ANALYZING AND INTERPRETING COURSE GRADES AND ASSESSMENT DATA

Session 2: Using Data to Make Decisions

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OVERVIEW

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Session 1: Preparing Data for Analyses

Session 2: Summarizing and Visualizing Data

Session 3: Using Data to Make Decisions

OBJECTIVES

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- At the conclusion of this presentation, you should be able to:
  1. Identify which tests of inferential statistics are most appropriate given the question(s) and nature of the data.
  2. Implement tests of inferential statistics.
  3. Interpret inferential test results.

DATA IMPORT

DATA IMPORT

- We've created a dummy data set for this session
- You can download it here: **http://bit.ly/quiz_scores_3**
- We'll import our `quiz_scores.csv` file into SPSS

DATA IMPORT

- Let's import our grades data into SPSS
  1. File >> Open >> Data
  2. Navigate to your grades data
     2.1 Be sure to select `Text (*.txt, *.dat, *.csv, *.tab)` under Files of type:
  3. Open
  4. Continue
  5. Select Yes under Are variable names included at the top of your file?
  6. Continue to Step 6 of 6 and select Done

HYPOTHESIS TESTING

HYPOTHESIS TESTING

- By now we have a clean data set ready for analysis
- We've calculated some descriptive statistics and created some figures
- We're ready to test some hypotheses

HYPOTHESIS TESTING

- What hypotheses should we test?
- Recall:
  - `gender`: Student's gender
  - `quiz`: Quiz number (i.e., 1–5)
  - `score`: Score on each of 5 quizzes
  - `class`: Student's classification

HYPOTHESIS TESTING

- What hypotheses should we test?
    1. Does gender affect quiz scores?
    2. Does classification affect quiz scores?
    3. Do gender and classification interact?

HYPOTHESIS TESTING

- These questions are all answerable simultaneously by running a 2×4 factorial ANOVA

	Freshman	Sophomore	Junior	Senior
Female	20	15	0	15
Male	15	5	20	10

FACTORIAL ANOVA

FACTORIAL ANOVA

- Factorial ANOVAs allow us to compare the variances between or within multiple groups
- We assume a single dependent variable and at least two independent variables with at least two levels
- Factorial ANOVAs also allow us to compare main and interaction effects between levels of the IVs

FACTORIAL ANOVA

- We should first obtain some descriptive statistics since we've added a new variable, `class`
    1. Analyze >> Reports >> Case Summaries
    2. Move `score` into the Variables field
    3. Move `gender` and `class` into the Grouping Variable(s) field
    4. Deselect Display cases
    5. Select Statistics and add the following statistics to the list
        - 5.1 Number of cases
        - 5.2 Minimum
        - 5.3 Mean
        - 5.4 Maximum
        - 5.5 Standard deviation
    6. Select Continue then OK

FACTORIAL ANOVA

- Now let's visualize these scores by both `gender` and `class`
  1. Graphs >> Legacy Dialogs >> Bar...
  2. Select Clustered then Define
  3. Under Bars Represent select Other Statistics (e.g., Mean)
  4. Move `score` to the Variable field
  5. Move `class` to the Category Axis field
  6. Move `gender` to the Define Clusters by field
  7. Select OK

FACTORIAL ANOVA

- Now we're ready to run our factorial ANOVA
    1. Analyze >> General Linear Model >> Univariate
- Why should we select Univariate over Multivariate?

FACTORIAL ANOVA

- Now we're ready to run our factorial ANOVA
  1. Analyze >> General Linear Model >> Univariate
- Why should we select Univariate over Multivariate?
  - Because we have a single dependent variable, or variate
  - Multivariate ANOVAs are used when we have multiple dependent variables

FACTORIAL ANOVA

- Now we're ready to run our factorial ANOVA
    1. Analyze >> General Linear Model >> Univariate
    2. Move `score` to the Dependent Variable field
    3. Move `gender` and `class` to the Fixed Factor(s) field
    4. Select Plots and move `gender` to the Horizontal Axis field and move `class` to the Separate Lines field and select Add
    5. Click Continue
    6. Under Post Hoc move `class` to the Post Hoc Tests For field and select Tukey
    7. Click Continue
    8. Under Options, select Estimates of effect size
    9. Click Continue then OK

FACTORIAL ANOVA INTERPRETATION

- A 2×4 factorial ANOVA was implemented to test the hypothesis that gender and class affect quiz scores. No interaction effect between students' gender and class was observed, $F(2, 93) = 8.7$, $p > .05$. However, a main effect for gender was observed, $F(1, 93) = 4.04$, $p < .05$, $\eta^2 = .04$.

THANKS!

- Thank you all for attending
- Thank you to Dr. Eaton for scheduling this CELT series
- Feel free to contact either me or Trent if you have any questions

QUESTIONS