BALL STATE
UNIVERSITY

Module 5 Lecture - Non-parametric Comparisons for More than Two Groups

Analysis of Variance

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1 Overview and Introduction

1.1 Learning Objectives

2 Continuing Mean Comparisons

2.1 A Priori / Planned / Orthogonal Contrasts

- A priori / planned / orthogonal comparisons are used to test specific contrast hypotheses established _____ to collecting the data.
- Contrasts are orthogonal if the tests are _____ of one another: that is if the outcome of one contrast cannot _____ the outcome of the other contrast. Two contrasts are orthogonal if they account for non-overlapping between group variance.
- Two contrasts are orthogonal if the _____ of the cross-product of the corresponding coefficients of these contrasts equals zero:
  - $\sum (C_{j1})(C_{j2}) = 0$ where:
    - C_{j1} weight given to mean j in 1st contrast
    - C_{j2} weight given to mean j in 2nd contrast

> **Important**
>
> In k groups, there are only k-1 contrasts orthogonal to each other

Contrast	G1	G2	G3	G4
A	-1	-1	1	1
B	-3	1	1	1
C	-1	1	-1	1

- Examples of checking cross-sums:
  - Are contrast tests A and B orthogonal?:
    - $[(-1)(-3)] + [(-1)(1)] + [(1)(1)] + [(1)(1)] = 4 \rightarrow$ non-orthogonal
  - Are contrast tests A and C orthogonal?:
    - $[(-1)(-1)] + [(-1)(1)] + [(1)(-1)] + [(1)(1)] = 0 \rightarrow$ orthogonal

Discuss: Are contrasts B and C orthogonal? Work through the math to show this

2.1.1 Scheffe A Priori

2.1.2 The Bonferroni Inequality

2.1.3 Dunn-Sidak

2.2 A Posteriori / Post-hoc

- For the following post-hoc tests, we do not need to assess whether they are _____ or not

2.2.1 Scheffe Post Hoc

2.2.2 Tukey HSD

2.2.3 Dunnett's Test for Treatment/Control Comparisons

3 Conclusion

3.1 Recap

Key Terms

A

A priori / planned / orthogonal A type of contrast that is planned before hypothesis testing in the ANOVA omnibus 2

The instructor-provided glossary may not include all terms worth memorizing, make sure you consider using the vocabulary list in you book and your own judgment to make sure you have all relevant terms