Week of April 27

1. Trend analysis: What it is
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Trend Analysis: What It Is

- Trend analysis is a method of determining the form (shape) of the relationship between a quantitative, continuous (rather than qualitative, categorical) independent variable and a quantitative dependent variable

Trend Analysis: ANOVA Approach

- The ANOVA approach tests a series of orthogonal polynomial contrasts (linear, quadratic, cubic, etc.) to determine whether or not each explains a significant proportion of variance in the dependent variable
  - Because the contrasts are orthogonal, each trend is tested independently—there is no need for a hierarchical analysis
  - Assumes equal intervals (on the independent variable) and equal cell sizes

An Example

http://psych205.50webs.com/presentations/data_060427.sav

- A study examines the effect of practice on Dance Dance Revolution performance
- Participants (who have no previous experience with the game) are given a song to practice
- Each participant is randomly assigned to a number of trials—2, 4, 6, 8, 10, or 12
- Their score on the final trial is the dependent variable

ANOVA Approach: How To Do It

1. Use GLM—Univariate
2. Define the Dependent Variable as such and the independent variable as a Fixed Factor
3. Click Contrasts
4. Select Polynomial, click Change, then click Continue
5. Click OK to run the analysis
6. In the output, the Contrast Results table will give you a *p*-value for each possible order of trend (To get an *F* ratio, divide the Contrast Estimate by its Std. Error, then square the result)

Trend Analysis: MRC Approach

- The MRC approach tests whether or not each powered vector (X, X^2, X^3, etc.) adds a significant amount of variance to prediction of the criterion variable
  - Because powered vectors are intercorrelated, must use a hierarchical analysis to find the unique variance associated with higher-order trends
  - Hierarchical analysis of powered vectors does not assume equal intervals or equal cell sizes, and so is appropriate with data from non-experimental designs

MRC Approach: How To Do It

1. Use Transform—Compute to create the powered vectors (e.g., compute x2 = x**2)
2. Use Regression—Linear
3. Define the criterion as the Dependent
4. Enter each powered vector in a separate Block, starting with the linear vector (i.e., enter *X* in Block 1, X^2 in Block 2, X^3 in Block 3, etc.)
5. In Statistics, select R squared change
6. Click OK to run the analysis
7. In the output, the *F* ratio for the change in R^2 at each step is a test of whether that order of trend adds significant variance to prediction of the criterion variable—beyond that provided by all lower orders

A Word of Advice

- Be cautious about interpreting trends more complex than quadratic or cubic ones, because complex trends are usually quite difficult to replicate

Meta-Analysis: What It Is (Rosenthal & DiMatteo, 2001)

- Any quantitative method of summarizing the results of multiple studies that address the same research question
  - Contrasted with qualitative, narrative reviews of the literature

Advantages of Meta-Analysis

- Provides a broad picture of existing research examining a particular question
- Pooled sample size provides…
  - More precise estimates of population parameters, and therefore…
  - Greater statistical power to test hypotheses
- Diversity of samples and methods allows identification of moderators (at the study level)

Basic Steps in a Meta-Analysis

1. Identify the independent and dependent variable(s) of interest
2. Systematically collect (published and unpublished) studies that have examined the relationship(s) between the independent and dependent variables
3. Select formal criteria for inclusion of studies in the final meta-analysis
4. For those studies included in the final meta-analysis, convert reported statistics to a common effect-size metric (e.g., *r*)
5. Combine the effect size estimates of individual studies into a meta-analytic estimate of the effect size
6. Examine variation in the effect size estimates of individual studies, and formally test for possible moderator variables
7. Interpret the meta-analytic findings