Lecture 16
Segment 2

Repeated measures: Risks

Risks

- Order effects
- Counterbalancing
- Missing data

Counterbalancing

- Consider a simple design with just two conditions, A1 and A2
- One approach is a Blocked Design
  - Subjects are randomly assigned to one of two "order" conditions
    - A1, A2
    - A2, A1

Counterbalancing

- Consider a simple case with just two conditions, A1 and A2
- Another approach is a Randomized Design
  - Conditions are presented randomly in a mixed fashion
    - A2, A1, A1, A2, A2, A1, A2…..

Counterbalancing

- Now suppose a = 3 and a blocked design
- There are 6 possible orders (3!)
    - A1, A2, A3
    - A1, A3, A2
    - A2, A1, A3
    - A2, A3, A1
    - A3, A1, A2
    - A3, A2, A1

Counterbalancing

- To completely counterbalance, subjects would be randomly assigned to one of 6 order conditions
- The number of conditions needed to completely counterbalance becomes large with more conditions
  - 4! = 24
  - 5! = 120

Counterbalancing

- With many levels of the IV a better approach is to use a “Latin Squares” design
- Latin Squares designs aren’t completely counterbalanced but every condition appears at every position at least once

Counterbalancing

- For example, if a = 3, then
  - A1, A2, A3
  - A2, A3, A1
  - A3, A1, A2

Missing data

- Two issues to consider
  - *Relative amount* of missing data
  - *Pattern* of missing data

Missing data ~ Relative amount

- How much is a lot?
  - No hard and fast rules
  - A rule of thumb is
    - Less than 10% on any one variable, OK
    - Greater than 10%, not OK

Missing data ~ Pattern?

- Is the pattern random or lawful?
  - This can easily be detected
  - For any variable of interest (X) create a new variable (XM)
    - XM = 0 if X is missing
    - XM = 1 if X is not missing
  - Conduct a t-test with XM as the IV and X as the DV
  - If significant then pattern of missing data *may be* lawful

Missing data ~ Remedies

- Drop all cases without a perfect profile
  - Drastic
  - Use only if you can afford it
- Keep all cases and estimate the values of the missing data points
  - There are several options for how to estimate values

Missing data ~ Estimation methods

- Insert the mean
  - Conservative
  - Decreases variance
- Regression-based estimation
  - More precise than using the mean but
  - Confusion often arises over which variables to use as predictors in the regression equation