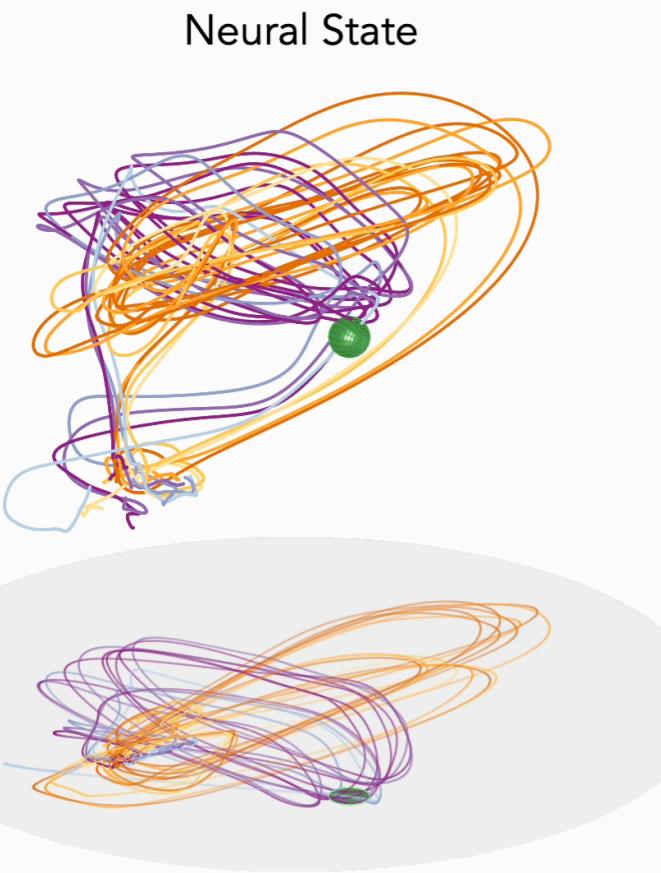


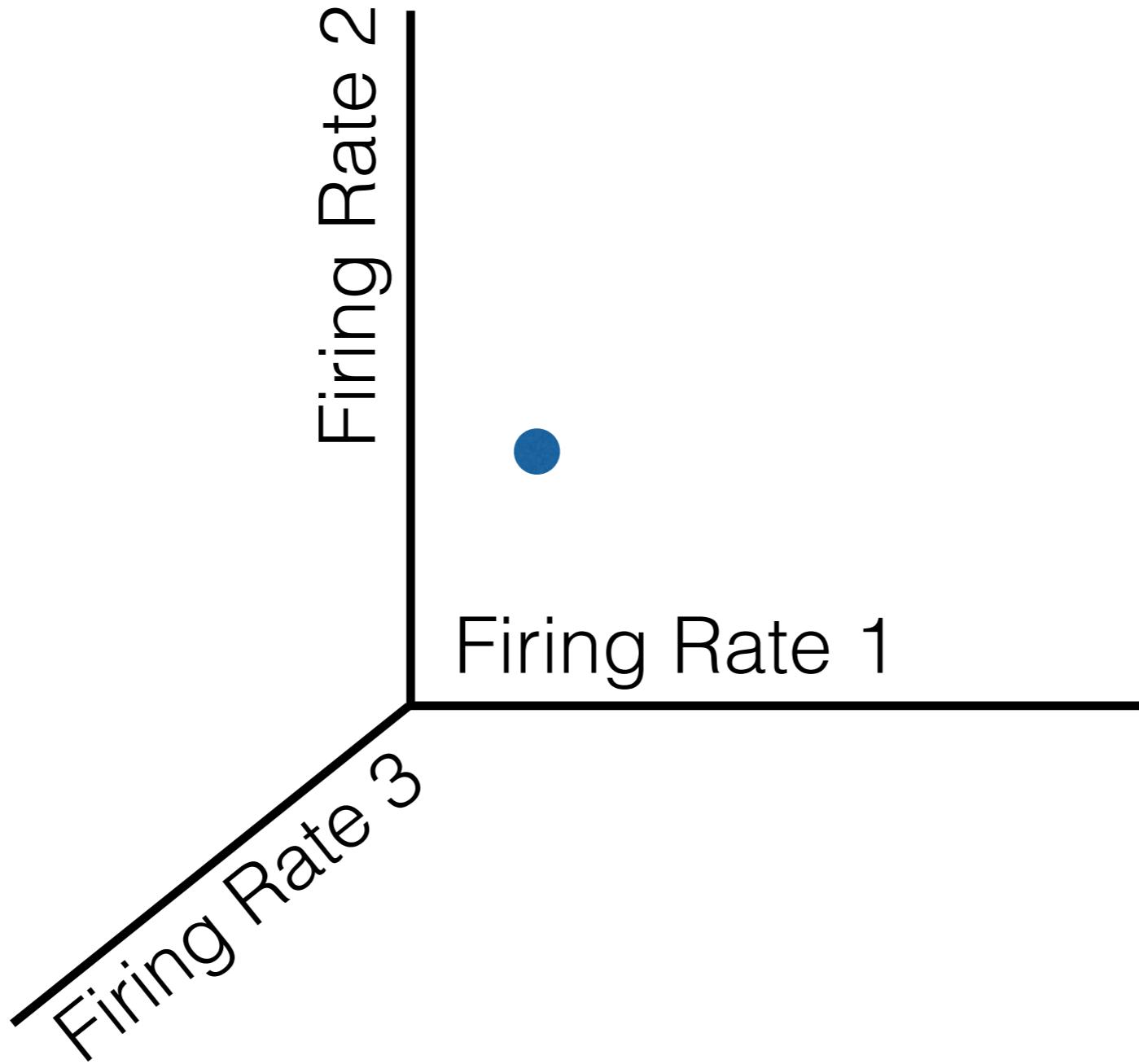
MINT: Mesh of Idealized Neural Trajectories

