

# SS-MELSM vs Two-stage HLM

Empirical example: Saeb

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The illustration uses openly accessible data from The Basic Education Evaluation System (Saeb) conducted by Brazil's National Institute for Educational Studies and Research (Inep), available at <https://www.gov.br/inep/pt-br/aceso-a-informacao/dados-abertos/microdados/saeb>. It is also available as the `saeb` dataset in the `ivd` package.

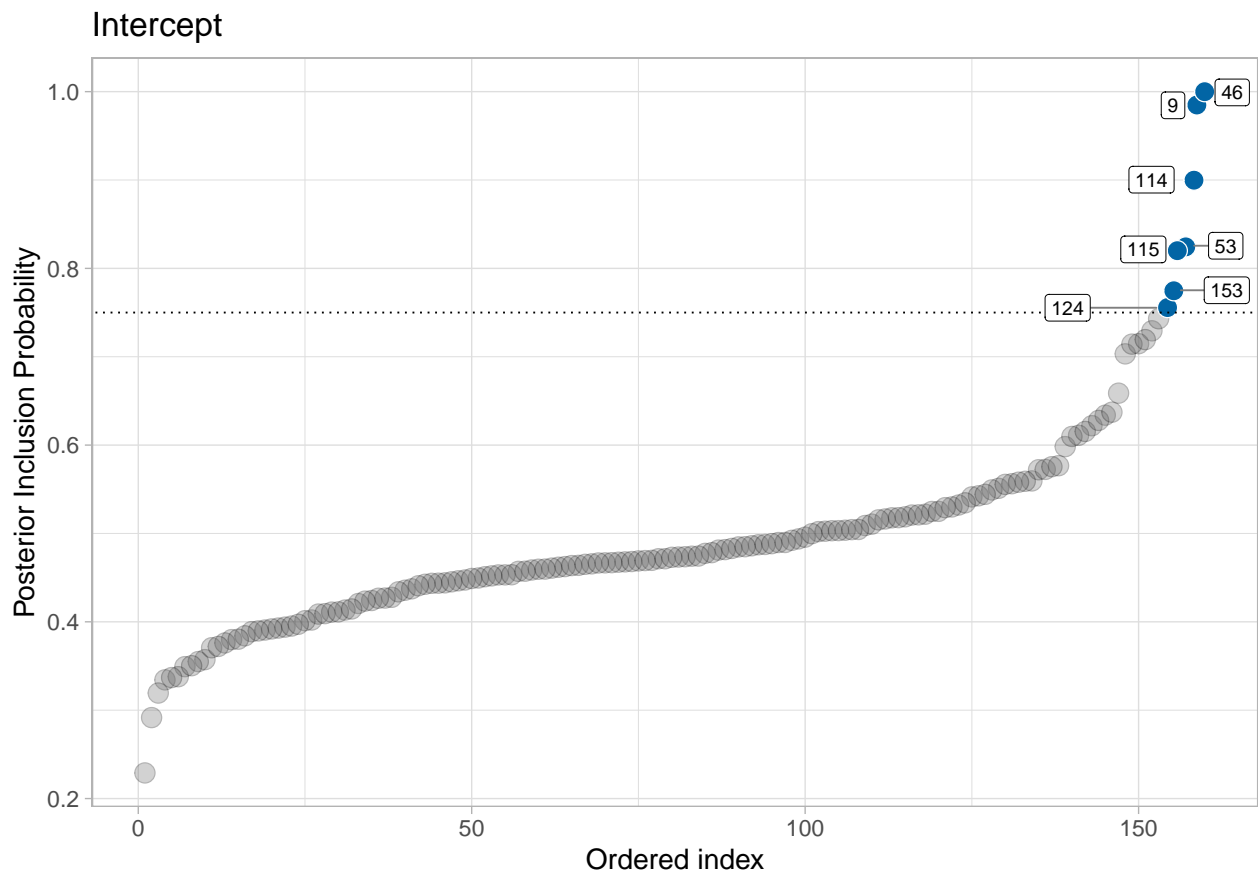
## Data preparation

Separate within- from between-school effects. That is, besides `student_ses`, compute `school_ses`.

