Comparing Priors for Estimating Sparse Ordinal Indicators in Bayesian Factor Analyses

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The Problem

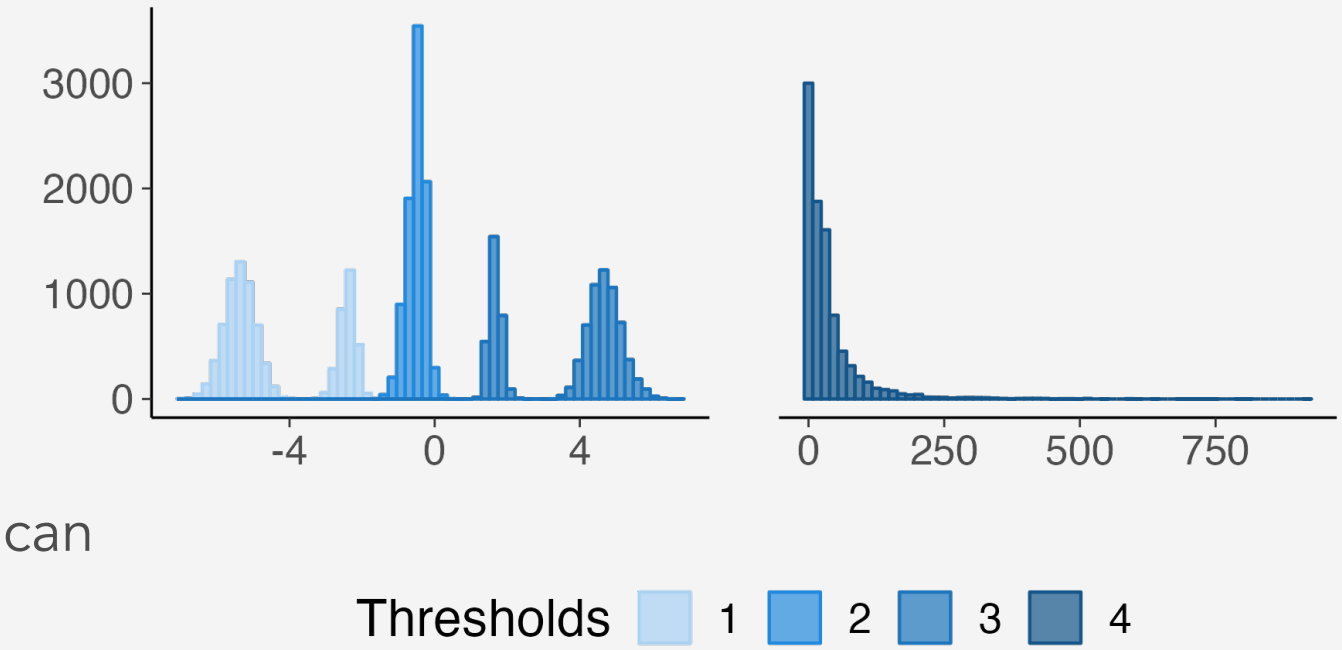
Burnout Assessment Tool (Schaufeli et al., 2019)

	Never	Rarely	Sometimes	Often	Always
I'm cynical about what my work means to others	☐	☐	☐	☐	☐