A lightweight algorithm for estimating the neural state and decoding behavior

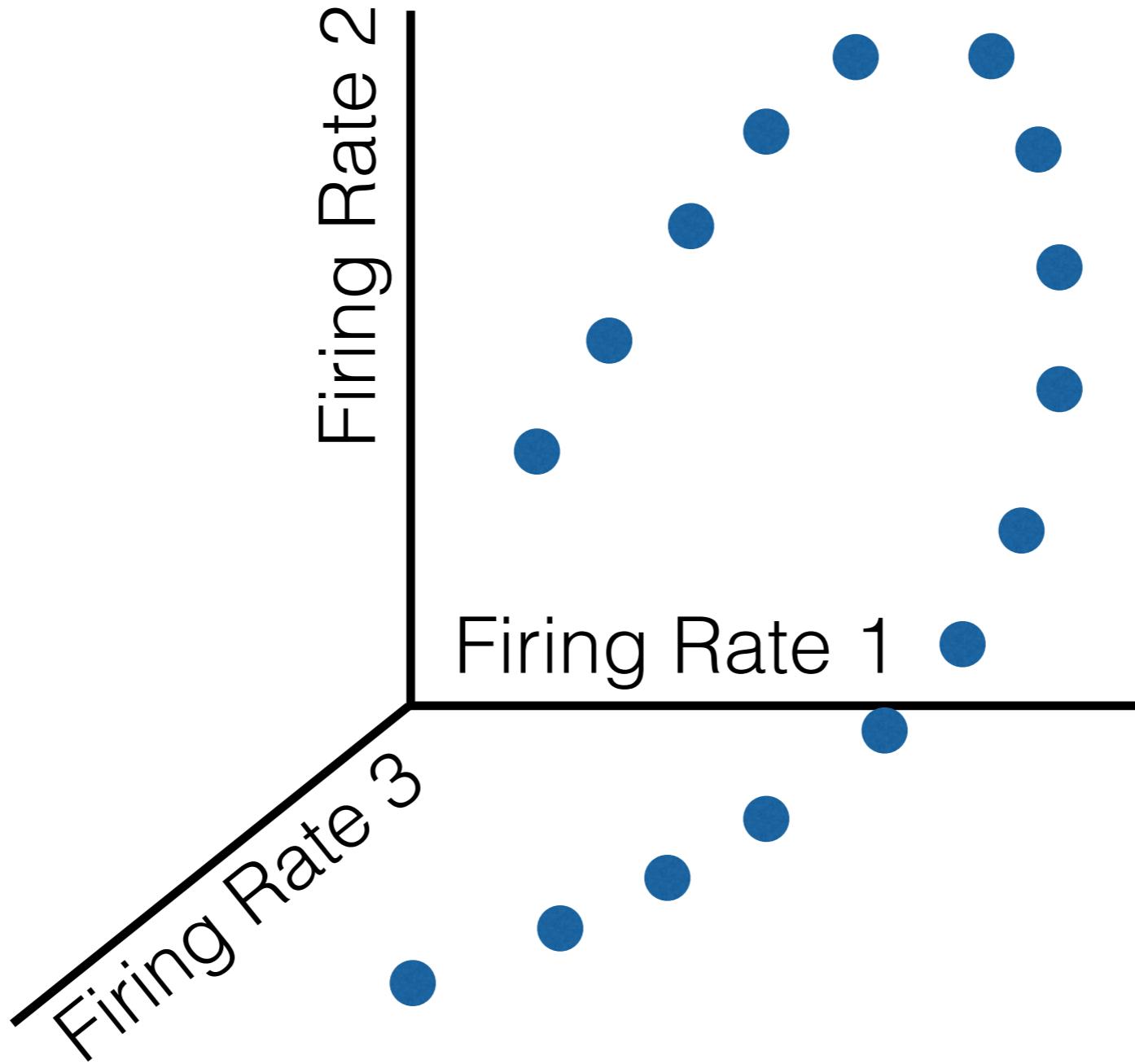
Sean Perkins



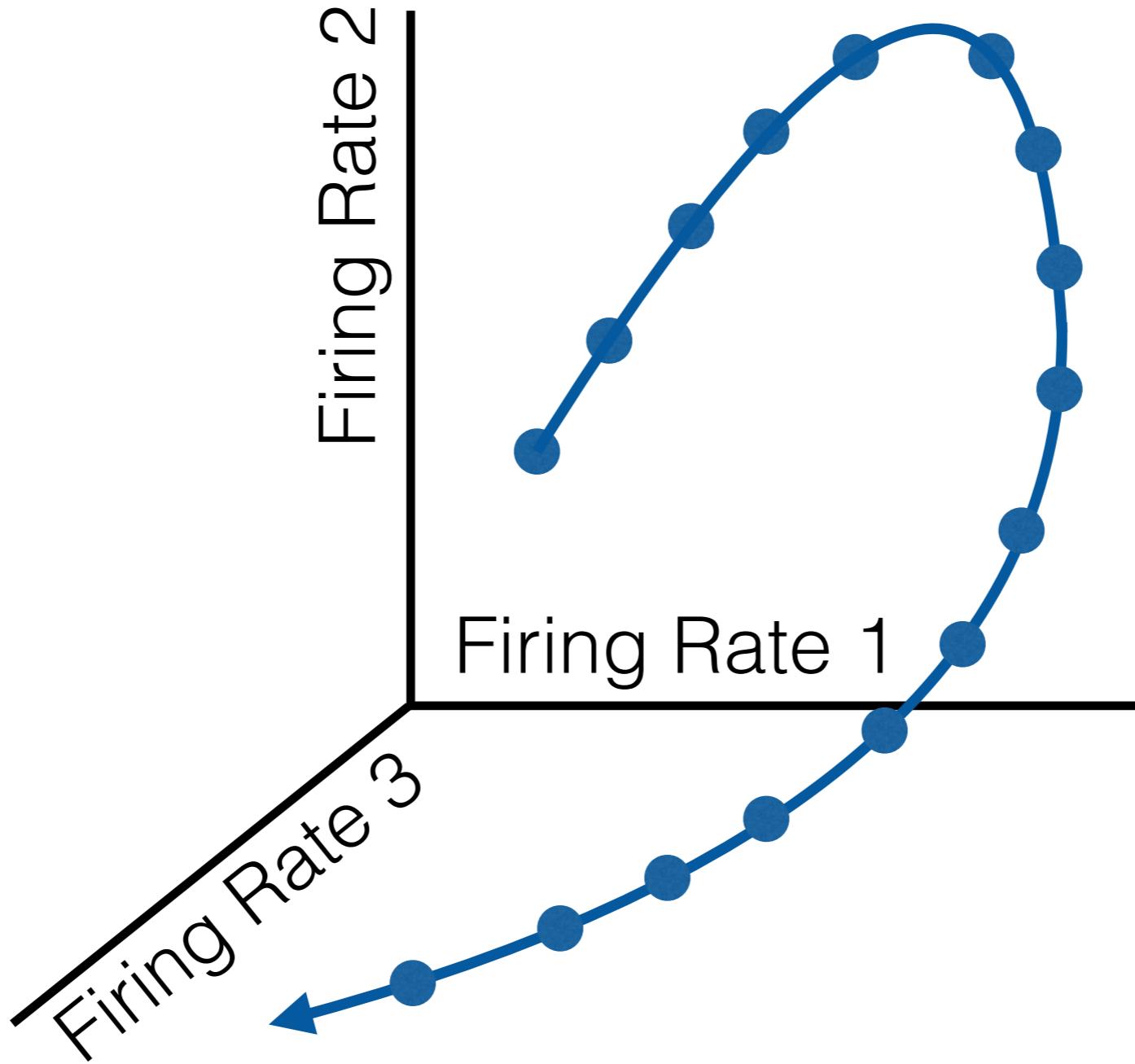
Neural states & neural trajectories



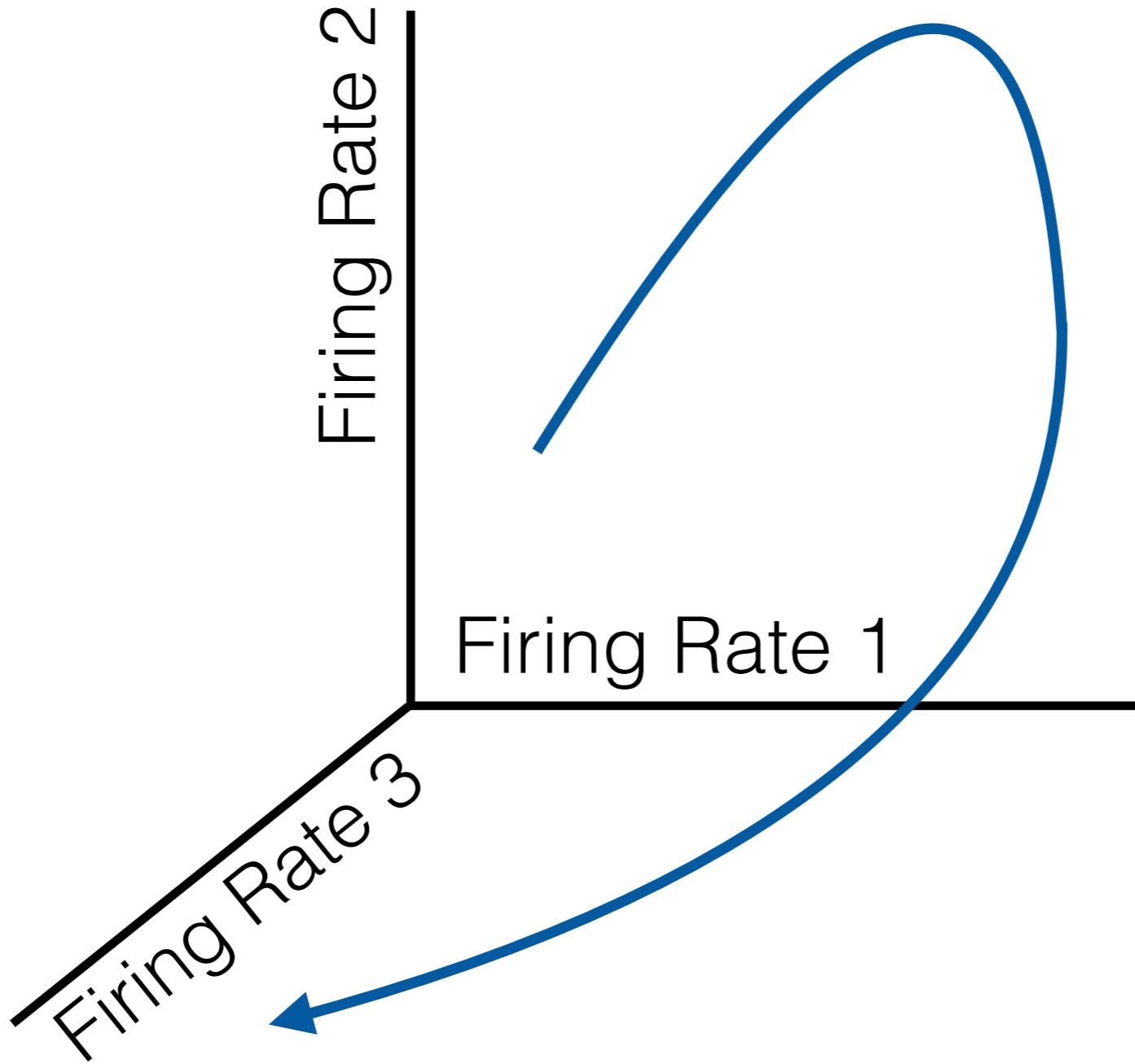
Neural states & neural trajectories



Neural states & neural trajectories

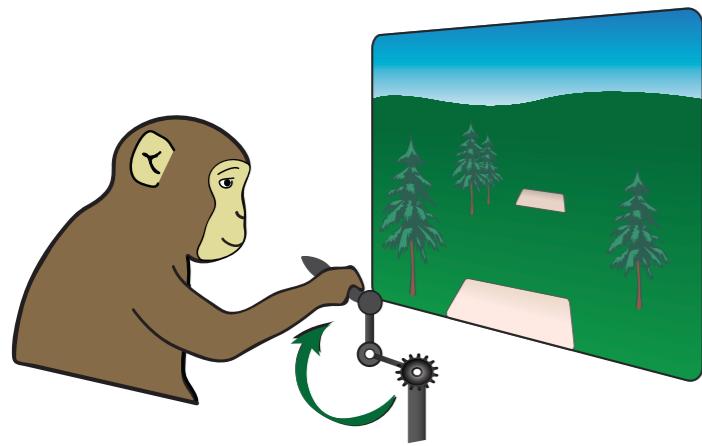


Neural states & neural trajectories

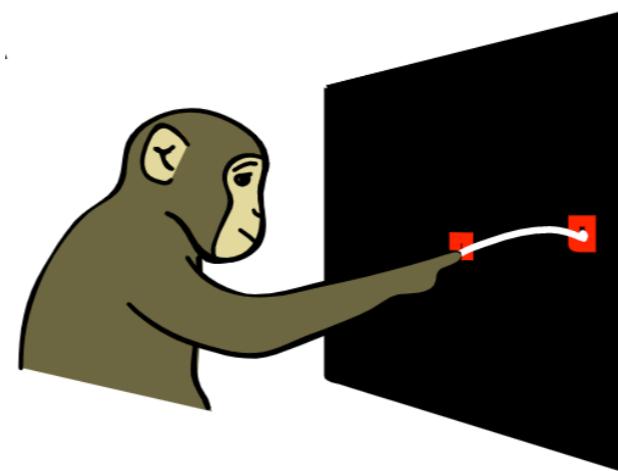


Making assumptions about the neural state

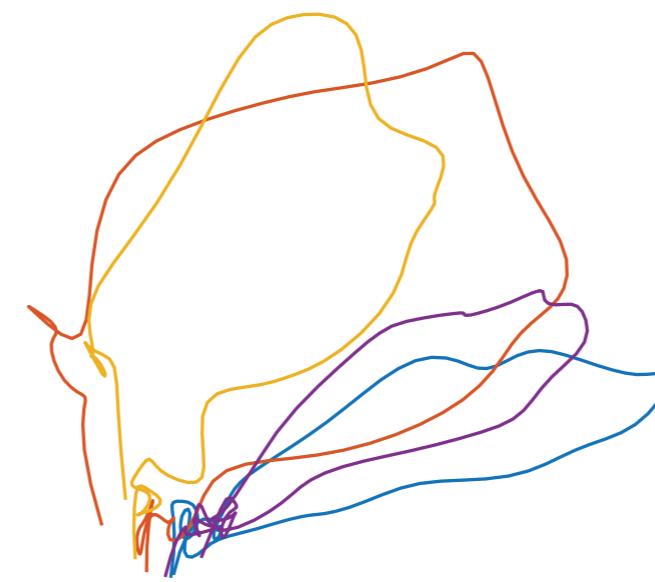
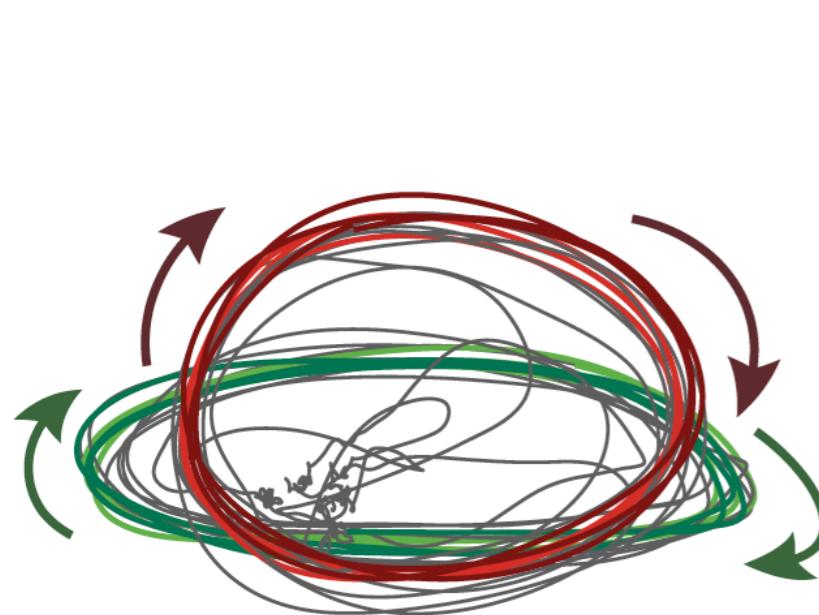
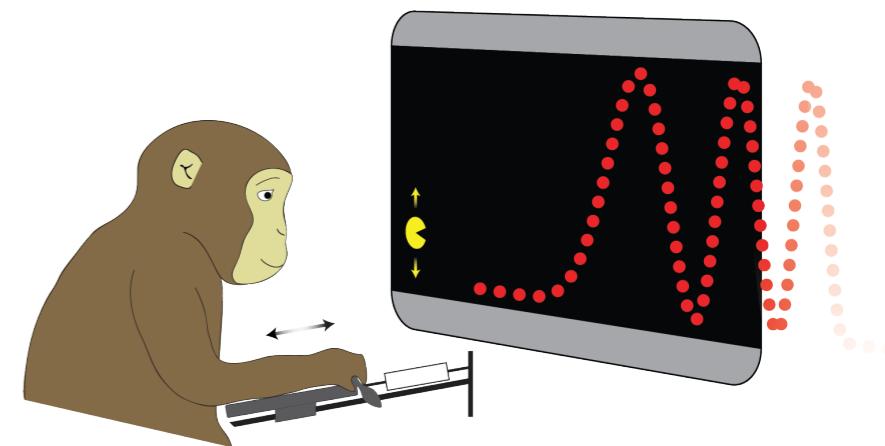
Cycling



