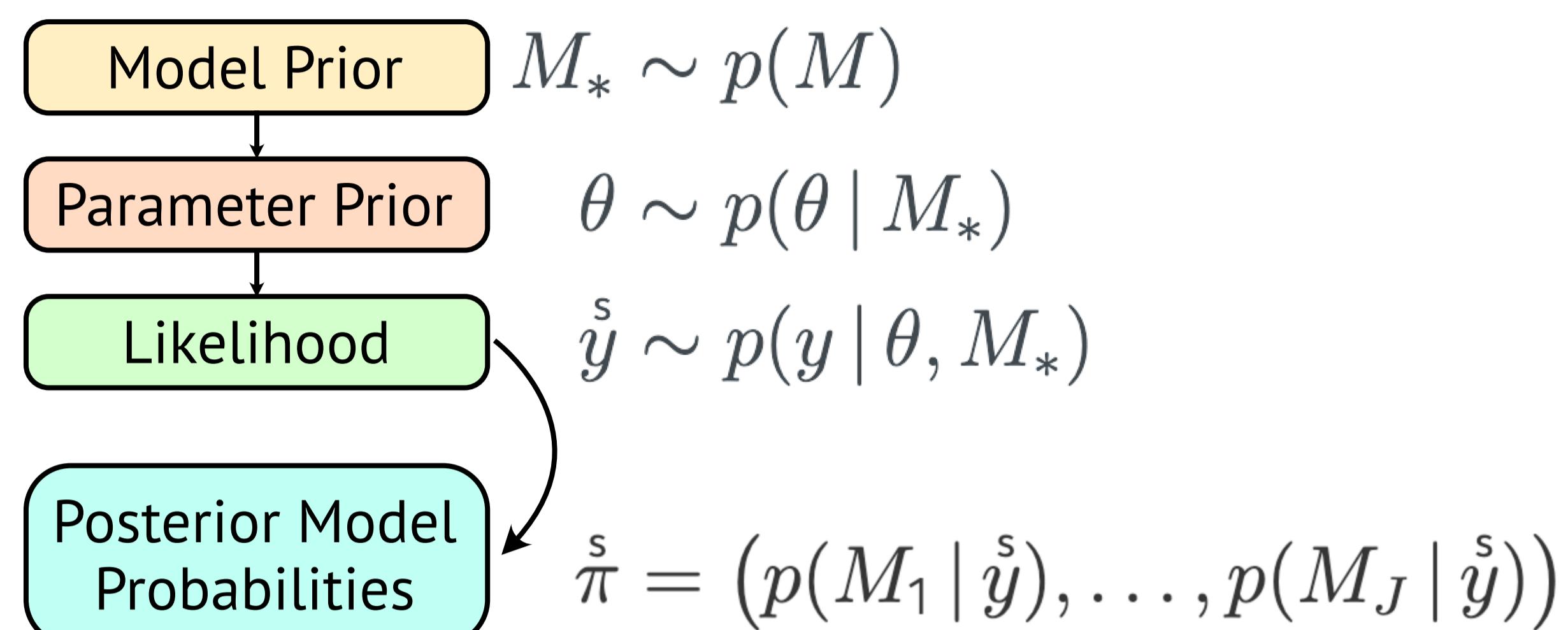


Meta-Uncertainty in Bayesian Model Comparison

Marvin Schmitt, Stefan T. Radev, Paul-Christian Bürkner