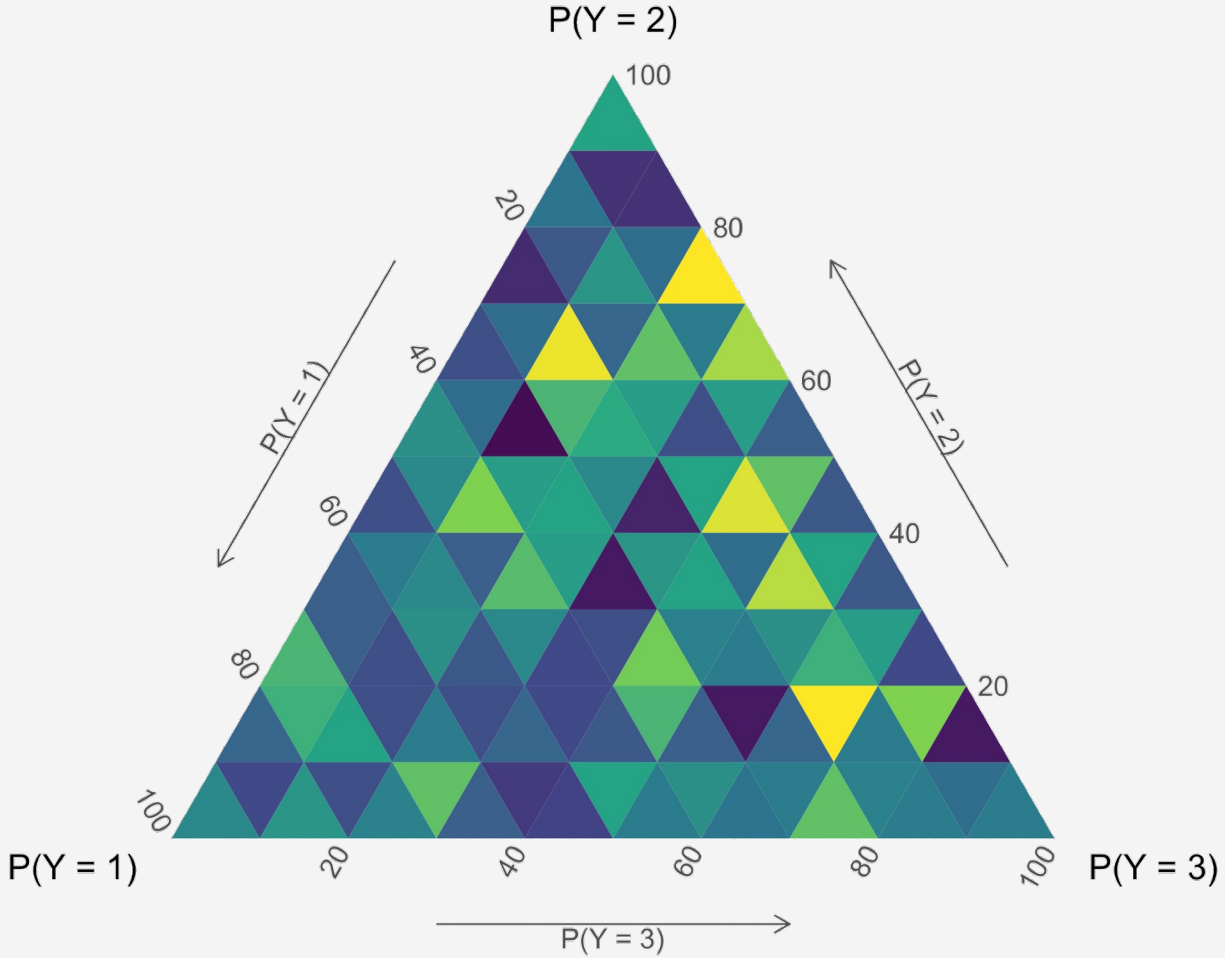

```
Warning message:
In lav_model_vcov(lavmodel = lavmodel, lavsamplestats = lavsamplestats,
  lavaan WARNING:
    The variance-covariance matrix of the estimated parameters (vcov)
    does not appear to be positive definite! The smallest eigenvalue
    (= -9.102913e-16) is smaller than zero. This may be a symptom that
    the model is not identified.
```

