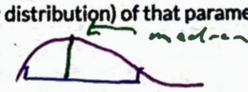
1 1 point

A 90% credible interval for a parameter is always symmetric around the median (of the posterior distribution) of that parameter. That is, it can always be written in the form (median - c, median + c) for some number c.

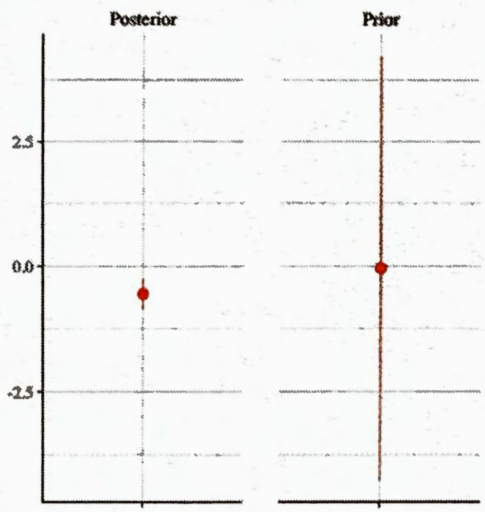
- [ ] True
- [x] False

Just consider a posterior that looks like:



The statement would only be true for a symmetric posterior.

2 1 point



The posterior_vs_prior() plot above indicates that the data does not contribute very much to the posterior.

- [ ] True
- [x] False

The posterior combines the likelihood (determined by the model and the data) with the ~~prior~~ prior. When there is a lot of data, the likelihood dominates; when there is little data the prior dominates. In this example, the sd of the posterior is much smaller than the sd of the prior, showing a strong effect of the data

R syntax

4 1 point

For a hierarchical linear regression model, with v as the outcome, u as the predictor, and the slope and intercept varying by the group w, which function would use?

- [ ] stan_glm()
- [x] stan_glmer()

The difference between stan_glm() and stan_glmer() is precisely that stan_glmer() is used for hierarchical models.

5 2 points

For a non-hierarchical linear regression model, with v as the outcome and u as the predictor, which formula would you use?

- [ ] u~v
- [x] v~u
- [ ] u~v+(1|w)
- [ ] u~v+(v|w)
- [ ] v~u+(1|w)
- [ ] v~u+(u|w)

6 2 points

For a hierarchical linear regression model, with v as the outcome, u as the predictor, and the slope and intercept varying by the group w, which formula would you use?

- ( ) u ~ v
- ( ) v ~ u
- ( ) u ~ v + (1 | w)
- ( ) u ~ v + (v | w)
- ( ) v ~ u + (1 | w)
- (x) v ~ u + (u | w)

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7 2 points

Suppose you are running a hierarchical linear regression on an outcome measure of student activism, with students grouped by the NJ high school. South Hunterdon Regional High School is the smallest in the state (about 450 students), while North Star Academy Charter is the largest (about 4500 students). Which statement is correct?

- ( ) The school-specific parameter estimates will shrink toward the overall estimates about the same amount for both schools.
- (x) The school-specific parameter estimates will shrink toward the overall estimates more for South Hunterdon Regional High School than for North Star.
- ( ) The school-specific parameter estimates will shrink toward the overall estimates more for North Star Academy Charter than for South Hunterdon.

An important factor in shrinkage is how much evidence there is within a group. North Star is large (= large sample size), meaning that there is a lot of data supporting ~~for~~ the North Star parameter estimates. That in ~~turn~~ turn means those parameters will shrink less. South Hunterdon is small, with less evidence, so the Bayesian hierarchical models effectively gives less weight and pulls those estimates towards the overall parameter estimates.