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***Social Science
Research Methods***

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Overview

- Laboratory and Field Work
- Principles of Analysis
- Analysis of Frequencies
- Nonparametric Statistics
- Statistics
- Hypothesis Testing
- Analysis of Variance

Laboratory and Field Work

■ Laboratory Experiments

- ★ Research studies in which the variance of all, or nearly all, of the possible influential independent variables not pertinent to the immediate problem of the investigation is kept at a minimum. This is accomplished by isolating the research in a physical situation apart from the routine of ordinary living, and by manipulating one or more independent variables under rigorously specified, operationalized, and controlled conditions.

Laboratory and Field Work

■ Laboratory Experiments

★ Strengths

- ◆ Relatively complete control
- ◆ Random assignment
- ◆ Manipulation of independent variables
- ◆ Precision
 - ➔ Accurate, definite and unambiguous

★ Weaknesses

- ◆ Lack of strength of independent variables
- ◆ Artificiality
- ◆ Lack of external validity

Laboratory and Field Work

■ Laboratory Experiments

★ Purposes

- ◆ Studying relations under 'pure' uncontaminated conditions
- ◆ Testing predictions derived from theory
- ◆ Refining theories and hypotheses

Laboratory and Field Work

■ Field Experiments

- ★ Research studies conducted in a realistic situation in which one or more independent variables are manipulated by the experimenter under conditions as carefully controlled as the situation will permit.

Laboratory and Field Work

■ Field Experiments

★ Strengths

- ◆ Practical
- ◆ Variables typically have a stronger effect
- ◆ Appropriate for complex situations
- ◆ Suit testing of hypotheses and to finding answers to practical problems

★ Weaknesses

- ◆ Control rarely as tight as in the laboratory
 - ➔ Manipulation may be difficult
 - ➔ Randomization may be opposed
- ◆ Attitude of the researcher is an issue
- ◆ Lack of precision

Laboratory and Field Work

■ Field Studies

- ★ Nonexperimental scientific inquiries aimed at discovering the relations and interactions among sociological, psychological, and educational variables in real social structures. Scientific studies that systematically pursue relations and test hypotheses, that are nonexperimental, and that are done in life situations will be considered field studies.
 - ◆ Exploratory
 - ◆ Hypothesis testing

Laboratory and Field Work

■ Field Studies

★ Strengths

- ◆ Realism
- ◆ Significance
- ◆ Strength of variables
- ◆ Theory orientation
- ◆ Heuristic quality

★ Weaknesses

- ◆ Nonexperimental character
- ◆ Lack of precision
- ◆ Practical problems

Laboratory and Field Work

■ Qualitative Research

- ★ Type of field study
- ★ Uses direct observation and semistructured interviewing in real-world settings
- ★ Naturalistic
- ★ Participatory
- ★ Interpretive
- ★ Flexible
- ★ Ethical issues particularly important

Laboratory and Field Work

■ Quantitative Research

- ★ Emanates from post-positivistic tradition; major constituents are physical objects and processes
- ★ Assumes knowledge comes from observation of the physical world
- ★ Investigator makes inferences based on direct observations or their derivatives
- ★ Goal is to describe cause and effect

Laboratory and Field Work

■ Qualitative Research

- ★ Emanates from phenomenological perspective; emphasizes internal, mental events as the basic unit of existence
- ★ Knowledge is actively constructed and comes from examining the internal constructs of people
- ★ Investigator relies on outside observational schemes and tries to keep intact the participants' perspective
- ★ Attempts to describe the ways that people assign meaning to behavior

Laboratory and Field Work

■ Multimethod Research

- ★ Qualitative → Quantitative
- ★ Quantitative → Qualitative
- ★ Both simultaneously
 - ◆ If one is dominant, 'nested'

■ Holistic Experimental Paradigm

- ★ Charles W. Simon

Principles of Analysis

- K&L has chapters on means, variance, covariance, probability, sampling, randomness, (Chapters 6 – 8) that I have not assigned because I assume you are studying / have studied these elsewhere

Principles of Analysis

- Note, in particular, that I reserve the use of the term *multivariate* for techniques with multiple *dependent* variables – K&L reflect the fact that different authors have different usages in this area
- I take the view that multiple independent variables are now commonplace and unremarkable (e.g., multiple regression)

Principles of Analysis

- Frequencies v. continuous measures
- Rules of categorization
 - ★ Based on research problem
 - ★ Exhaustive
 - ★ Mutually exclusive and independent
 - ★ Derived from one principle
 - ★ On one level of discourse
- Graphing

Principles of Analysis

- Measures of central tendency and variability
- Measures of relations
 - ★ (Product-moment) correlation (r)
 - ★ Spearman Rank correlation (ρ)
 - ★ Phi coefficient
 - ★ Point-biserial correlation
 - ★ Coefficient of multiple correlation (R)
 - ★ Distance (D)

Principles of Analysis

- Indices
 - ★ Composite of two or more numbers
- Negative or inconclusive results are harder to interpret
- Exploratory data analysis
 - ★ Stem-and-leaf
 - ★ Many others . . .

Analysis of Frequencies

- Crosstabs
 - ★ E.g. 2 x 2 tables
- Frequencies v. percentages
- Contingency tables
- χ^2 test
- Levels of significance
- Yates' correction when N small
- Fisher exact test for small N
- Cramer's V (measures strength of association)

Nonparametric Statistics

- Parametric tests assume known distributions (often Normal or Multivariate Normal) with known parameters
- Often parameters are unknown but can be estimated from the data
- Parametric tests are usually most powerful when the data is distributed according to the assumed distribution
- *Powerful* – high probability of rejecting false null hypotheses
- When the assumptions of parametric tests do not hold, *nonparametric* tests are usually more powerful and should be used instead
- Often data are not Normally distributed, but the Central Limit Theorem justifies using parametric statistics for large samples – nonparametric tests are needed for small samples

Statistics

- Binomial
- Law of Large Numbers
- Normal Distributions
- Standard deviations
- Sampling Error of the Mean

Hypothesis Testing

- Difference between means
- Null hypotheses and alternative hypotheses
- Type I and Type II errors
- Alpha and beta risks
- Power
- Central Limit Theorem

Hypothesis Testing

■ Steps

- ★ State the null
- ★ State the alternative
- ★ Compute the test statistic
- ★ Apply the decision rule
- ★ Relate the decision back to the original problem