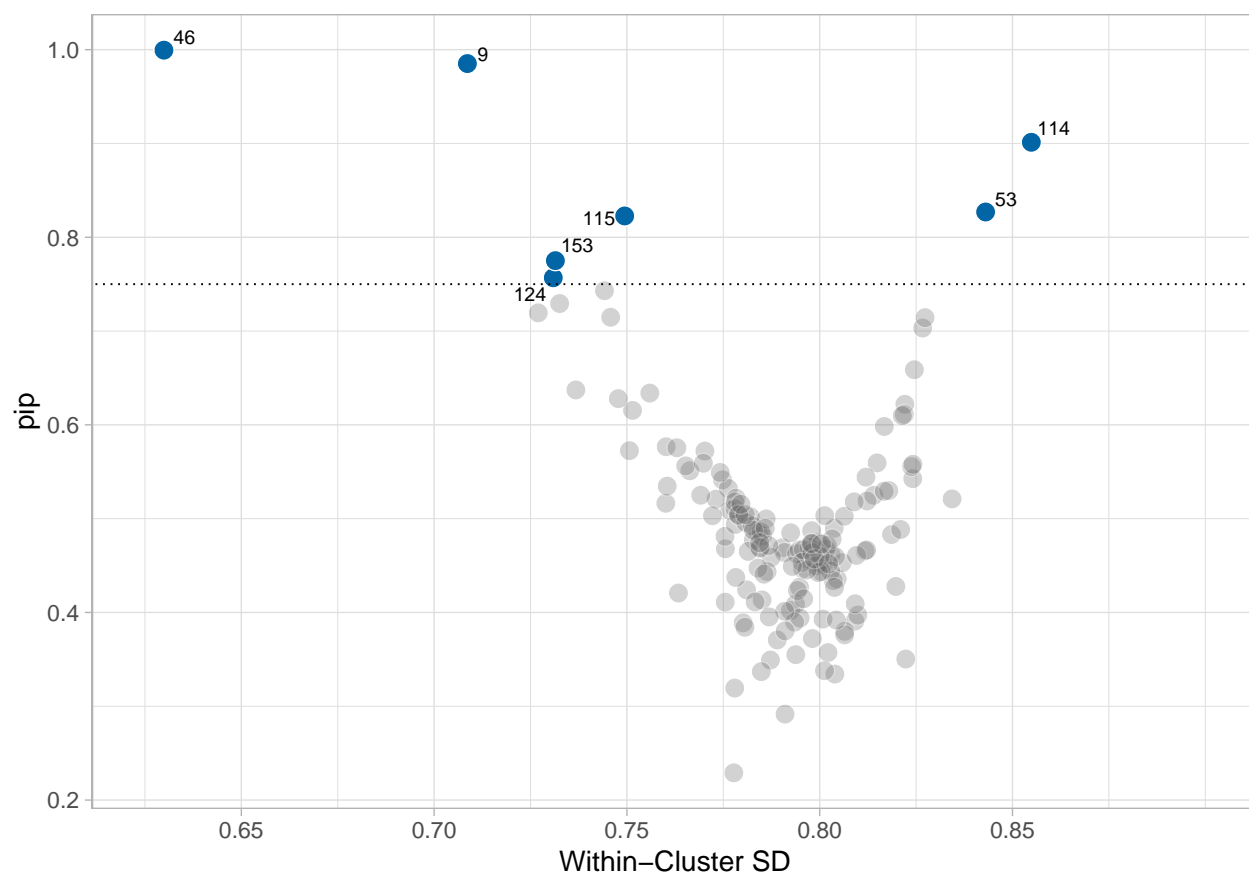
## Fit SS-MELSM with `ivd`

```
out <- ivd(location_formula = math_proficiency ~ student_ses * school_ses + (1|school_id),
  scale_formula = ~ student_ses * school_ses + (1|school_id),
  data = saeb,
  niter = 3000, nburnin = 5000, WAIC = TRUE, workers = 6)
```

