Graduate Statistics

Introduction

What We Will Cover in This Section

- Course requirements.
- Introduction.
- Research designs.
- Variables.
- Numbers.

Course Requirements

- Text
  - Gravetter & Wallnau
  - Mertler & Vannatta
- Reserve
  - Kachigan
  - Grimm & Yarnold
  - Witte & Witte

- Study guide
- Assignments
- SPSS
- Attendance
- Contacting me.

Evaluation

- Frequent quizzes.
- Occasional homework problems in the study guide.
- No final examination.
- No extra credit.

Course Web Site

- Syllabus.
- How to contact me.
- PowerPoint slides.
- Interesting sites.
- Pictures of me.

Approach to the Course

- Theory.
- How computations are done.
- Model.
  - Conceptual.
  - Formulas.
- Interpretation.
- Assumptions.

Reality Check

- My assumptions about you.
  - You expect to MASTER your profession.
  - You have had at least an introduction to statistics.
  - You have the courage to ask…
- What are your assumptions?

Major Goal of the Course

Give you the basic knowledge to understand psychological statistics especially as they are used in applied research.

Basic Terms and Concepts

Basic Terminology

STATISTICS

Numerical techniques for describing groups of people or events.

Fundamental Uses

DESCRIPTIVE STATISTICS

Techniques used to organize, summarize, and describe sets of numbers.

INFERENTIAL STATISTICS

Techniques that allow us to make estimates about populations based on sample data.

Univariate Statistics

Techniques used where there is one dependent variable (experiment) or one predictor and one criterion variable (simple correlation).

Multivariate Statistics

Techniques used where there is two or more dependent variables (experiment) or multiple variables in a correlational study.

Population

All members of a group that are alike on at least one characteristic.

PARAMETER

Symbol used to indicate the properties of a population.

In statistics, parameters are expressed in Greek letters (μ, σ).

Sample

A group that is less than the total population from which it is drawn.

STATISTIC

Symbol used to indicate the properties of a sample.

Statistics are expressed in Roman letters (M, S, r).

Sample Types

REPRESENTATIVE SAMPLE

Sample that is selected in such a way that its characteristics accurately reflect the population from which it was drawn.

RANDOM SAMPLE

Method of selecting a sample so that each member of the population has an equal chance of being selected.

Research Designs: Experimental

- Variables
  - Independent variable.
  - Dependent variable.
- Univariate
  - Studies where there is one dependent variable.
  - t-test, analysis of variance
- Multivariate
  - Studies where there are multiple dependent variables.

Research Designs: Correlational

- Variables.
  - Predictor.
  - Criterion.
- Univariate designs.
  - Assess the relationship between one predictor and one criterion.
  - Simple correlation.
- Multivariate designs.
  - Assess the relationship(s) between multiple predictors and/or multiple criteria.

Example: Univariate Experiment

Research question: Which is better for cardiovascular fitness, 20 minutes on a stationary bicycle or 20 minutes on a stair climbing machine?

Independent Variable	Dependent Variable
Group A spends 20 minutes daily on a stationary bicycle for 15 days. Group B spends 20 minutes a day on a Stairmaster for 15 days.	Heart rate after exercising on day 15.

Example: Multivariate Experiment

Research question: Which is better for cardiovascular fitness, 20 minutes on a stationary bicycle or 20 minutes on a stair climbing machine?

Independent Variable	Dependent Variable
Group A spends 20 minutes daily on a stationary bicycle for 15 days. Group B spends 20 minutes a day on a Stairmaster for 15 days.	Heart rate after exercising on day 15. Carotid blood flow after exercising on day 15. Knee joint distance after day 15.

Meta-Analysis

The evaluation of different studies involving similar variables with the goal of estimating the population effect size.

Using Numbers

3.14159

Variables

DISCRETE VARIABLE

A variable that can take on only whole values.
Example: Number of toes or number of cars you have.

CONTINUOUS VARIABLE

A variable that can take on fractional values.
Example: Speedometer reading, height.

Levels of Measurement

NOMINAL SCALE

Numbers are used as labels.

ORDINAL SCALE

Numbers are used to indicate rank order.

Levels of Measurement

INTERVAL SCALE

Numbers are used to indicate an actual amount and there is an equal unit of measurement between adjacent numbers.

RATIO SCALE

Numbers indicate an actual amount and there is a true zero.