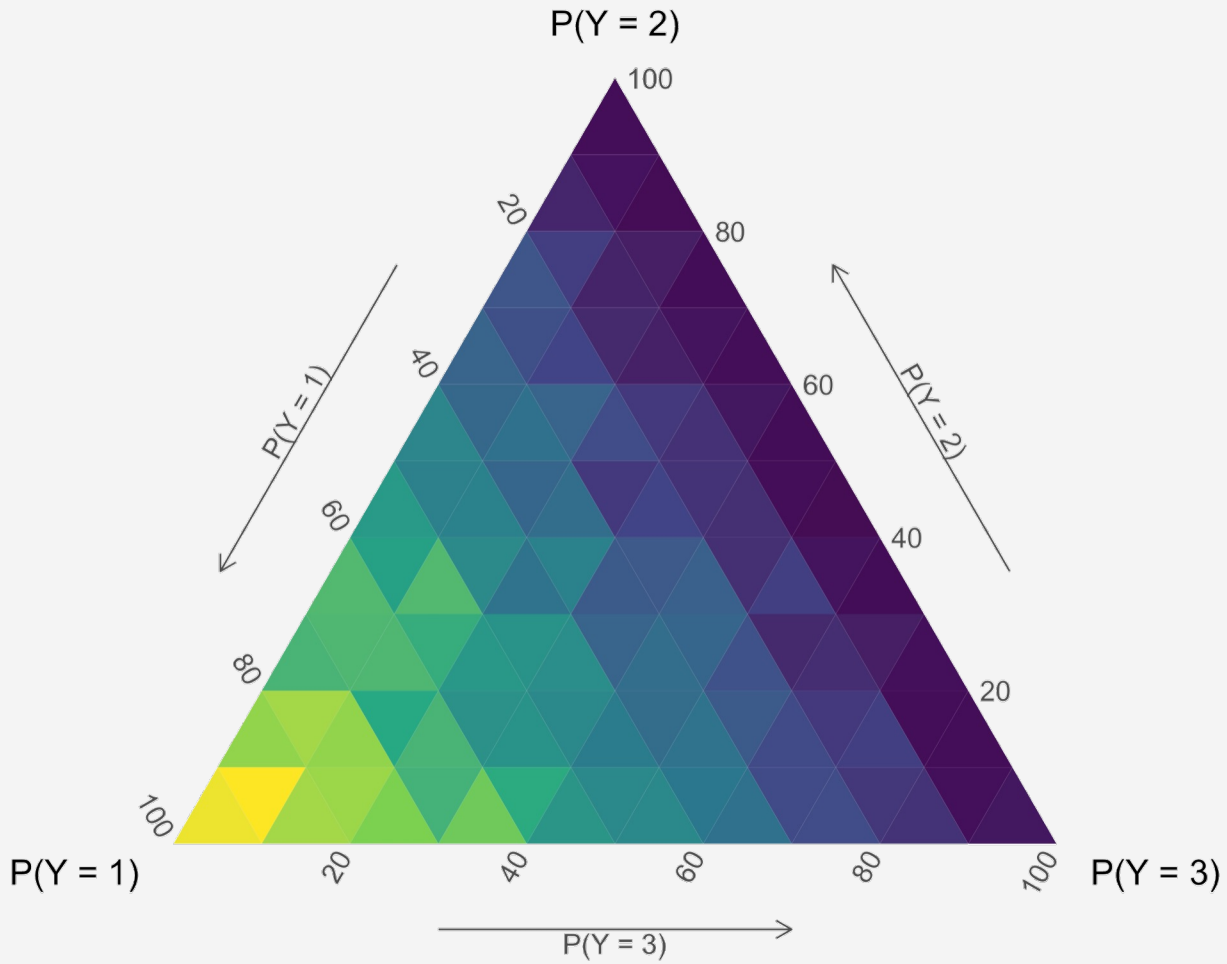
Bayesian Estimation + Alternative Priors

- Bayesian estimation with moderately informative priors on factor loadings and thresholds can improve
  - convergence rates
  - parameter estimate accuracy & stability (Bainter, 2017)
- Typically, prior on thresholds is based on univariate Normal distribution
  - with sparse response categories, can cause
    - convergence issues
    - inefficient threshold estimates

