Effect Size

Repeated Measures

and

ANCOVA

Measures of association

- Measures of association are conducted in the same way for repeated measures design
- In general, partial η^2 is:
  - $SS_{effect}/(SS_{effect} + SS_{error})$
- And this holds whether the samples are independent or not, and for a design of any complexity

Standardized contrasts

- For standardized contrasts, there are three approaches one could use with dependent samples
  - 1. Treat as you would contrasts between independent means
  - 2. Standardize the dependent mean change against the standard deviation of the contrast difference scores, $s_{D\Psi}$
  - 3. Standardize using the square root of MS_{error}
- The first method makes a standardized mean change from a correlated design more directly comparable with a standardized contrast from a design with unrelated samples, but the latter may be more appropriate for the change we are concerned with
- The third is not recommended as in this case the metric is not generally of the original or change scores and so may be difficult to interpret

Standardized contrasts

- One thing we'd like to be able to do is compare situations that could have been either dependent or independent in cases where we could have done either design
  - Ex. We could test work performance at morning and night via random assignment or repeated measures
- In that case we'd want a standardizer in the original metric, so the choice would be to use those d family measures that we would in the for simple pairwise contrasts for independent samples
- For actual interval repeated measures (i.e. time), it should be noted that we are typically more interested in testing for trends and the r family of measures

Mixed design

- r family measures of effect such as η^2 will again be conducted in the same fashion

- For standardized mean differences we'll have some considerations given which differences we're looking at

Mixed design

- For the between groups differences can we calculate as normal for comparisons at each measure/interval and simple effects
  - i.e. use $\sqrt{MS_{within}}$
  - This assumes you've met your homogeneity of variance assumption
- This approach could be taken for all contrasts, but it would ignore the cross-condition correlations for repeated measures comparisons
- However, the benefit we'd get from being able to compare across different (non-repeated) designs suggests it is probably the best approach
- One could if desired look at differences in the metric of the difference scores and thus standardized mean changes
- For more info, consult your Kline text, Olejnik and Algina (2000) on our class webpage, Cortina and Nouri (2000)

ANCOVA

- r - family of effect sizes, same old story

- d-family effect size
  - While one might use adjusted means, if using an experimental i.e. balanced design (i.e. no correlation b/t covariate and grouping variable) the difference between adjusted means should be pretty much the same as original means
  - However, current thinking is that the standardizer should come from the original metric, so run just the ANOVA and use the sqrt of the MS_{error} from that analysis
- In other words, if thinking about standardized mean differences, it won't matter whether you ran an ANOVA on the post test scores or ANCOVA if you meet your assumptions
- However, your (partial) r effect sizes will be larger with the ANCOVA as the variance due to the covariate is taken out of the error term