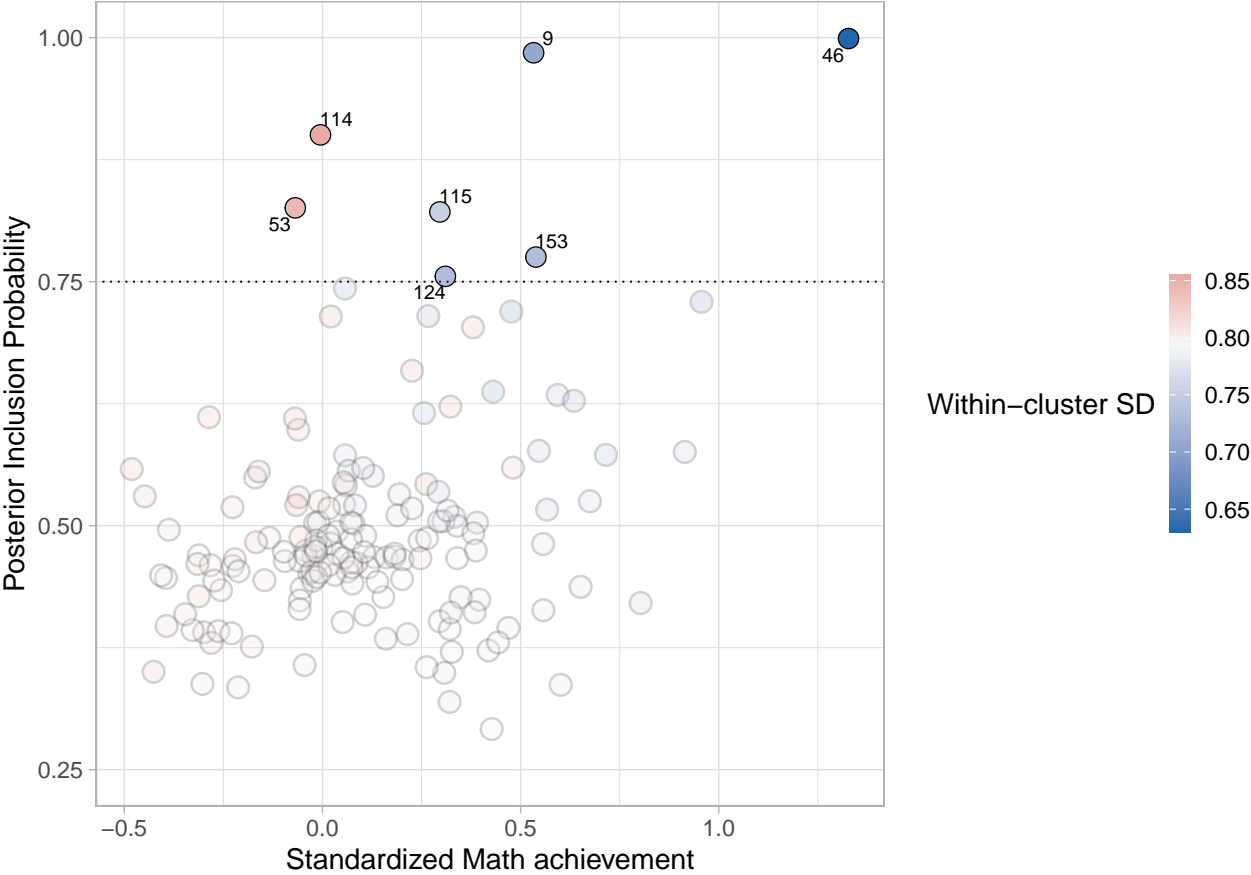
## Posterior Inclusion Probabilities



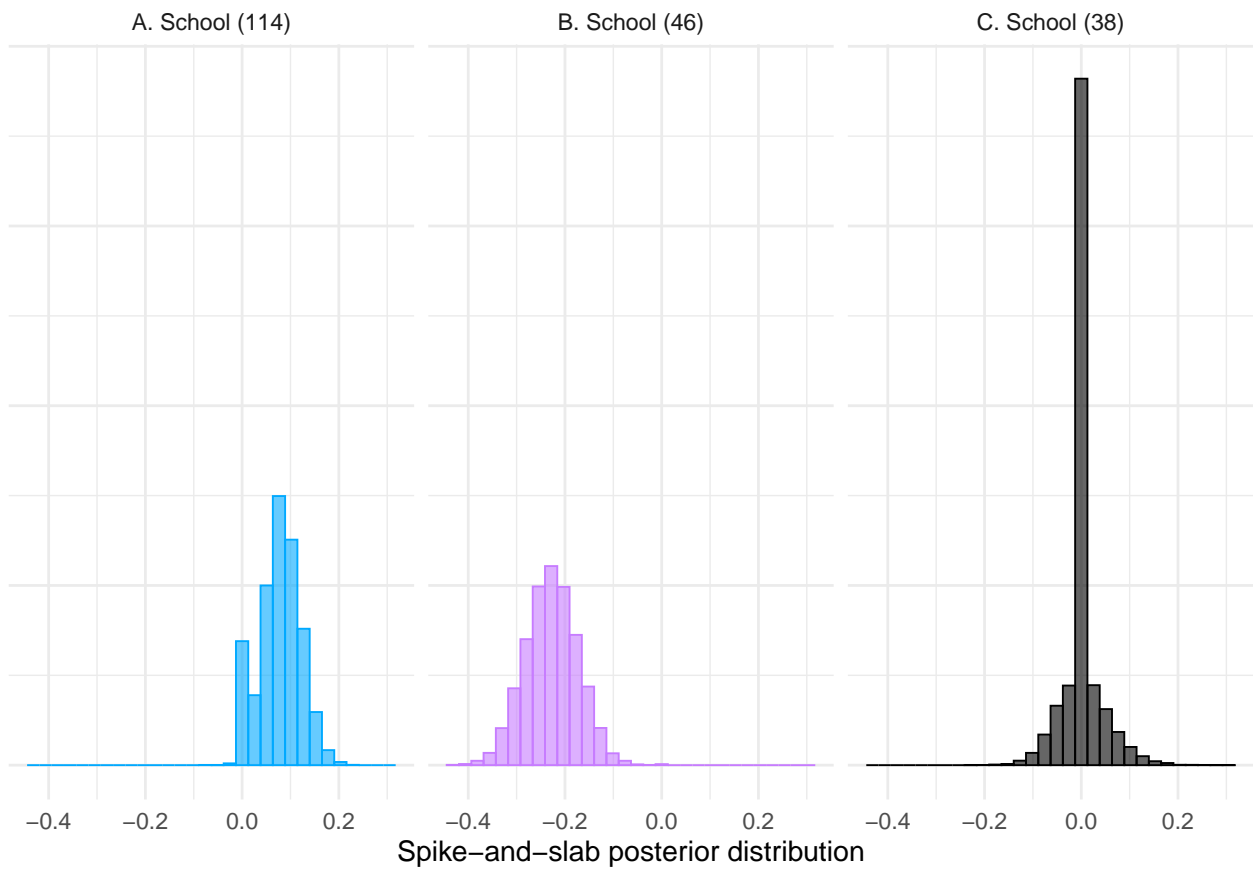
## Within-cluster SD



Math achivement



## Caterpillar plot



## Caterpillar plot