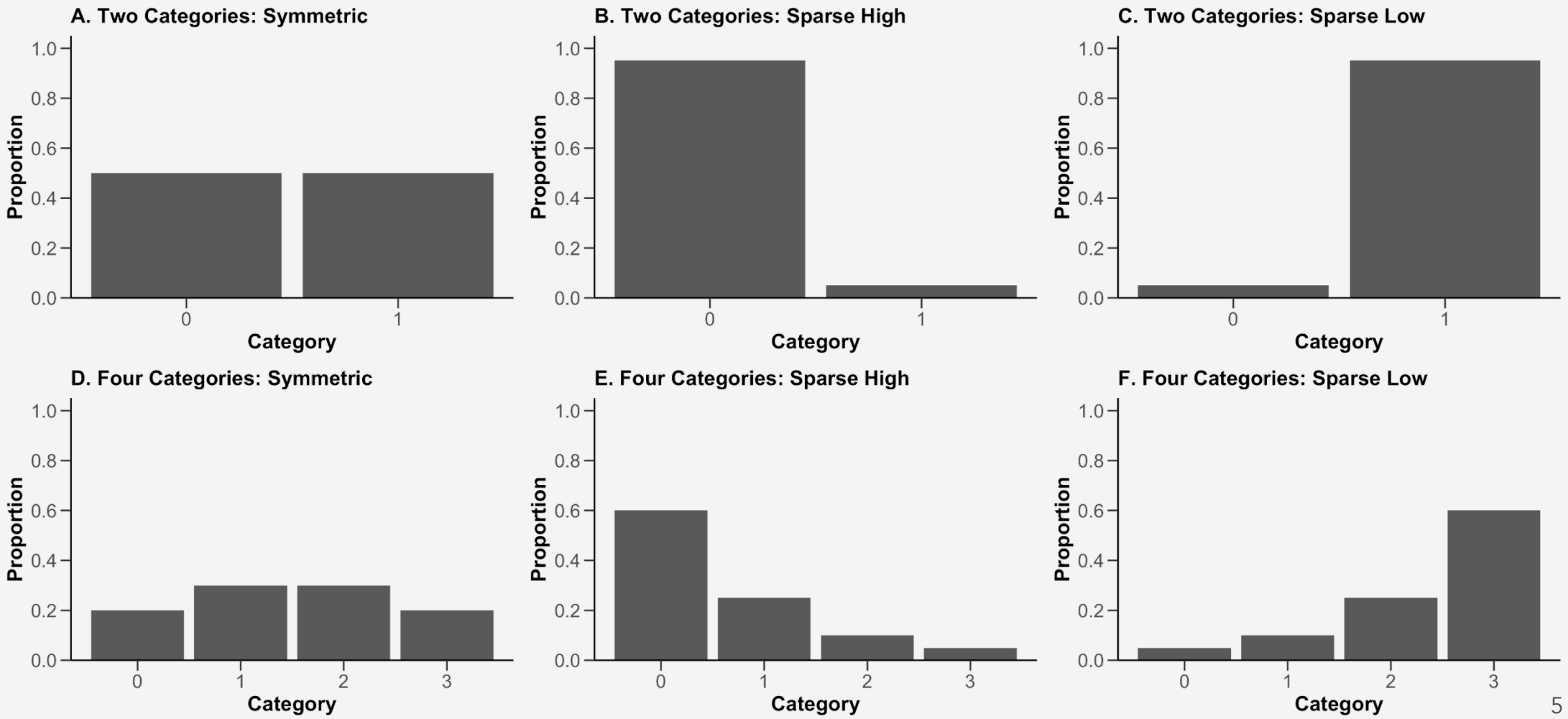


Alternative Prior: Multivariate Dirichlet

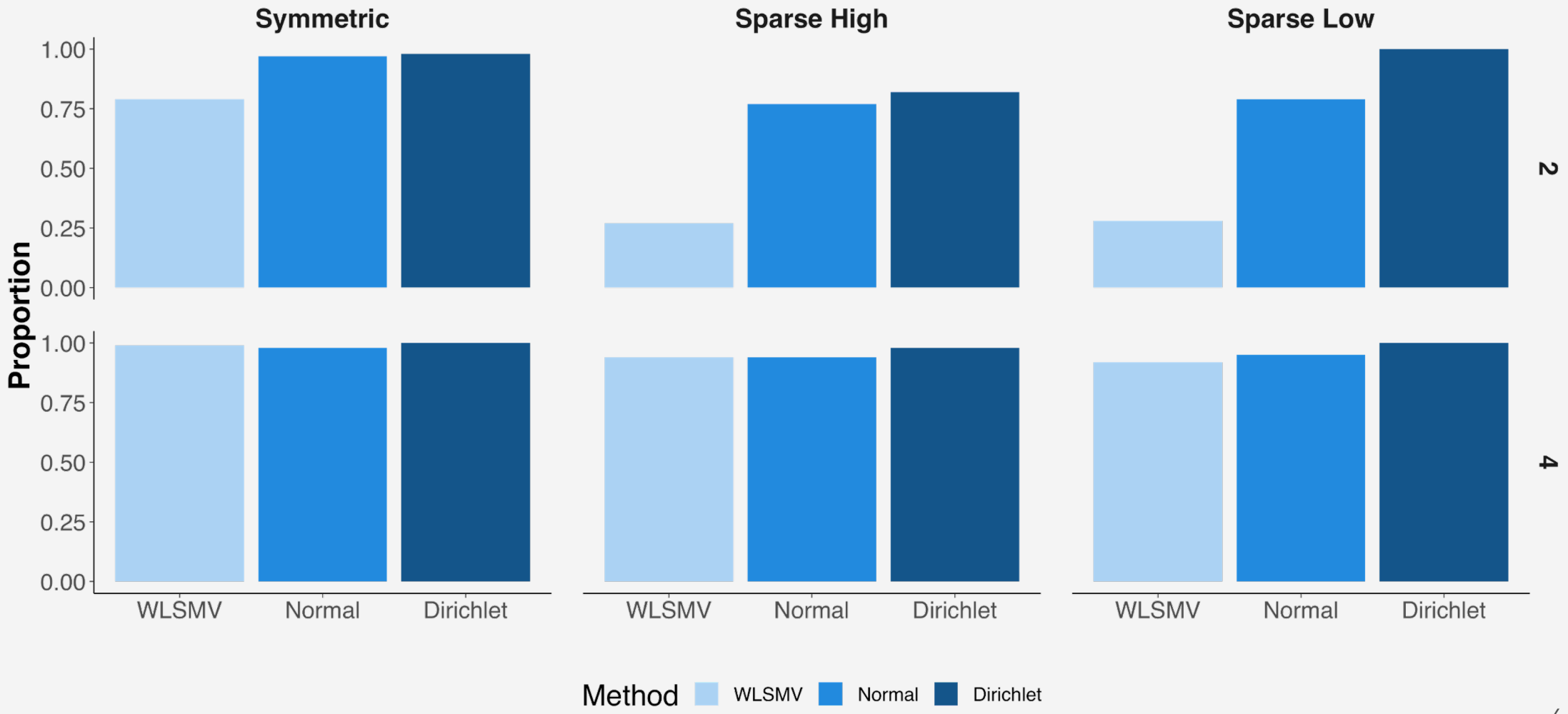