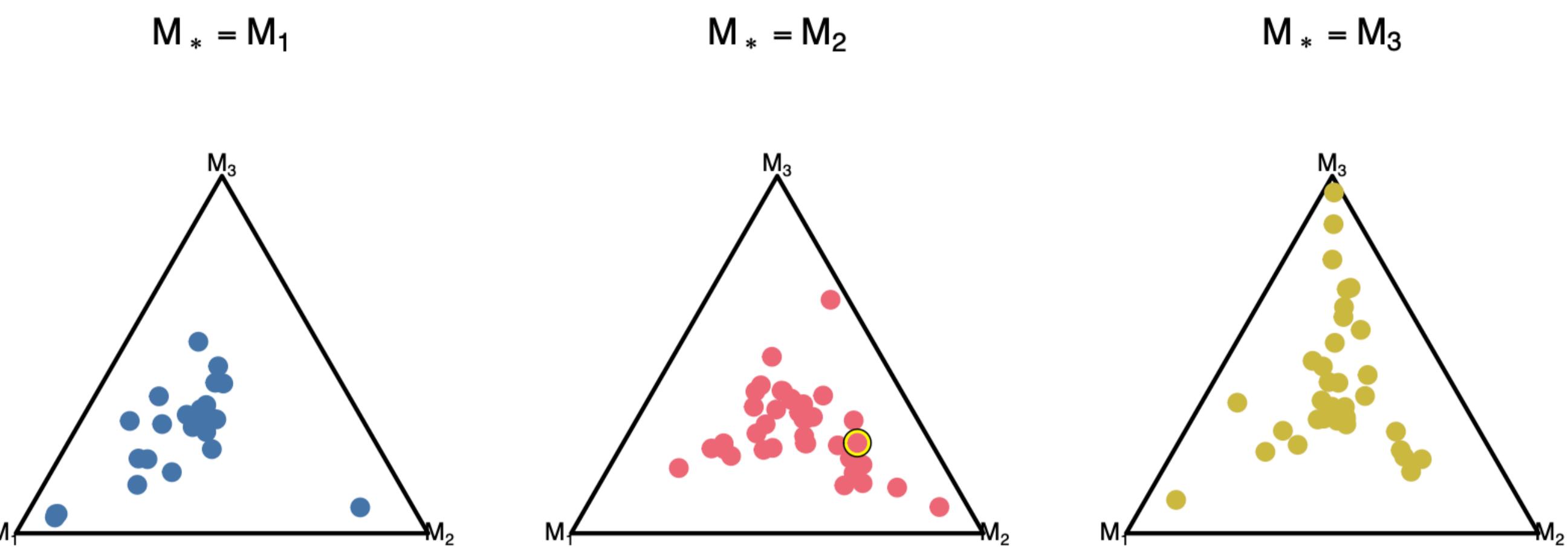


Level 1



Level 2

Model-implied PMP distributions from simulated data



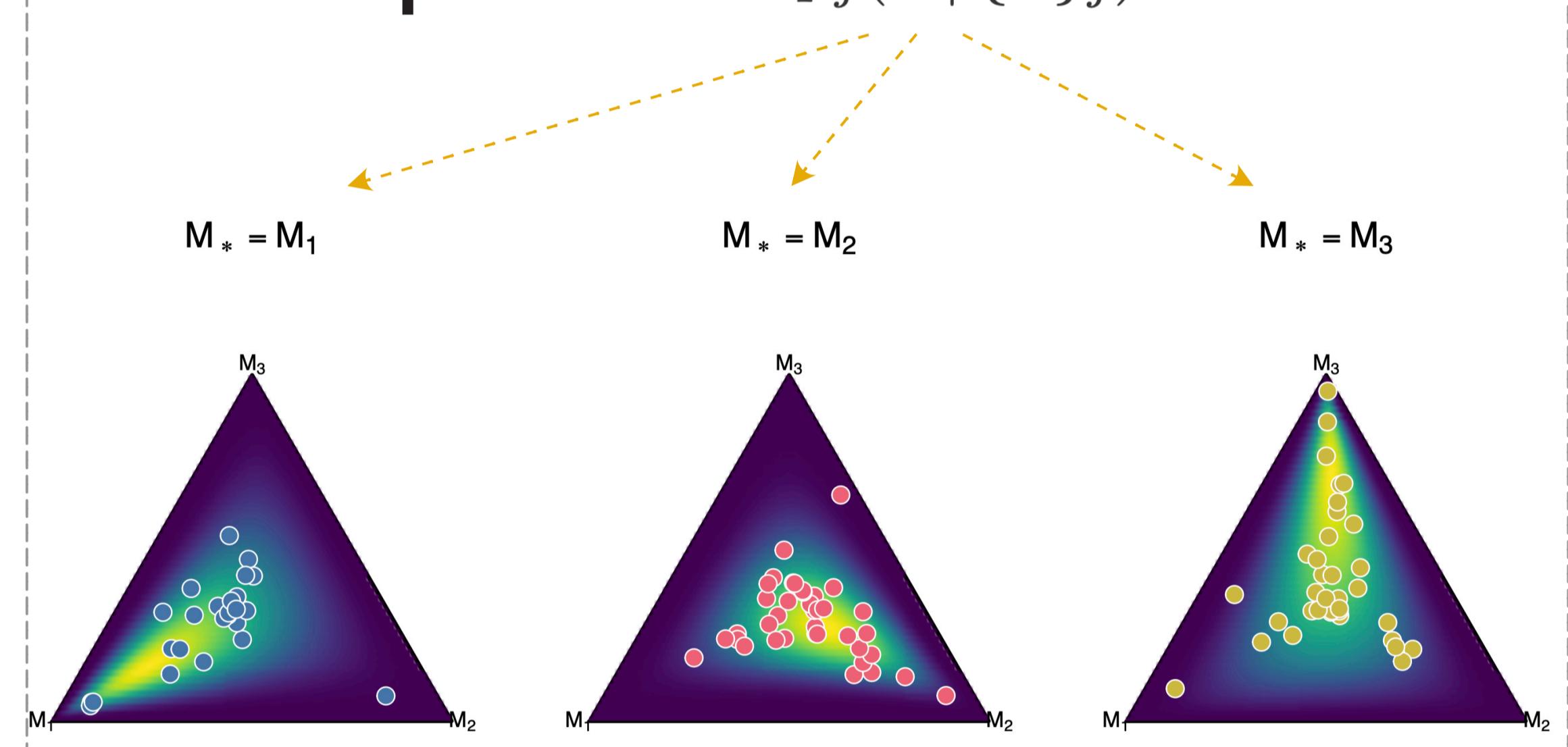
Level 3

Meta models

