

Population Genetics Homework - Week 12

Christian Polania

First, analyses:

```
ven <- subset(greenhouse, species == "venusta")
pun <- subset(greenhouse, species == "punctata")

plma <- stan_glmer(lma ~ (1|mom_id), data = pun, refresh = 0)
pfwc <- stan_glmer(fwc ~ (1|mom_id), data = pun, refresh = 0)
plwr <- stan_glmer(lwr ~ (1|mom_id), data = pun, refresh = 0)
vlma <- stan_glmer(lma ~ (1|mom_id), data = ven, refresh = 0)
vfwc <- stan_glmer(fwc ~ (1|mom_id), data = ven, refresh = 0)
vlwr <- stan_glmer(lwr ~ (1|mom_id), data = ven, refresh = 0)
```

Then a summary of heritabilities:

```
herit <- data.frame(mean = NA, lo = NA, hi = NA)

hplma <- heritability(plma, pun)
hpfwc <- heritability(pfwc, pun)
hplwr <- heritability(plwr, pun)
hvlma <- heritability(vlma, ven)
hvfwc <- heritability(vfwc, ven)
hvlwr <- heritability(vlwr, ven)

herit <-add_row(herit, mean = hplma$Mean, lo = hplma$lo, hi = hplma$hi)
herit <-add_row(herit, mean = hpfwc$Mean, lo = hpfwc$lo, hi = hpfwc$hi)
herit <-add_row(herit, mean = hplwr$Mean, lo = hplwr$lo, hi = hplwr$hi)
herit <-add_row(herit, mean = hvlma$Mean, lo = hvlma$lo, hi = hvlma$hi)
herit <-add_row(herit, mean = hvfwc$Mean, lo = hvfwc$lo, hi = hvfwc$hi)
herit <-add_row(herit, mean = hvlwr$Mean, lo = hvlwr$lo, hi = hvlwr$hi)

herit <- na.omit(herit)
rownames <- c("p.lma", "p.fwc", "p.lwr", "v.lma", "v.fwc", "v.lwr")
row.names(herit) <- rownames

herit
```

```
##           mean           lo           hi
## p.lma 0.2907870 0.004722340 0.6662928
## p.fwc 0.2954331 0.004659315 0.6779320
## p.lwr 0.2889504 0.004598882 0.6626655
## v.lma 0.1801527 0.001236659 0.5766584
## v.fwc 0.2006262 0.001178214 0.5901999
## v.lwr 0.5054859 0.056105470 0.8201676
```

Protea punctata seems to have the same moderate heritability across the board: about a third of phenotypic variation in each of the three studied traits can be explained by genetic variation. *Protea venusta* has lower heritability for leaf mass per area and fresh water content, but has unusually high heritability for leaf length-width ratio.