Reaching

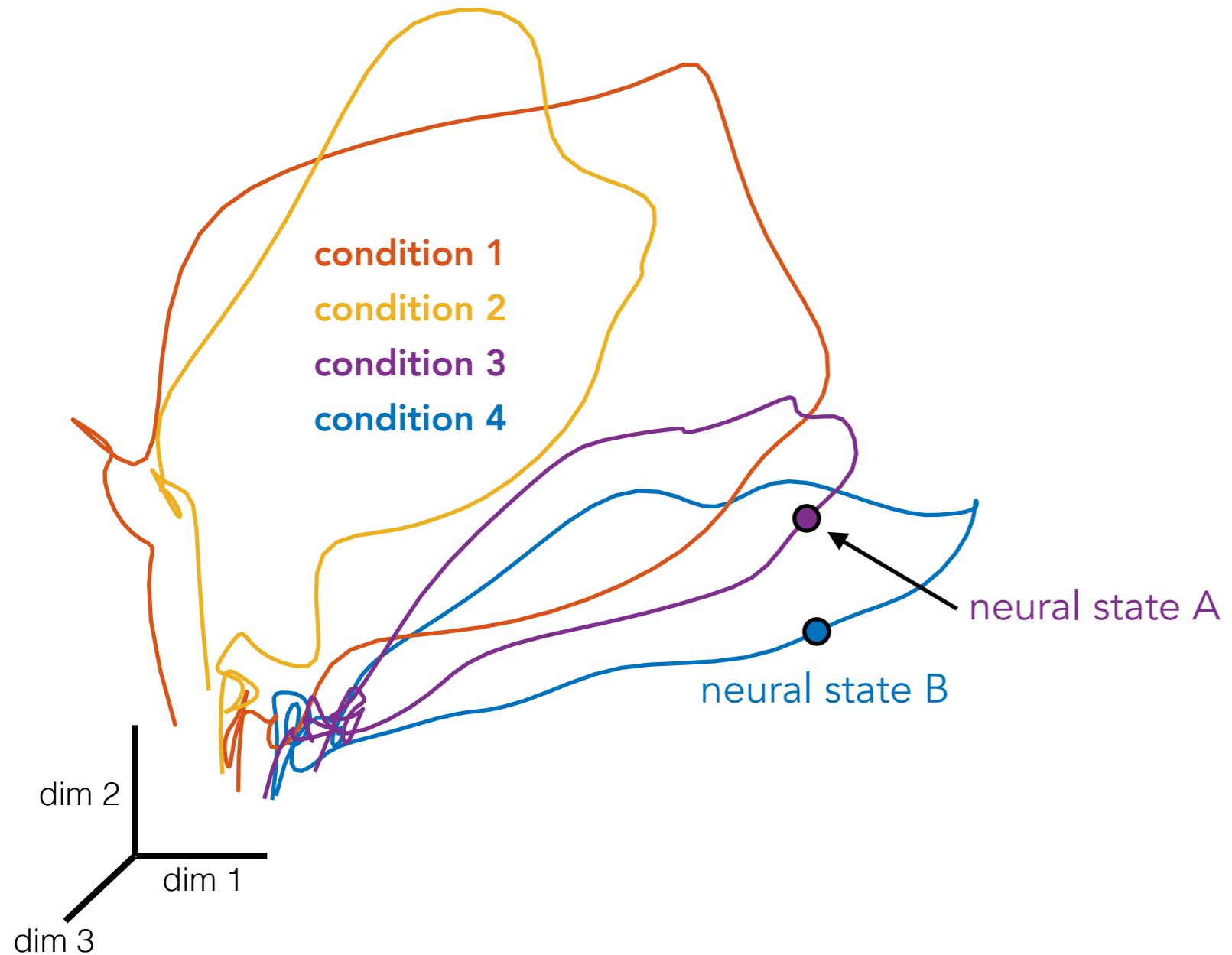


Pac-Man



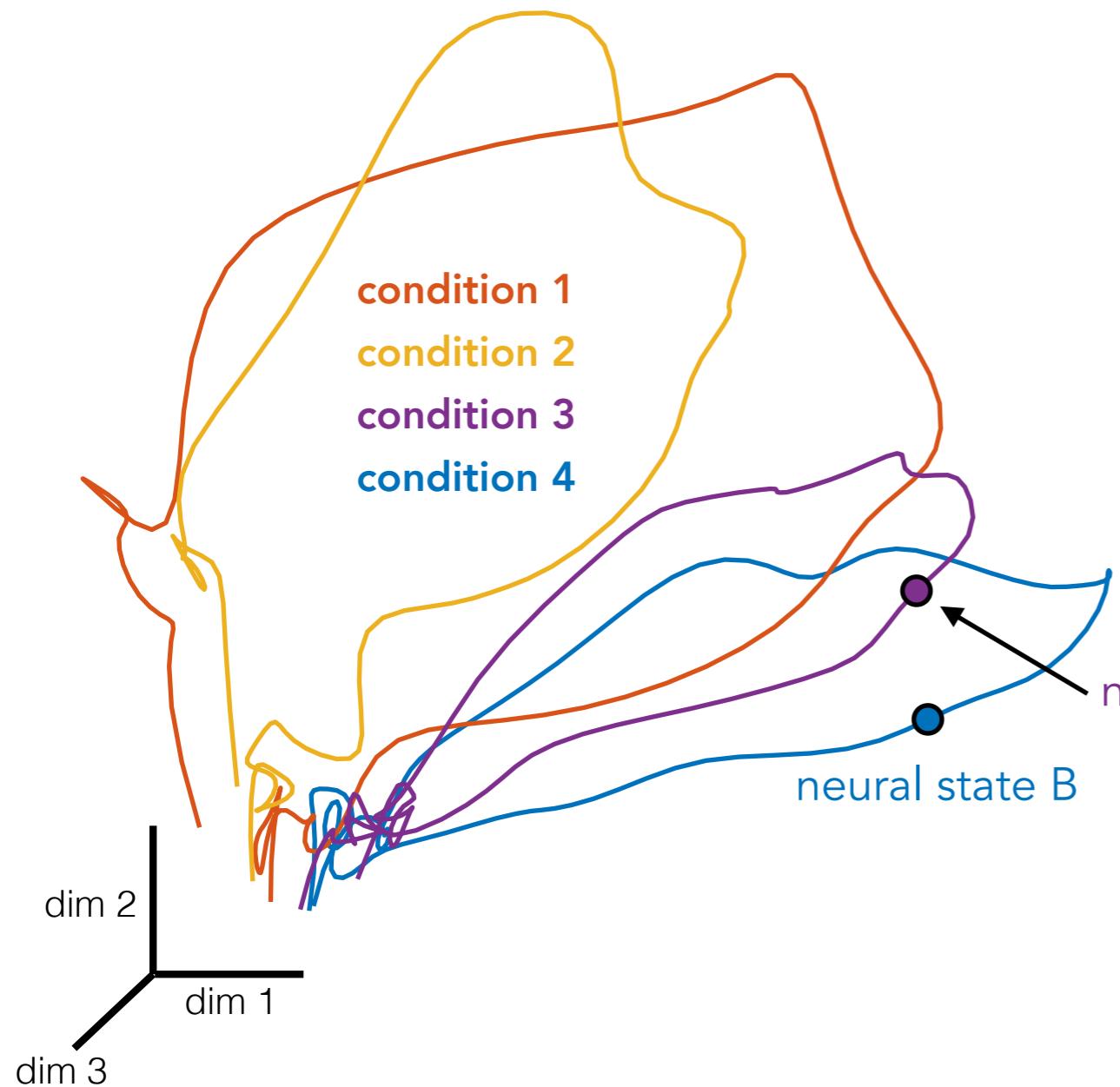
How MINT works

Idealized Neural Trajectories

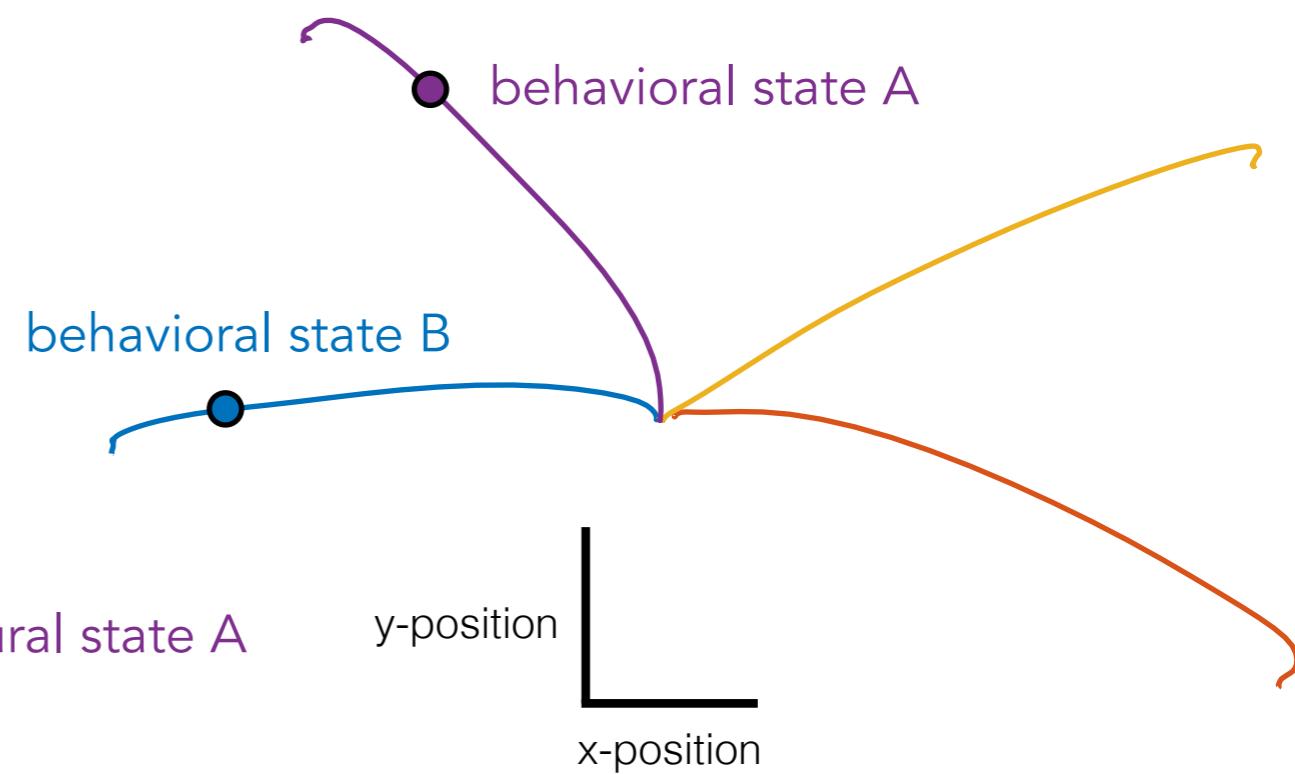


How MINT works

Idealized Neural Trajectories

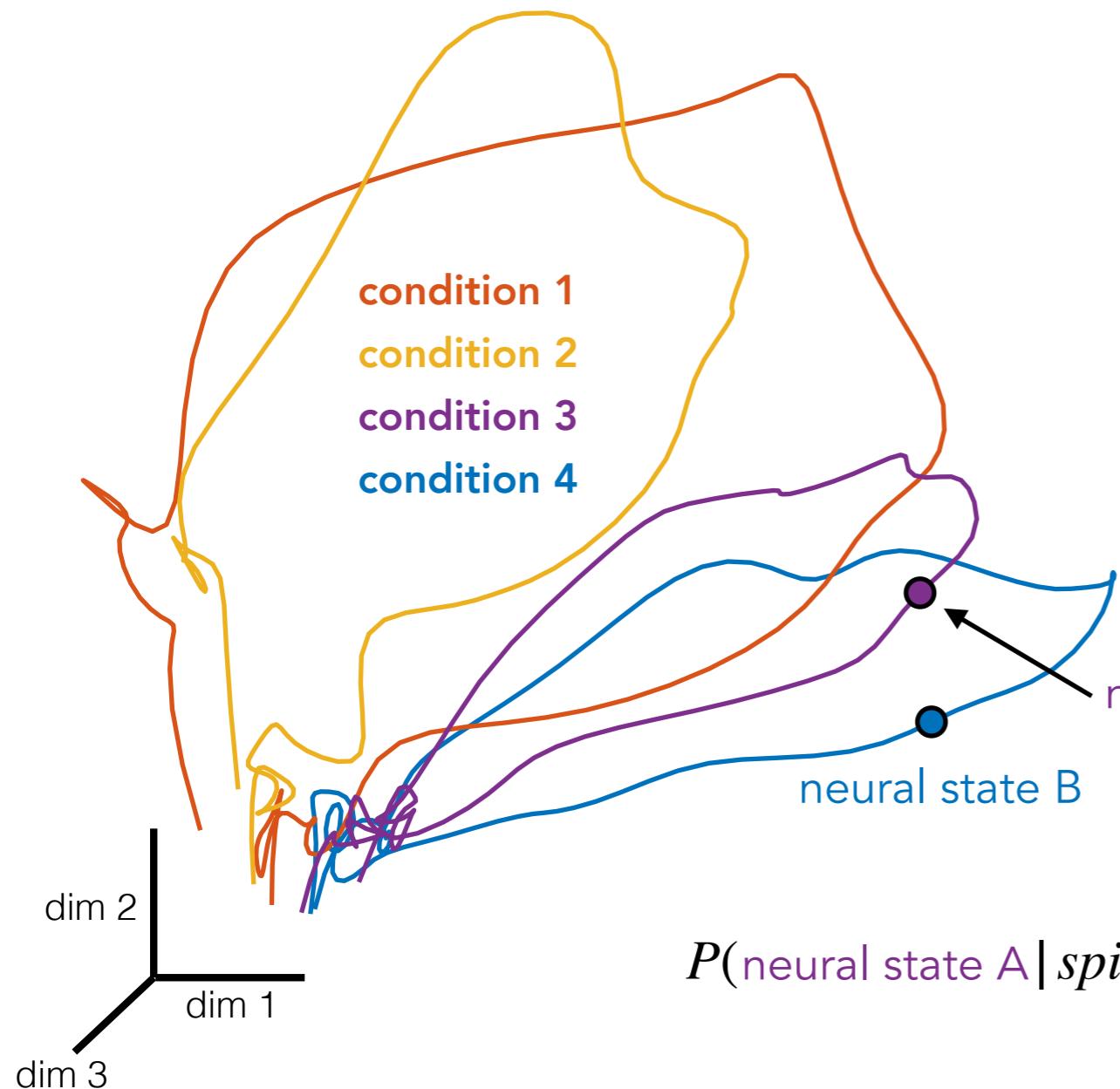


Behavioral Trajectories