Data: Level 2 PMPs

Posterior: $p_j(\tau_j | \{\pi_j^s\})$

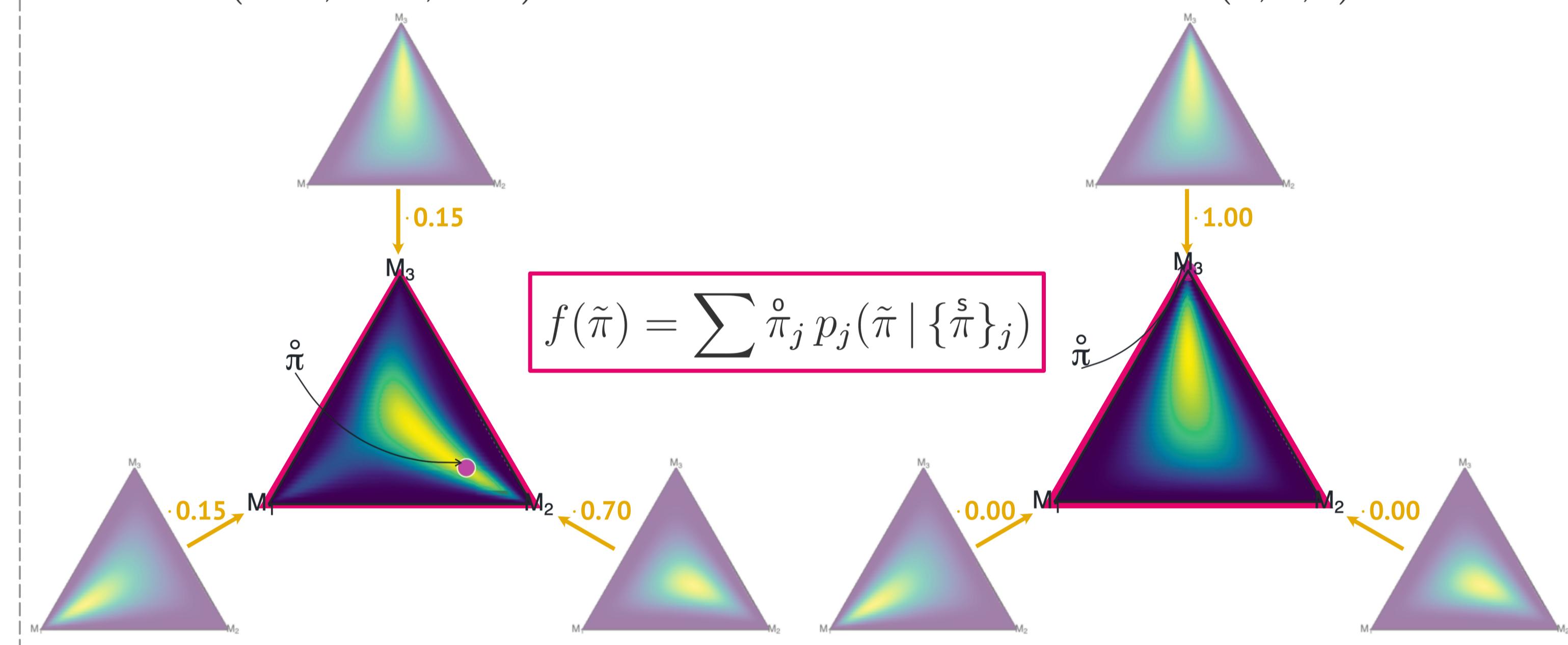
Posterior predictive: $p_j(\tilde{\pi} | \{\pi_j^s\})$



