ANALYZING AND INTERPRETING COURSE GRADES AND ASSESSMENT DATA

Session 3: 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.
- Slides for today are available here: `http://bit.ly/celt_3`

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, $F(3, 93) = 0.391$, $p > .05$. However, a main effect for gender was observed, $F(1, 93) = 4.34$, $p < .05$, $\omega^2 = .03$.

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