

Stat 414 - Day 28 Case Study Part II

Part II: We saw in some of the early data exploration, evidence that subjects with higher baseline levels of negative emotionality tend to have higher performance anxiety levels prior to performances.

Add `mpqnem` to the model, but first center it. Also include the cross-level interaction to look at how `mpqnem` explains variation in both the intercepts and the slopes.

```
musicians$mpqnem.c = musicians$mpqnem - mean(musicians$mpqnem)
performlargeF = as.factor(musicians$performlarge) #helps with the effects plot
summary(model3 <- lmer(na ~ performlargeF*orchtype + performlargeF*mpqnem.c +
  (performlargeF | subjnum), data = musicians), corr = FALSE)
```

(a) What do you learn about the suggested association between `mpqnem` and `na`?

For fun, what happens if we don't convert our binary variable into a factor and try to explore the interaction between two quantitative variables.

```
model3b <- lmer(na ~ performlarge*orchtype + performlarge*mpqnem.c + (performlarge
  | subjnum), data = musicians)
plot(allEffects(model3b))
```

(b) Now how do you describe the new interaction between `mpqnem` and performance size?

Recapping, subjects with higher baseline levels of `mpqnem` have significantly higher levels of performance anxiety before solos and small ensembles (setting `performlarge` to zero because involved in an interaction with `mpqnem`) and they also had somewhat greater differences (bigger drops) between large ensembles and other performance types (the interaction), controlling for instrument, although this interaction was not statistically significant ($t = -0.575$).

Compare model 2 from last time to model 3b (so both using 0/1 for performance)

```
texreg::screenreg(list(model2, model3b), digits = 3, single.row = TRUE, stars = 0,
  custom.model.names = c("no mpqnem", "with mpqnem"), custom.note = "")
```

(c) How has the model changed from Model 2 (for the common parameters)? Why? (DSTL)

(d) Interpret the intercept in context

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(e) Interpret the coefficient of the large ensemble (performance) variable.

(f) Interpret the coefficient of the interaction between `mpqnem` and the large ensemble variable. Try to be more specific (numbers) this time (not just direction).

And what if we hadn't centered mpqnem?

(g) What does and does not change in the output? What interpretations will change?

(h) In these interpretations, when do you need to set "other variables" to zero and when do you need to "hold them constant"?

(i) Is model 3 a significantly better fit compared to model 2?

(j) Can you improve model3 further? What term would you suggest dropping and why (See earlier output.)?

(k) Is the new model better?

```
summary(model4 <- lmer(na ~ performlargeF*orchtype + mpqnem.c + (performlargeF |
subjnum), data = musicians), corr = FALSE)
```

Consider the following model

```
solo = as.numeric(musicians$perform_type1 == "Solo")
model5 <- lmer(na ~ previous + audience + solo + mpqpem + mpqab + orchtype + mpqnem
+ mpqnem:solo + (previous + audience + solo | subjnum), data = musicians)
```

(l) Summarize what is going on with the "audience" variable (in the R code and in the output)

(m) How many variance/covariance terms are there? Interpret one of the correlations.

(n) Suggest a variable not collected in these data that might make sense for a Level 3 grouping variable. Explain your reasoning.

Let's try some other fancy output functions

(o) Which were you able to use? What are some advantages and disadvantages of the different outputs?