Predictive mixture

Example 1: moderate PMPs

$$\dot{\pi} = (0.15, 0.70, 0.15)$$



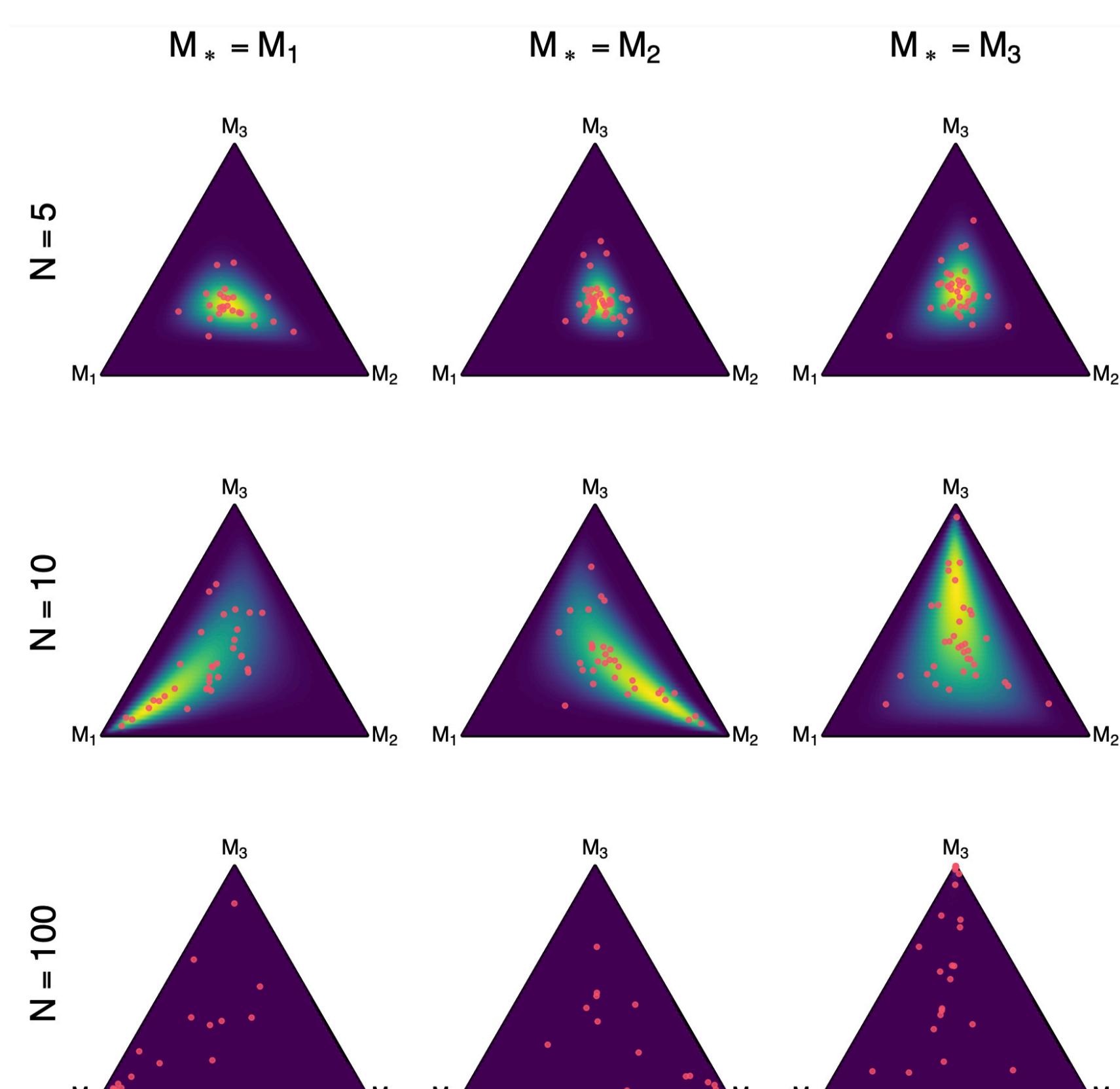
Posterior model probabilities are
measures of uncertainty
but they are also **uncertain** themselves.