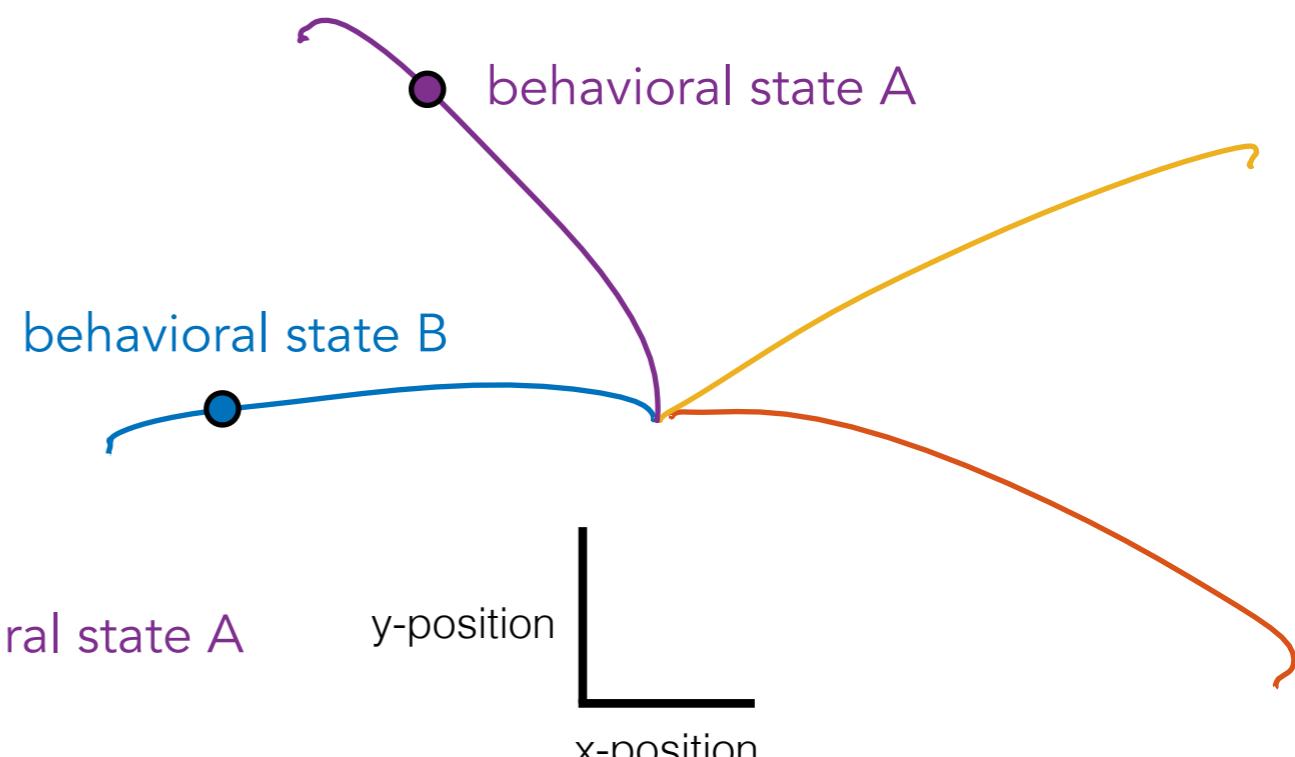


How MINT works

Idealized Neural Trajectories



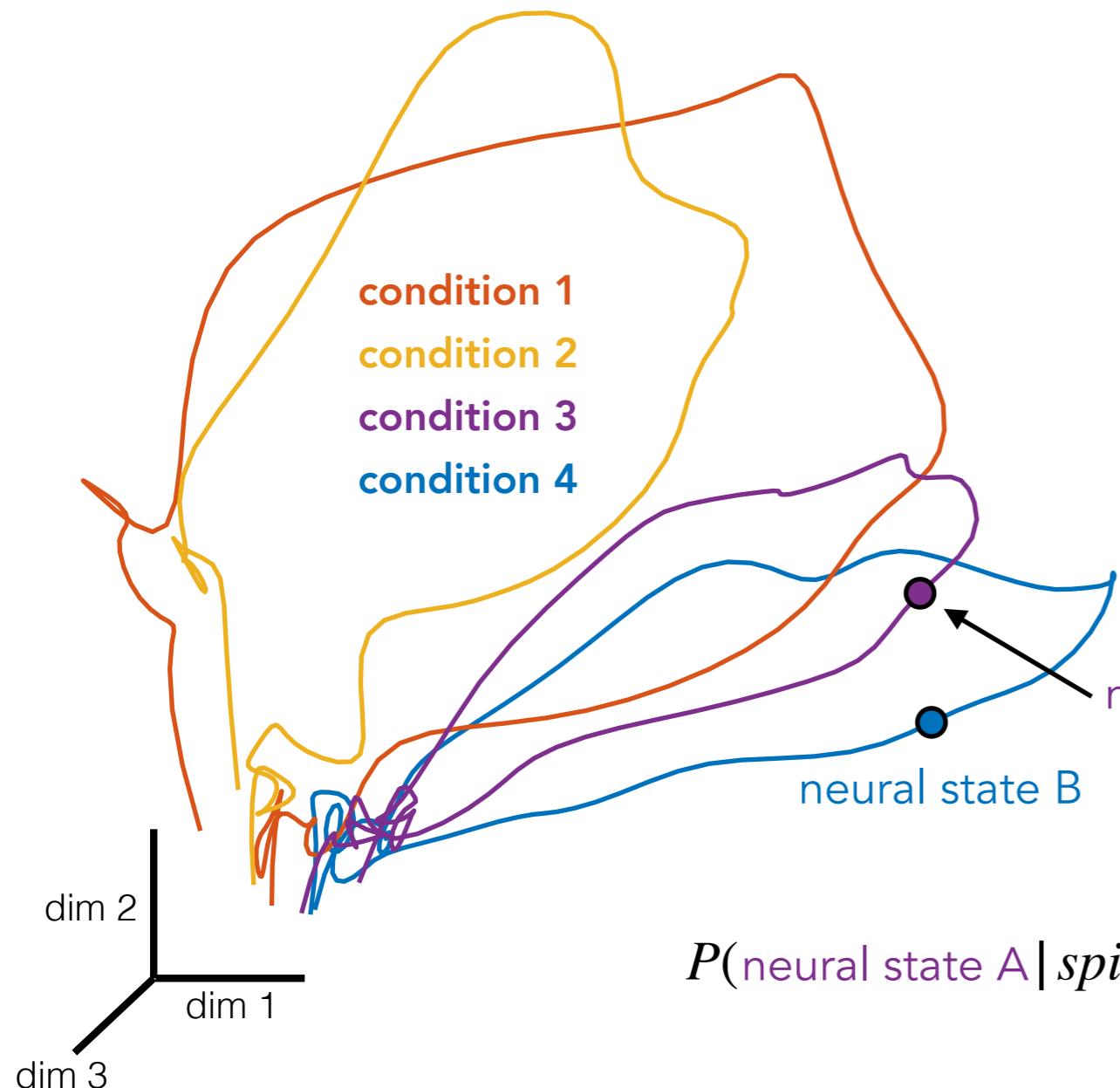
Behavioral Trajectories



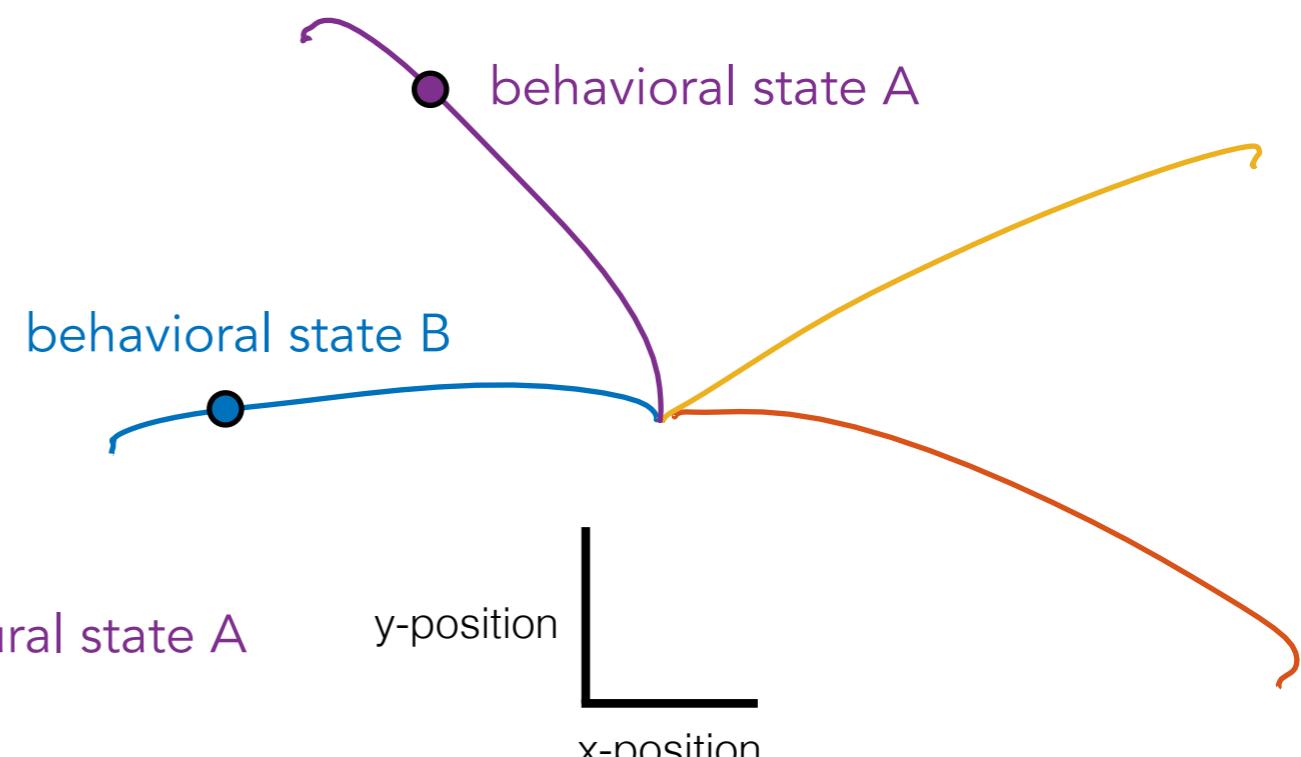
$$P(\text{neural state A} | \text{spikes}) > P(\text{neural state B} | \text{spikes})$$

