ANOVA, ANCOVA & Trend Analysis

- The "cause"
- Typically categorical
- Two or more "levels" or "conditions"
  - MUST have a comparison group
  - Ex. Training vs. No training
- Can be within- or between-subjects
- Can be true IV or quasi-IV

A Hypothesis

- Offering more vacation days is more effective in boosting motivation among employees than offering more overtime, longer breaks, or sponsored daycare
- How would you analyze this?
- Three t-tests?

Why multiple t-tests don't work in multiple-group designs

- More tests, greater chance of _____
- Only looks at two groups at a time

- Are there *any* differences between *any of* the groups or conditions?
- *F*-test: variance between conditions over variance within conditions
  - Shows that the variance explained in the DV is due to differences in the IV rather than error
  - Significant? "There is a difference between at least two of the groups"

Elements

- Sum of squares between-groups (SS_{bg})
- Sum of squares within-groups (SS_{wg})
- Total sum of squares (SS_{Total})
- Mean square between-groups (MS_{bg})
  - systematic variance
- Mean square within-groups (MS_{wg})
  - error variance
- F-statistic = MS_{bg} / MS_{wg}
  - The bigger the better

Finding the Differences:

- Each group has a mean
- Which means do you want to compare?
  - Individual groups?
  - Combined groups?
- The more groups you have, the more possible contrasts you can estimate

Developing

- Contrast coefficients must add to ZERO
- Linear contrasts of
  - Will have a coefficient of +1 and a coefficient of -1, with the rest equaling zero
  - Group 1 vs. Group 7?
    - Enter 1, 0, 0, 0, 0, 0, -1

$$\mu_1 - \mu_7$$

  - Group 2 vs. Groups 3?
    - Enter 0, 1, -1, 0, 0, 0, 0

$$\mu_2 - \mu_3$$

Developing Linear Contrasts

- Linear contrasts of
  - Coefficients will vary depending on how many groups are in the cluster
  - Sum of the coefficients of each group's cluster must equal +1 or -1
  - Groups 1 and 2 vs. Groups 3 and 4?
    - Enter .5, .5, -.5, -.5, 0, 0, 0

$$\frac{(\mu_1 + \mu_2)}{2} - \frac{(\mu_3 + \mu_4)}{2}$$

Developing Linear Contrasts

- One group vs. all other groups
  - Coefficient of one group will be +1 or -1
  - Remaining coefficients will sum to +1 or -1
  - Groups 1-6 vs. Group 7
    - Enter .16, .16, .16, .16, .16, .16, -1

$$\frac{(\mu_1 + \mu_2 + \mu_3 + \mu_4 + \mu_5 + \mu_6)}{6} - \mu_7$$

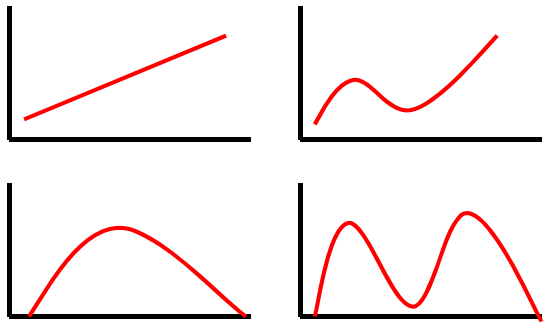
_____

- Forecasting technique that relies primarily on historical time series data to predict the future
- Use when your IV is quantitative
  - Ex. Time, dosage of drug, etc.
- Analysis involves searching for the right trend equation that will suitably describe the trend of the data series

Conducting a _____

- Same as usual One-Way ANOVA EXCEPT…
- Under "Contrasts" check "Polynomial"
  - Specify which degree you want it to examine
    - 1 = linear
    - 2 = quadratic
    - 3 = cubic
- Under "Options" check "Descriptive Stats" and "Means Plot"

Possible Trends



Factorial ANOVA Effects

- _____= The effect of a single independent variable in a factorial design
- _____= The effect of one independent variable across the levels of other independent variables
- _____= The effect of one independent variable at a single level of another independent variable
  - Only run if you have an interaction effect
  - More info next class

_____

- Works the same as One-Way and Factorial ANOVAs EXCEPT
- ANCOVAs examine the cause-effect association while controlling for one or more covariates
  - Ex. Ego Threat X Gender interaction effect
  - Still significant after controlling for narcissism and hostile personality?
  - Much better support for the hypothesis that ego threat and gender are important IVs to consider
- Assessing and controlling for covariates is highly recommended when examining Quasi-IVs