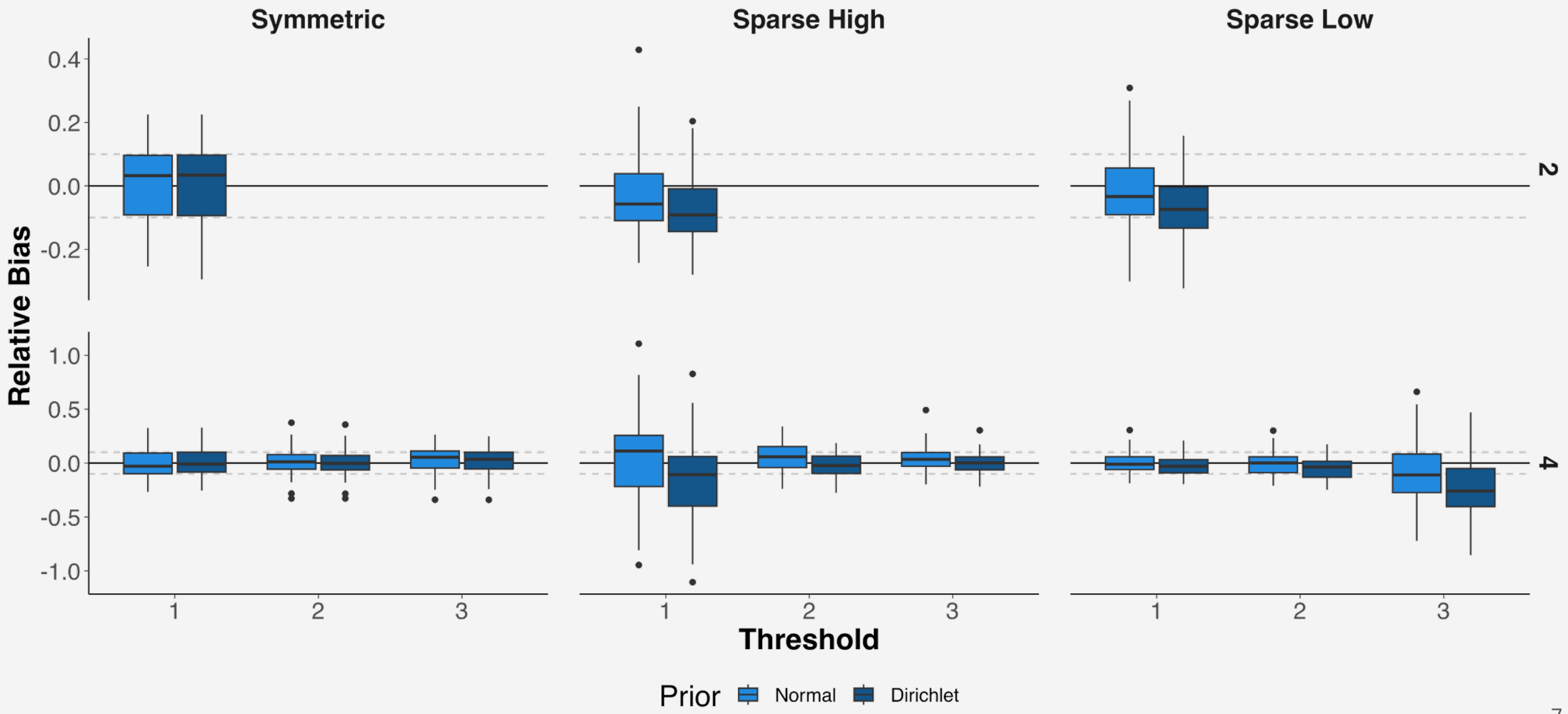
Simulation Study: Response Distributions