How MINT works

Idealized Neural Trajectories



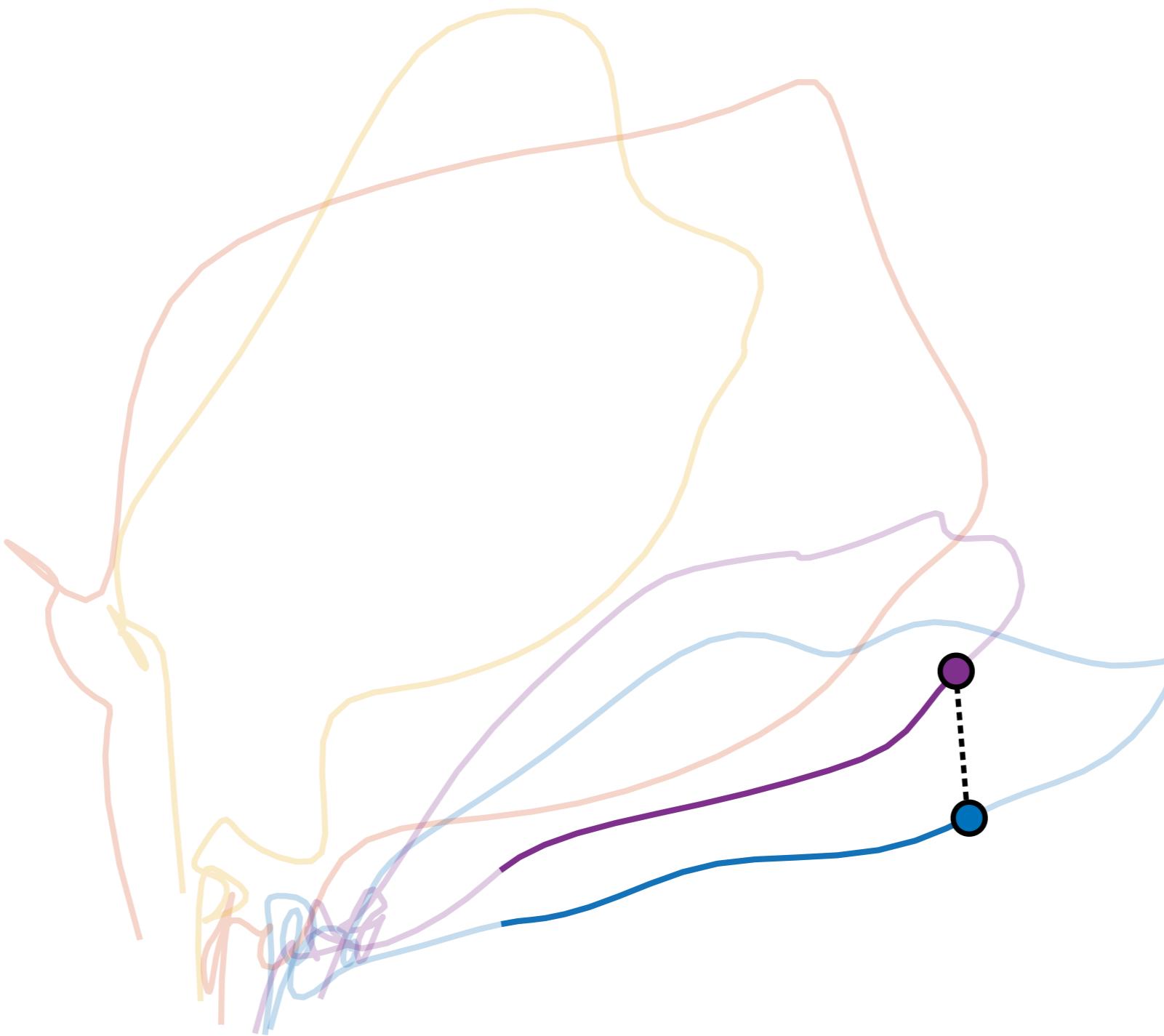
Behavioral Trajectories



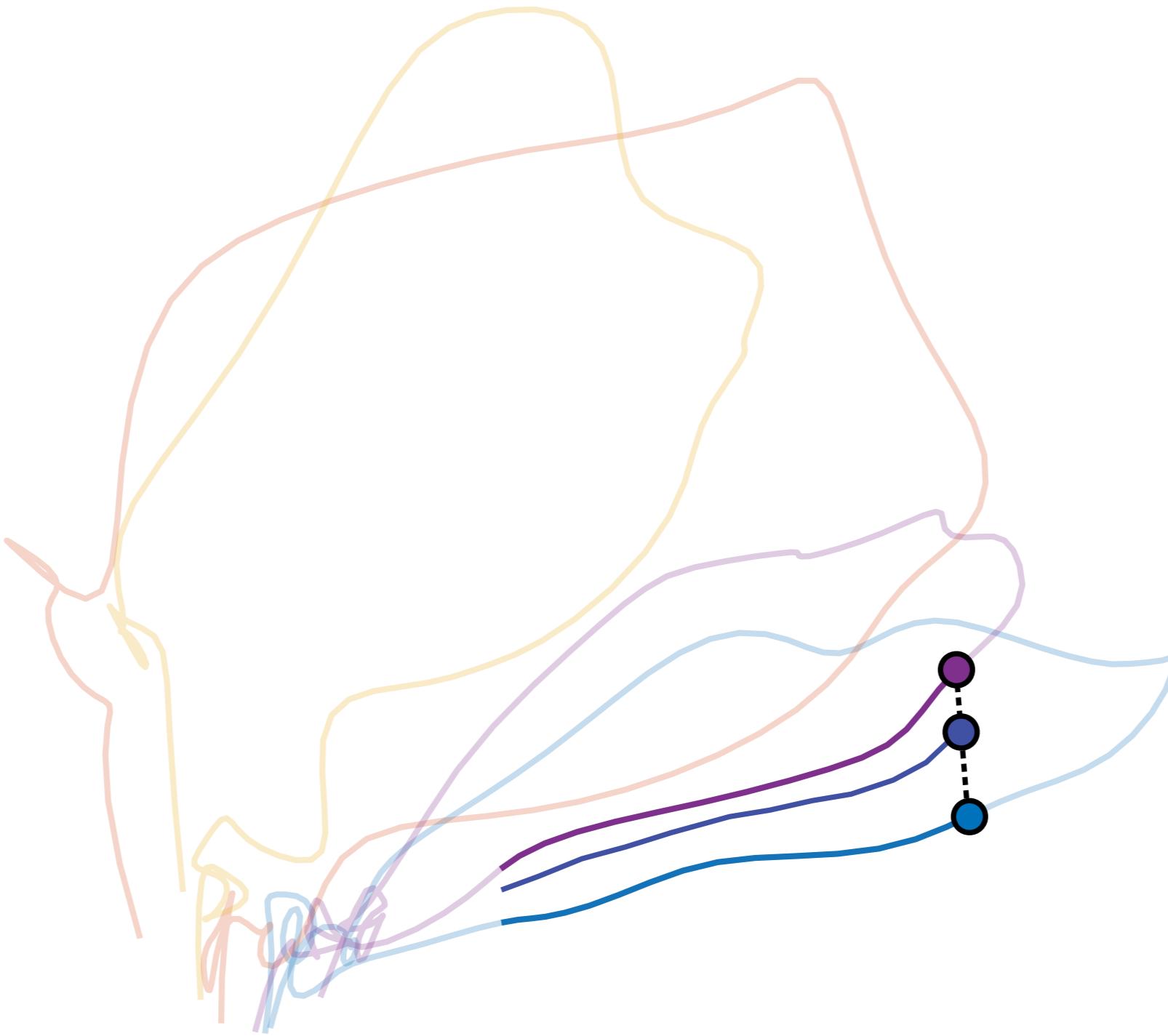
$$P(\text{neural state A} | \text{spikes}) > P(\text{neural state B} | \text{spikes})$$

estimate neural state A
decode behavioral state A

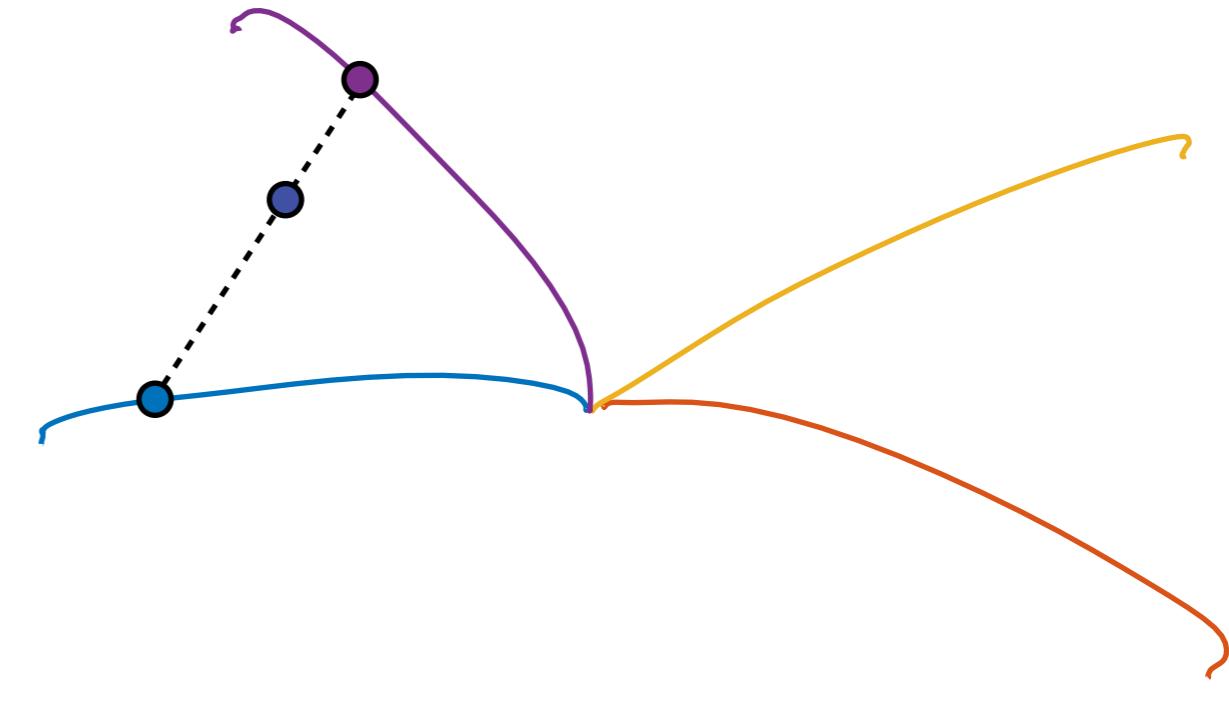
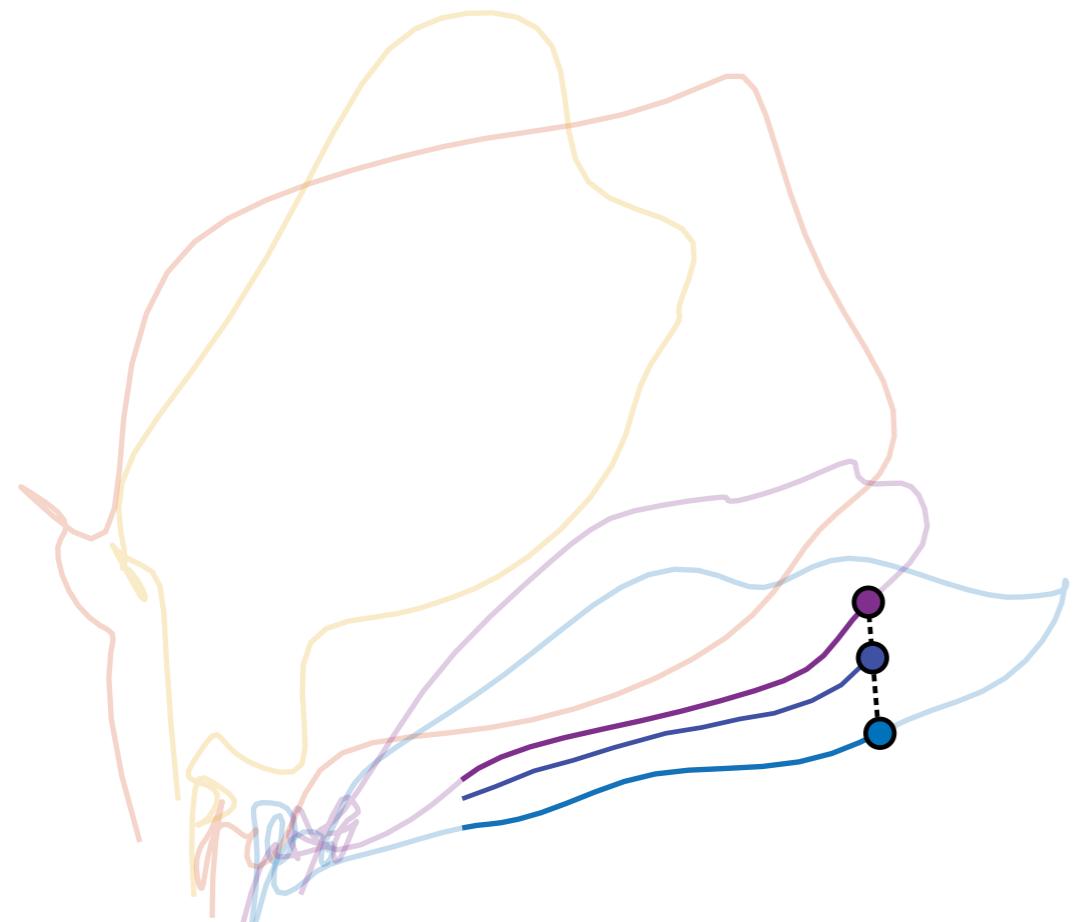
Generalizing between states