Experiments

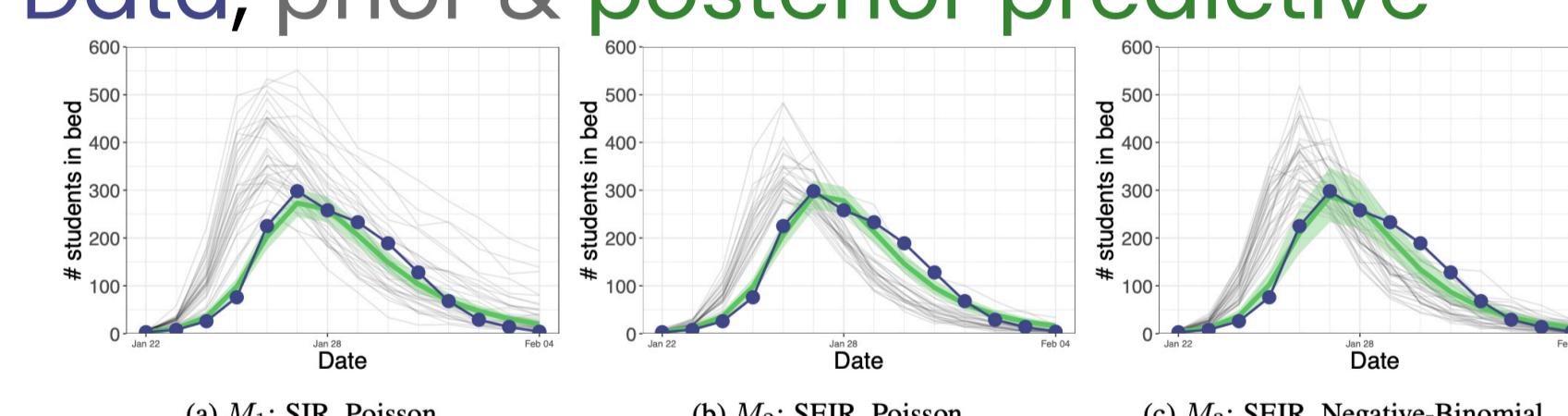
Toy Conjugate

Bayesian linear regression



Likelihood-based

Data, prior & posterior predictive



Level 2 and Level 3

$M_* = M_1$

$M_* = M_2$

$M_* = M_3$

Predictive mixture

not overconfident!

Simulation-based

Hodgkin-Huxley model: neural activity

Level 2 and Level 3

$M_* = M_1$

$M_* = M_2$

$M_* = M_3$

Observed data

Predictive mixture