

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