Generalizing between states

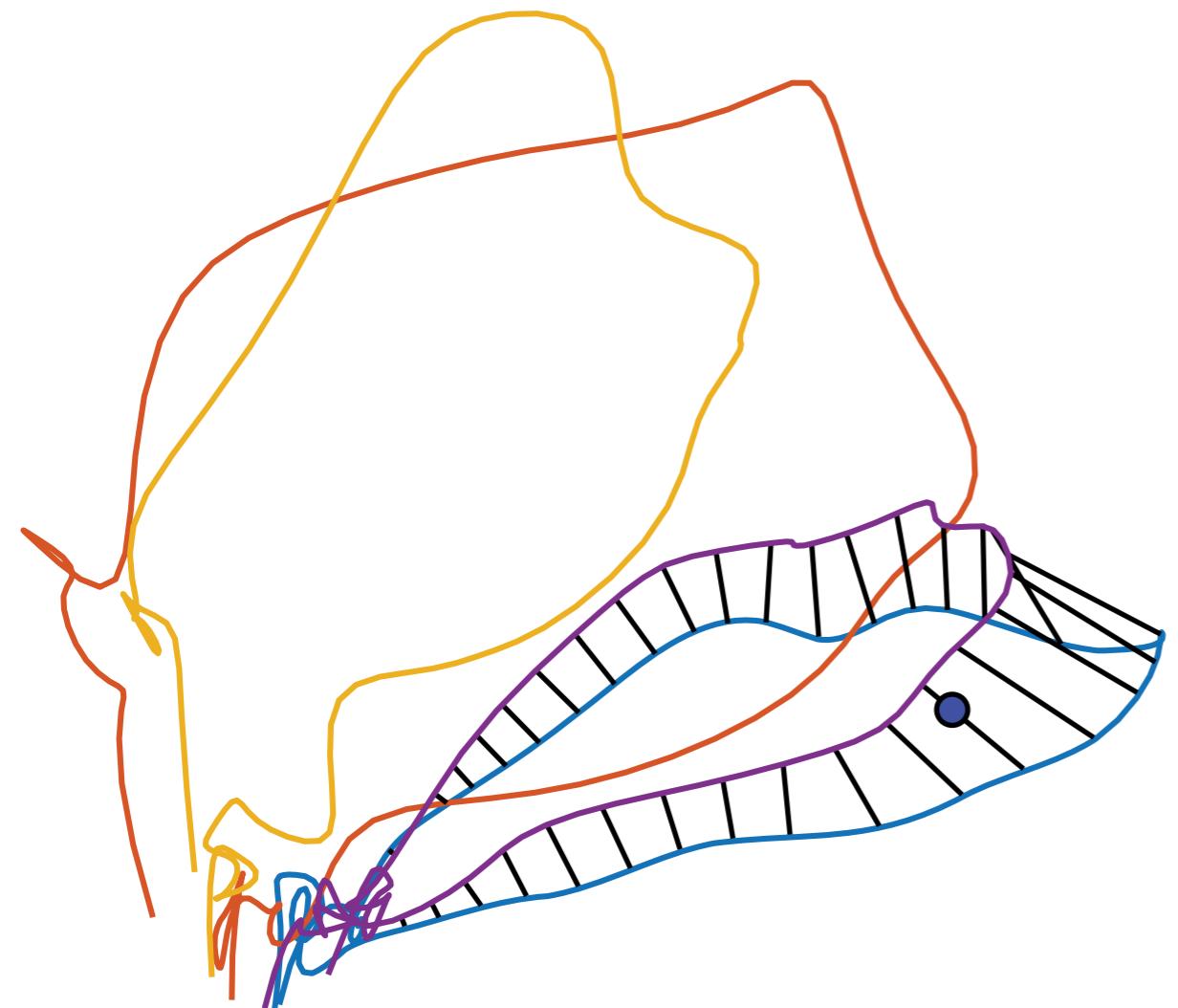


Generalizing between states

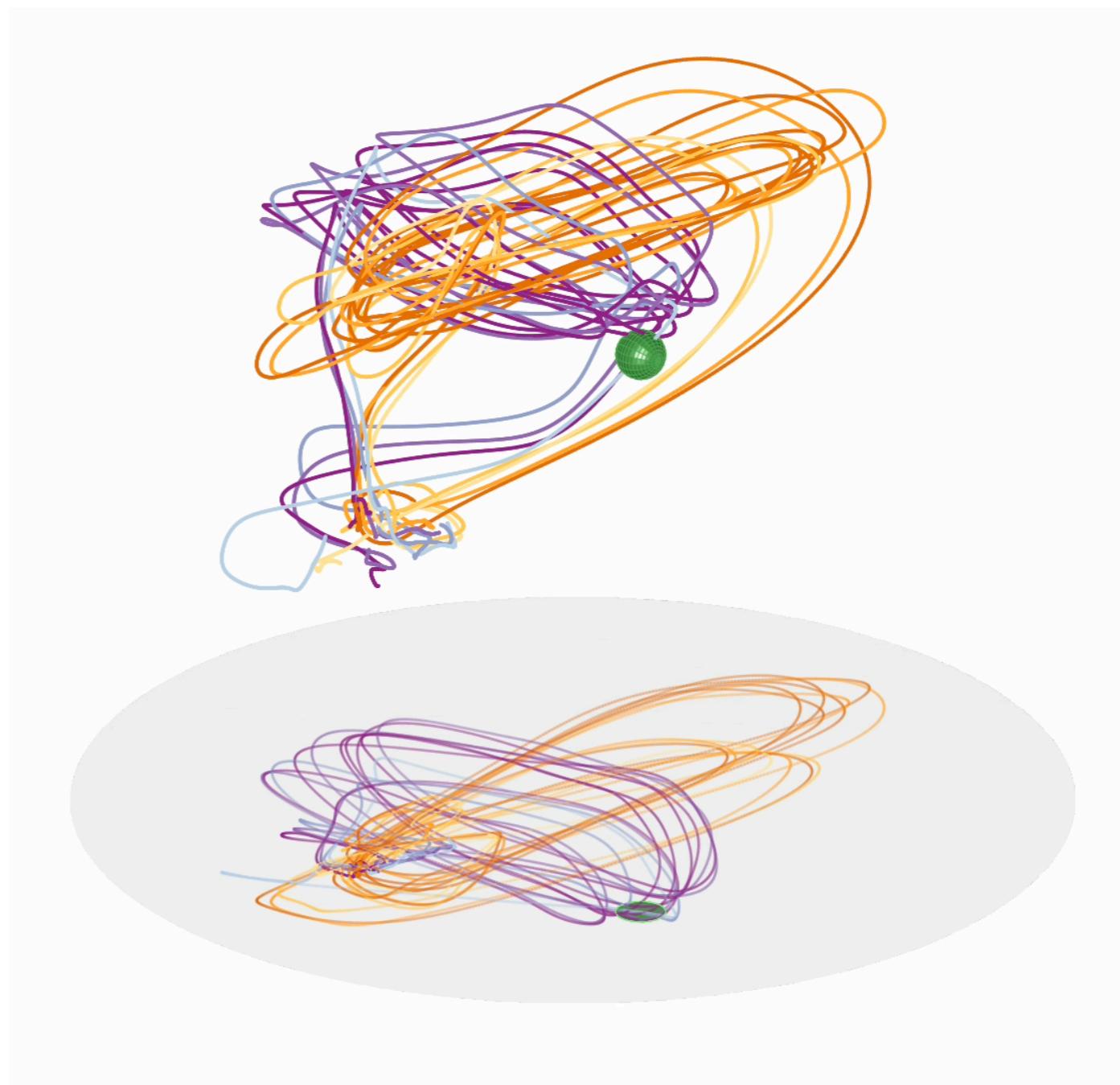


Mesh of Idealized Neural Trajectories (MINT)