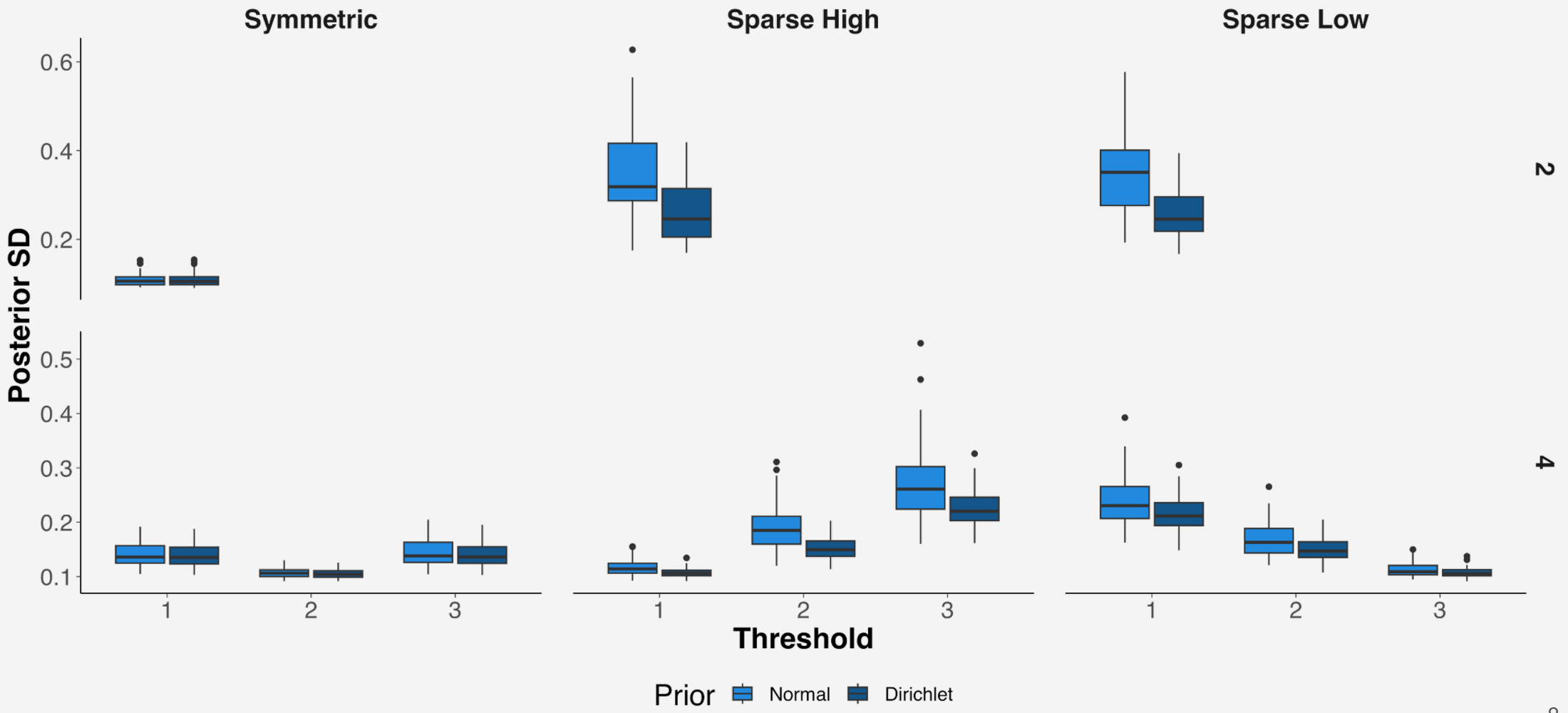
Convergence



Relative Bias



Posterior SD



Conclusions & Next Steps

The Dirichlet distribution is a promising alternative to the Normal distribution for estimating threshold parameters

- Improved convergence
- Similar bias
- Improved efficiency

Next Steps:

- Examine additional conditions, prior specifications, parameters
- Refine Dirichlet prior specification process
- Impact of prior-data disagreement?

Thank you!

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