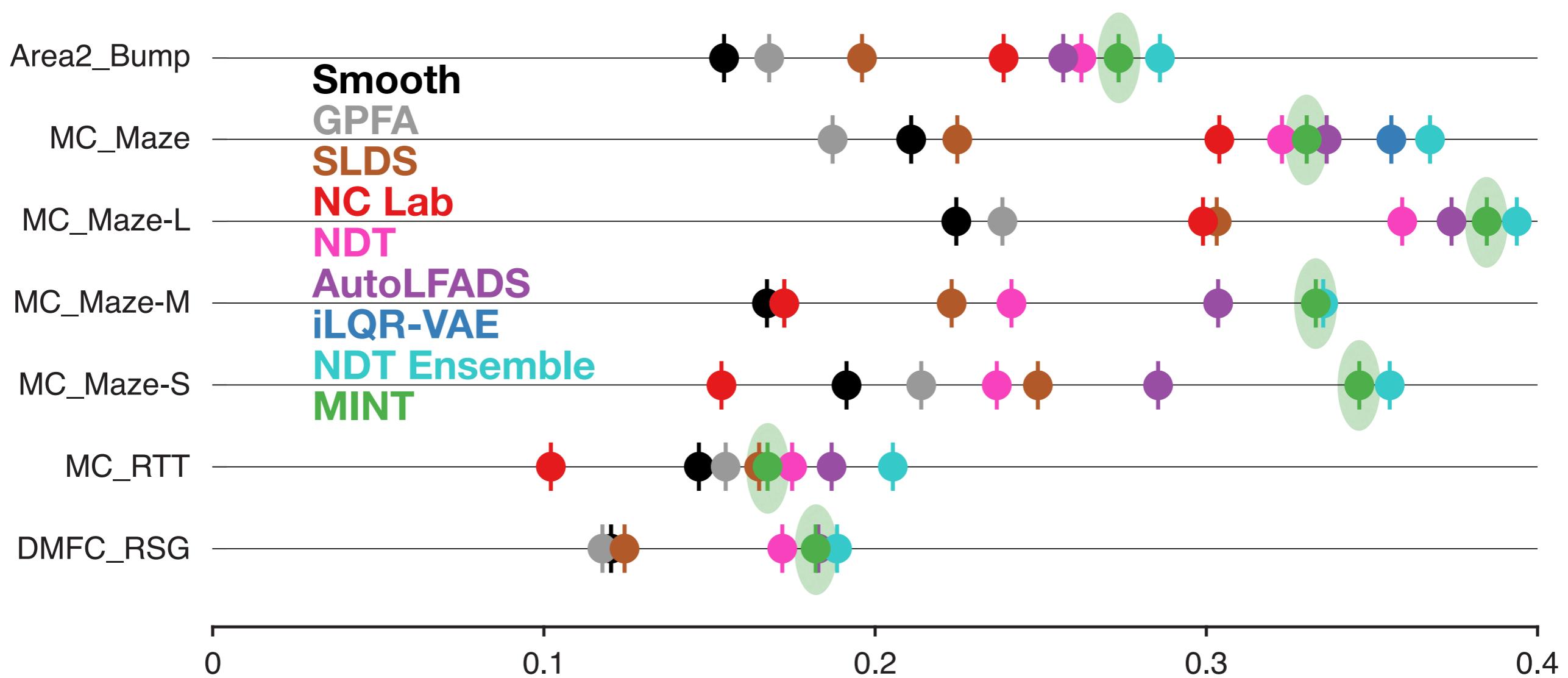
Reaching



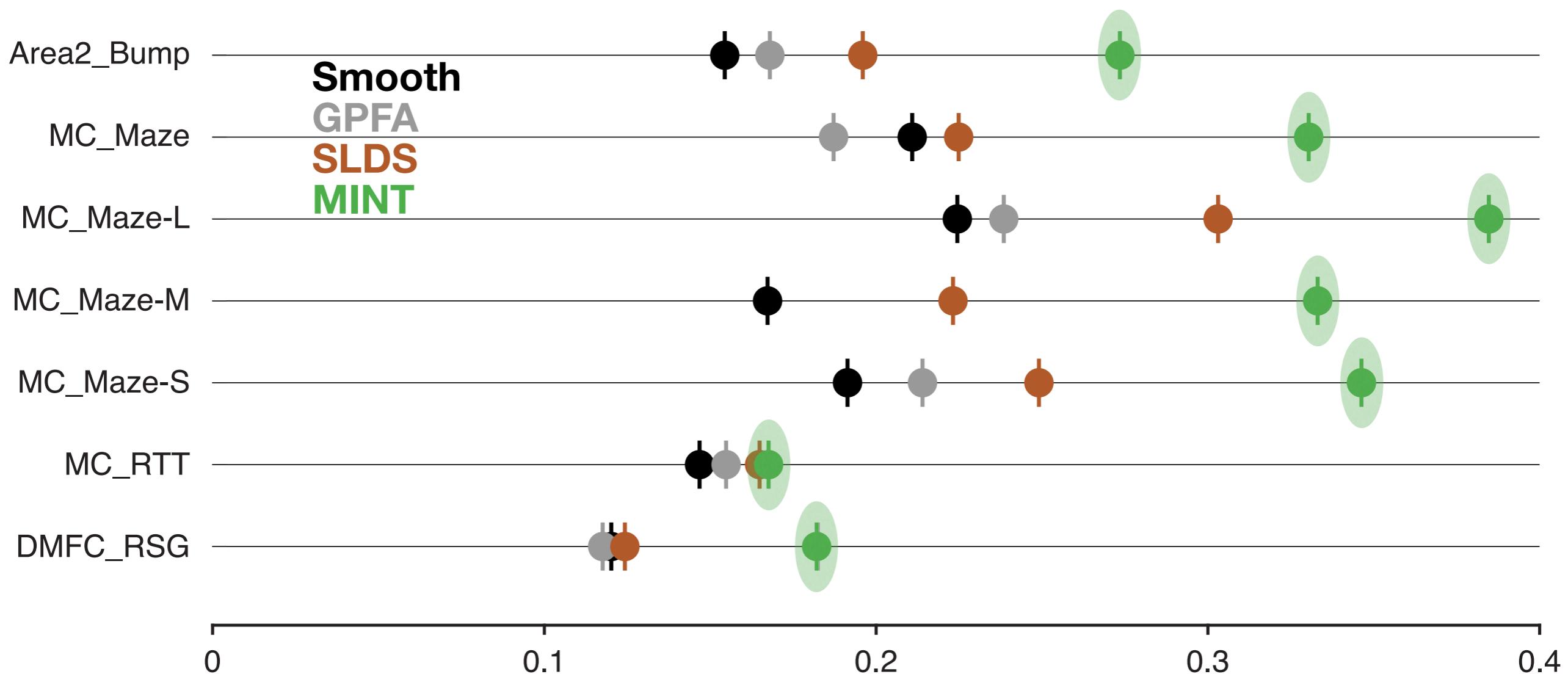
Cycling



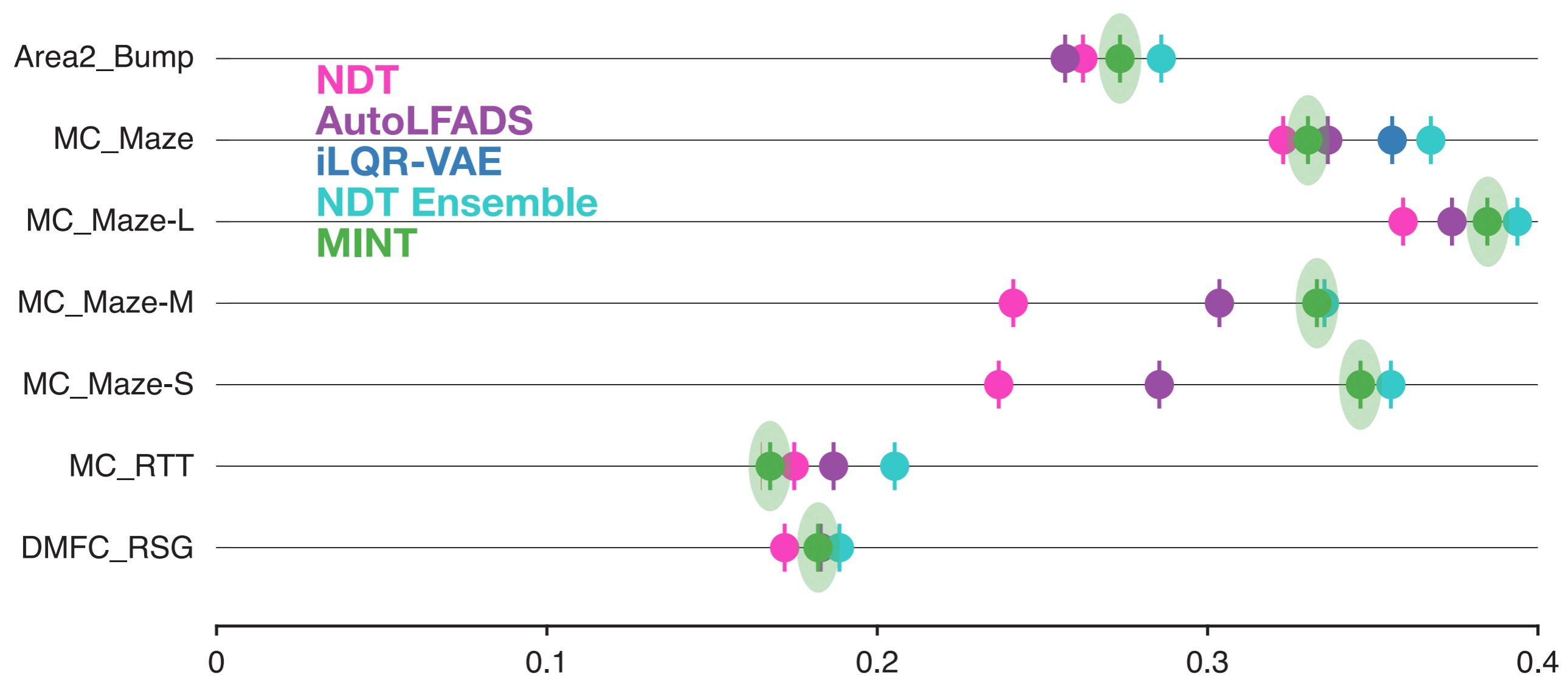
NLB - Bits Per Spike



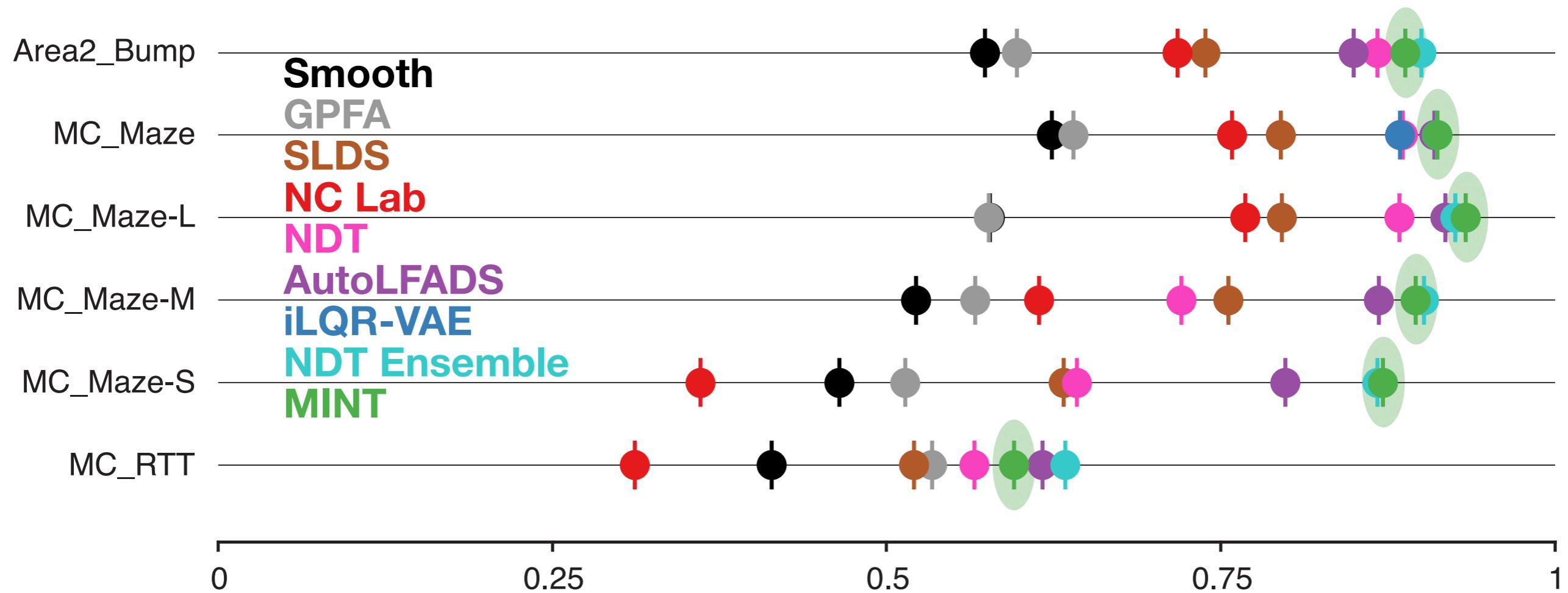
NLB - Bits Per Spike



NLB - Bits Per Spike



NLB - Velocity R²



A modular (interpretable) framework

$P(state)$

state prior

A modular (interpretable) framework

$P(state)$

state prior

$P(state_t | state_{t-1})$

state dynamics

A modular (interpretable) framework

$P(state)$

state prior

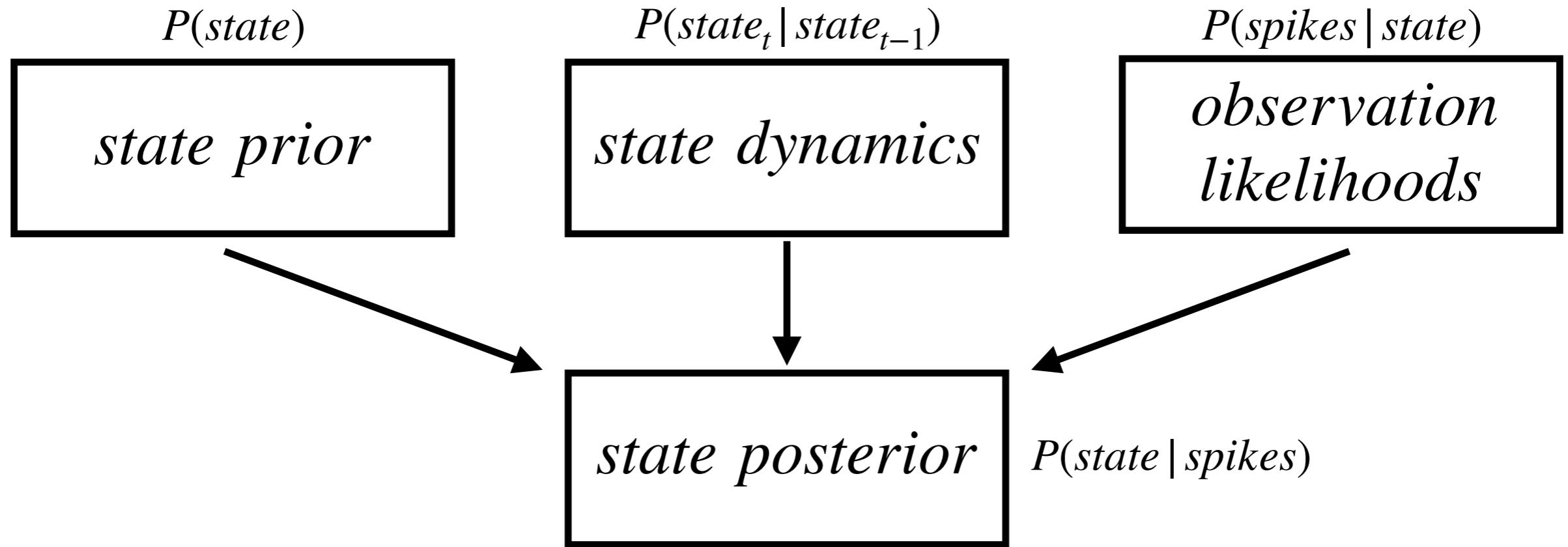
$P(state_t | state_{t-1})$

state dynamics

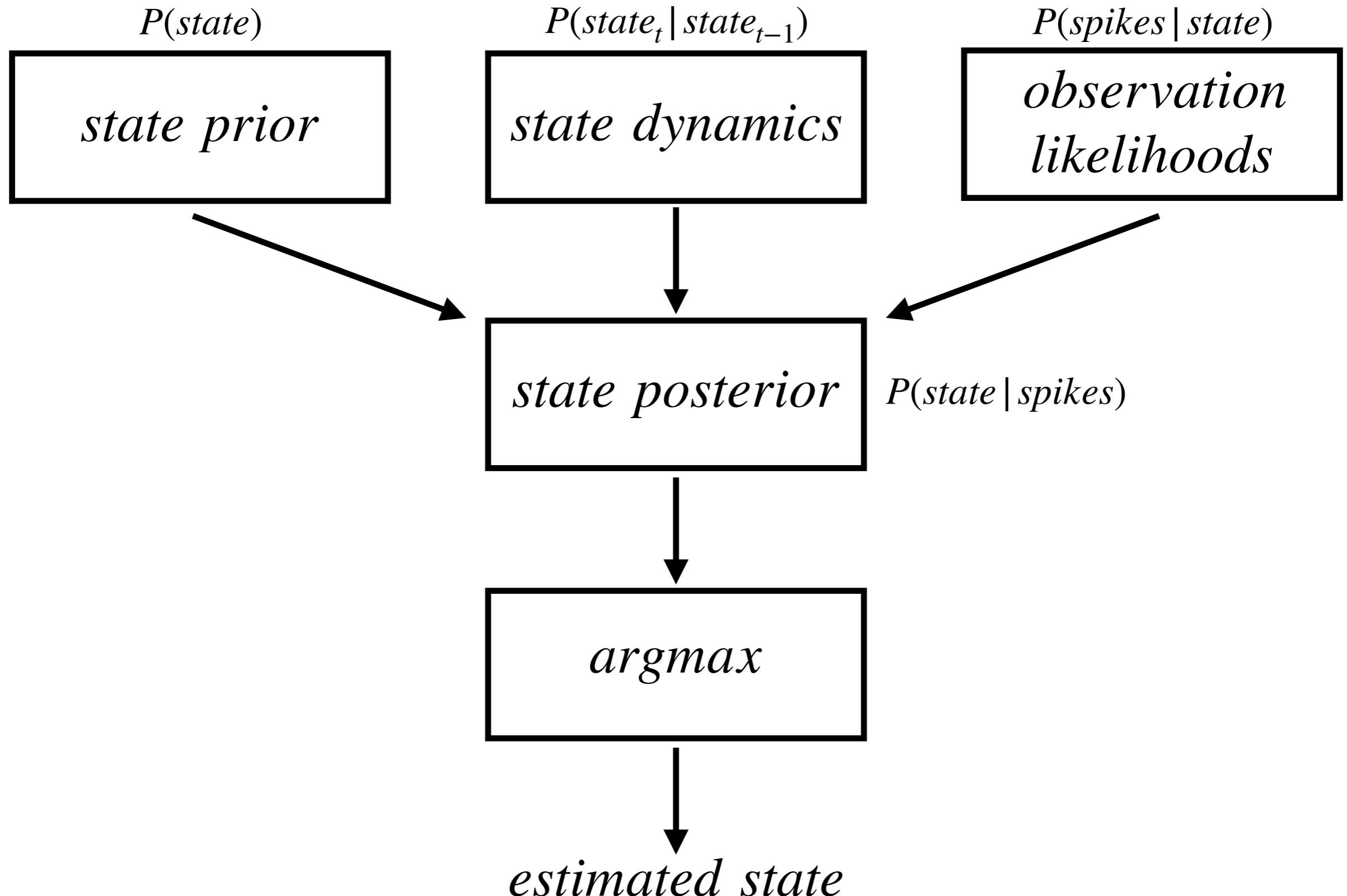
$P(spikes | state)$

*observation
likelihoods*

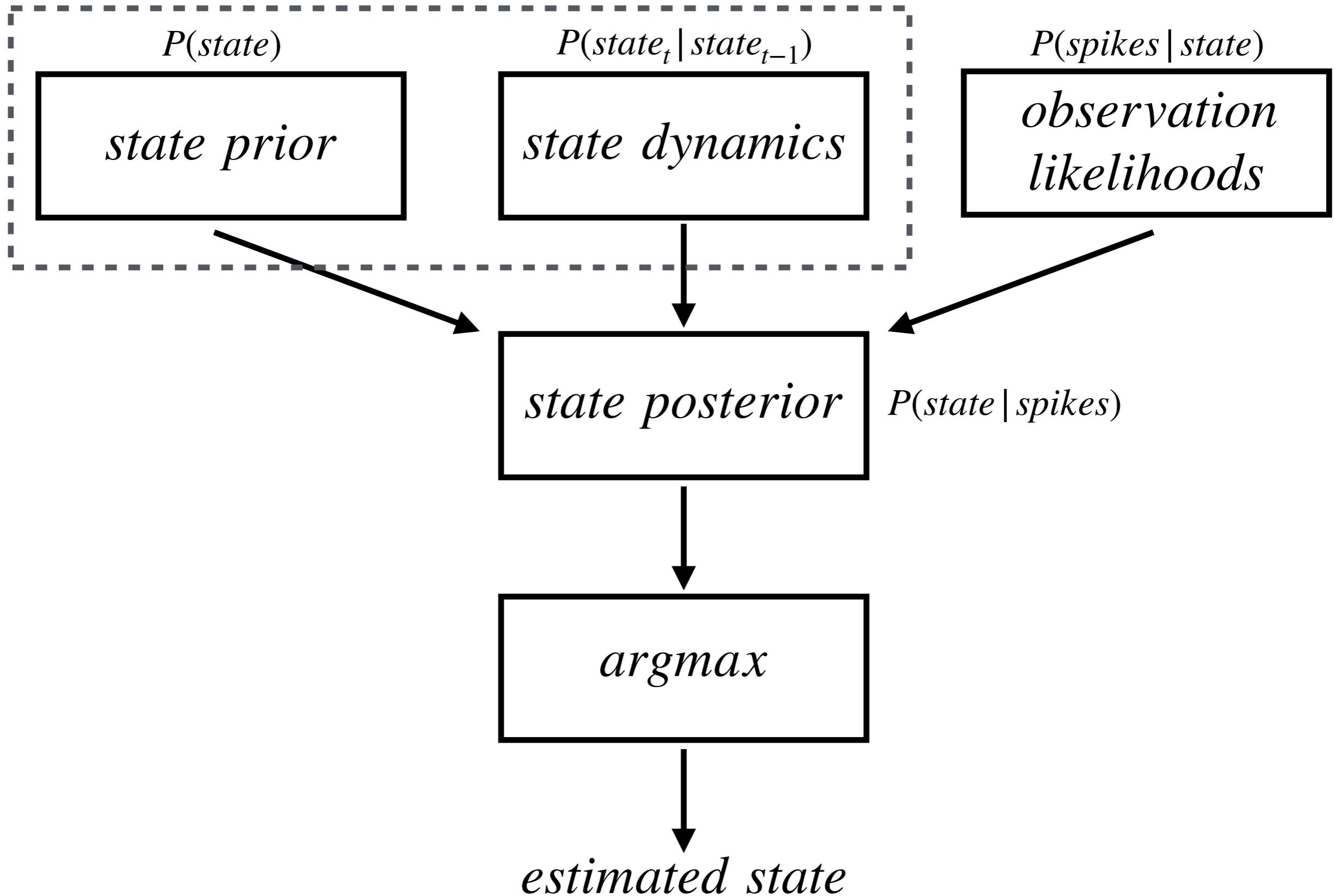
A modular (interpretable) framework



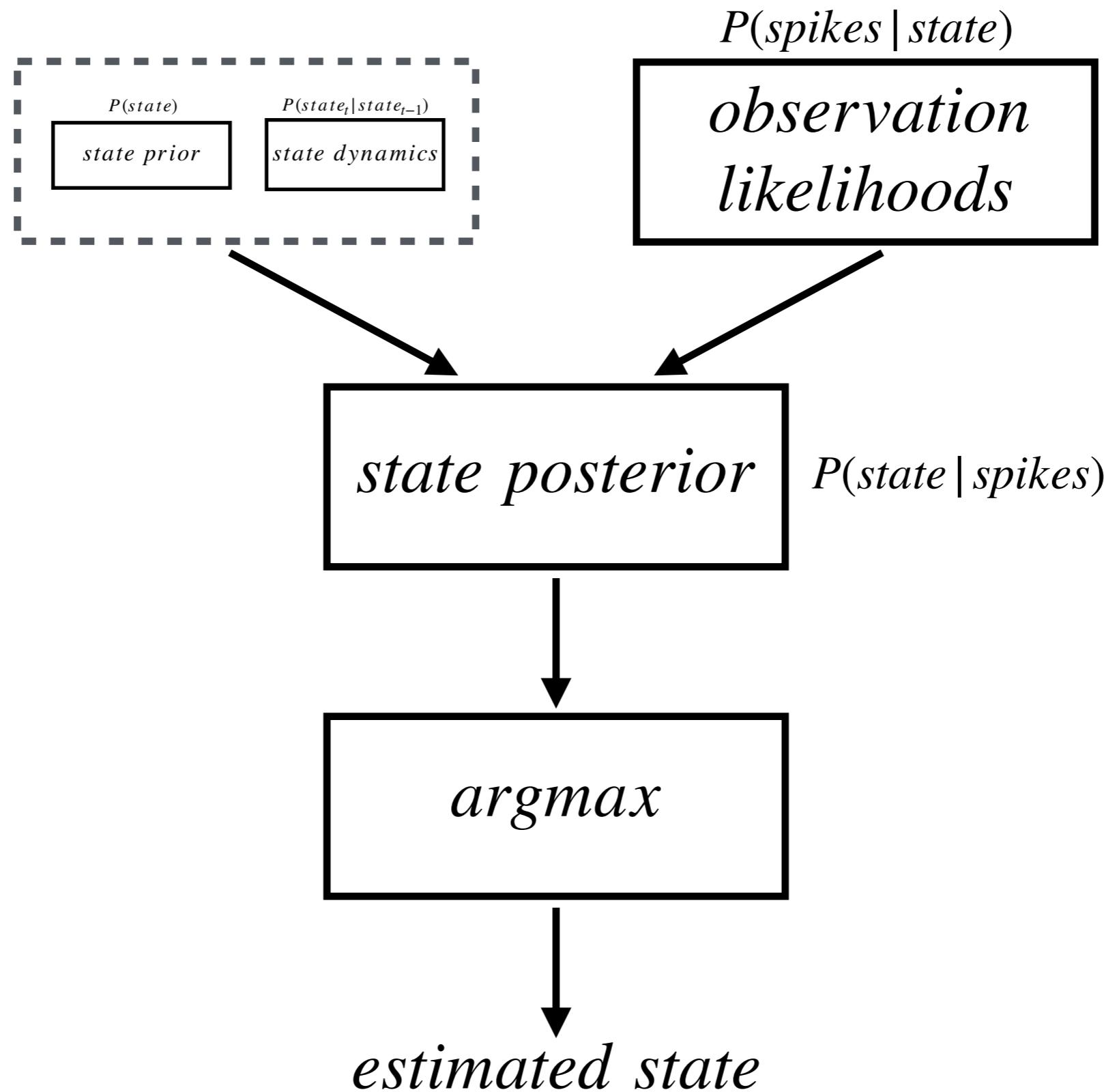
A modular (interpretable) framework



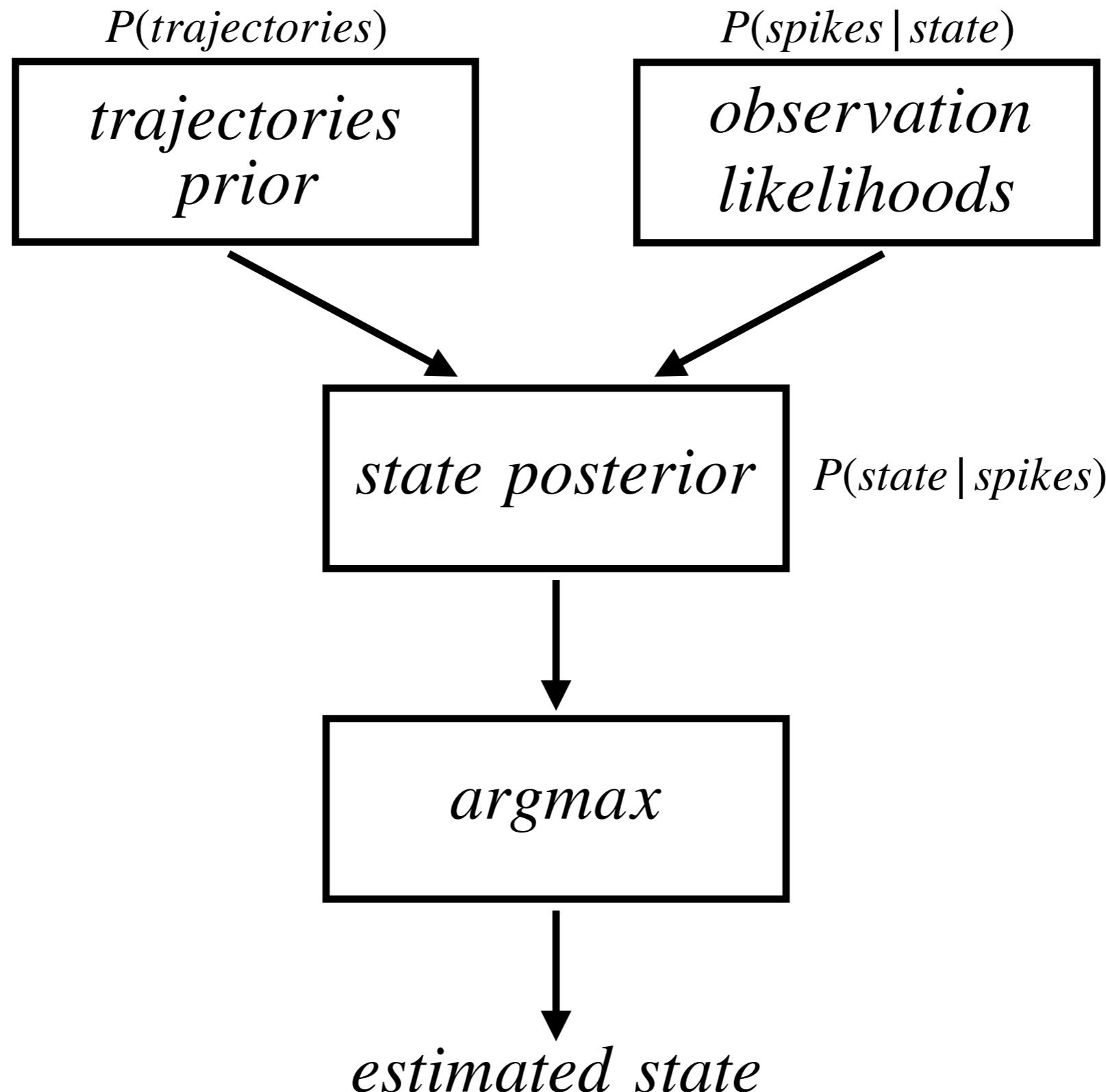
A modular (interpretable) framework



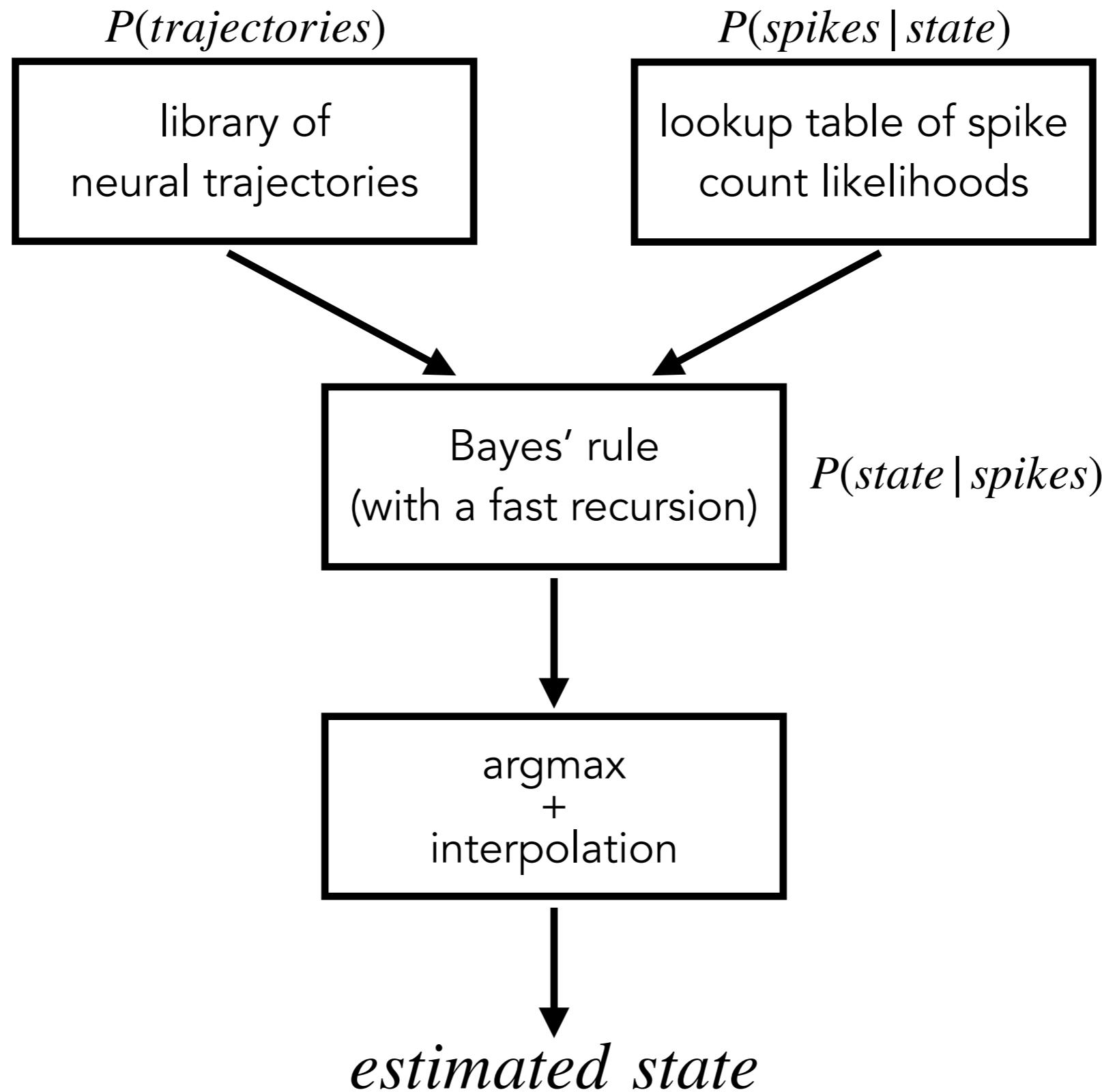
A modular (interpretable) framework



A modular (interpretable) framework



A modular (interpretable) framework



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