

Lecture 10-12:
Non-Experimental, Observational, Quasi-
Experimental, and Developmental Designs

I. INTRODUCTION

A. Experimental vs. Correlational research

- For the most part we have been discussing Experimental Designs
- Characteristics of experimental designs?
 - Experimental control over distribution of IV
 - Experimental control over EV
 - Control over initial differences between participants
 - Random assignment
 - Within subjects design
- **The idea is to see if groups who are initially equal can be made to be different**

I. INTRODUCTION

A. Experimental vs. Correlational research

- Sometimes you can not exert experimental control over initial differences
 - 1. You can study a certain group of people without comparison to others (Non-experimental research).
 - Only 1 level of an IV. How does a creative person work?
 - 2. Compare groups who had different experiences but can't be sure that they were initially the same (Quasi-experimental research)
 - Kids who go or do not go to day care

I. INTRODUCTION

A. Experimental vs. Correlational research

- 3. Compare groups who initially differ and see whether their initial difference is also differentially associated with other characteristics (Correlational Research)
 - Do creative people differ from non creative people?
- 4. Assess developmental changes in a group of people (Developmental designs)
 - Are there developmental changes in creativity?

I. INTRODUCTION

B. Creative Inferencing and Beyond

- Because such research designs lack control, drawing conclusions from data require creative inferences.
 - There are assumptions that allow you to draw conclusions.
 - Most of the assumptions bear on triangulating on a defensible claim.
 - Comparing results of different studies
 - Strong argumentation dismissing other factors.
 - Consider how you would test the value of a Weber State University education?

II Designs

A. Non-experimental

- Sometimes you want to examine behavior which has been expressed, but obviously you can not control the conditions under which it was produced.
- **1. Case History**
 - Case studies: A single subject provided a basis for demonstrating psychoanalytic theory.
 - Freud used case studies as a primary form of evidence
 - T1 → D.
 - But Perhaps T2 → D.

II Designs

A. Non-experimental

- **2. Archival Research**
- Sometime you want to do research by getting archival data
 - Details about sex offenders
 - Recognize that such archival permission is difficult to get these days.
 - The logic in this case is that hypotheses can be **postdicted**, (making judgments about behavior which as already occurred) rather than **predicted**.

II Designs

A. Non-experimental

- **3. Content Analysis**
- Sometimes you might want to analyze the artifacts (written or spoken record) of a person after the fact.
- Research on gender and language is an example.
- The coding of the artifacts must be:
 1. Objective (rules for analysis)
 2. Systematic (included all relevant information)
 3. Generality (your results should fit within a theoretical model which allows for its generality)

II Designs

A. Non-experimental

4. Limits of Non-experimental Research

- These designs are all non experimental because there may be no comparison groups at all.
- As there is no comparison group, there is no experimental control
- As a result no causal inferences can be made from data in any of these design.

II Designs

B. Observational

- In another style of research you can examine ongoing behavior by observing it.
- Observation is a research technique which can be used with experimental or non-experimental designs.
 - BEHAVIORAL CATEGORIES are developed by which the “behavioral stream” is coded.
 - The behavioral categories tells you what to code and how to code it.

II Designs

B. Observational

- **Quantifying behavior:** We can code behavior (time working on a project) in three ways
 - **Frequency:** Code particular types of behavior for how frequently they occur.
 - Frequency of look away behavior. (frequency)
 - **Duration:** Code the length of time a behavior lasts.
 - Time on task. (temporal measure)
 - **Intervals:** You sample specific behaviors in discrete time periods.
 - Time spent working on a topic, in each 10 sec. interval (rate = frequency/intervals)

II Designs

B. Observational

- Quantifying behavior often isolates it from the context of other actions.
- An alternative is to analyze **behavioral sequences** which examines behavioral interactions between people
 - Interactions between child and teacher
 - Parent-child interactions in assessing the growth of pragmatics.
- Better to record behavioral sequences than just isolated behavioral events

II Designs

B. Observational

- **Once you decide what behavior to sample, you have to decide how to sample the behavior**
- To do so you must decide **when** to sample behavior
 - Time sampling : Observe group for a specific period of time. Observe/Record. Good for continuous behavior.
 - Individual sampling: Observe particular individual (study whole context of behavior)
 - Event sampling: Observe only a particular behavior of interest

II Designs

B. Observational

▪ **Observational Techniques**

- 1. Naturalistic observation
- Non-participant observers assess participants in their natural context.
- Used in in many different research contexts
 - Child and Family
 - Psychology
 - Biology: Ethology

II Designs

B. Observational

- Unobtrusive observations: Observations which do not alter the behavior in the natural context.
- Techniques to promote unobtrusive observations:
 - Video
 - One-way mirrors.
 - Habituating participants to observers

II Designs

B. Observational

▪ **2. Ethnography and Participant Observation**

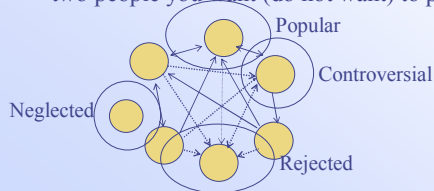
- The observer becomes part of the natural environment to better record behavior:
- The researcher can be “Surreptitious Participant” who is “under cover”
 - Studies of ‘high school’ by researchers who went under cover. My be ethically questionable
- The researcher can be “**Non-surreptitious participant**” by making clear her role.
 - Anthropologist
 - Ethologist: Jane Goodall.

II Designs

B. Observational

3. Sociometric Techniques

- Sociometric techniques are used to study interpersonal relations within a group.
 - One technique is to assess friendship patterns: List two people you want (do not want) to play with.



II Designs

B. Observational

4. Reliability Issues

- Reliability: Does the measurement device produce similar results when repeated measurements are made under identical conditions.
 - A measurement is reliable if it is consistent measurements stay the same across experimenters and/or over time.
 - Reliability over raters or over time

II Designs

B. Observational

- Multiple Observers: Measure inter-rater reliability:
 - 1. Percentage agreement:** What percentage of time did raters agree?

	Yes	No	
Yes	6	1	7
No	1	2	3
	7	3	10

Agreements/observation x 100 = 80%

II Designs

B. Observational

- Problems
 - Capitalizes on frequency of occurrence
 - If behavior is very infrequent, the percent agreement will be very high

	Yes	No	
Yes	1	1	2
No	1	97	98
	2	98	10

Agreements/observation x 100 = 98%

II Designs

B. Observational

- **2. Cohen Kappa:** What percentage of time did raters agree, independent of the likelihood of chance agreement

- $K = P(o) - P(c) / 1 - P(c)$
 - $p(o)$ = proportion of actual agreement = .8
 - $p(o)$ = summed frequency of agreements over total number of comparisons = $(6 + 2)/10 = .80$
- S1 ▪ $p(c)$ = Chance proportion of actual agreement = .58
 - $p(c)$ = Multiply corresponding rows and columns together and divide by the square of the total = $(7 \times 7) + (3 \times 3) / 10^2 = 58/100 = .58$
- $K = (.8 - .58) / (1 - .58) = .22 / .42 = .52$

II Designs

B. Observational

- **3. Pearson Correlation:** Assess reliability by computing correlation between two observers.

	S1	S2
ob1	5	10
ob2	4	9
ob3	3	8
ob2	2	7
ob1	1	6

- The $r^2 = 1.00$, which seems problematic as there is no agreement!
- Very weak method

II Designs

B. Observational

- At least for inter-rater reliability there seems to be an ordering of techniques:
 1. Most conservative: Cohen's Kappa
 2. Inter-rater Reliability
 3. Least conservative: Person Correlation

II Designs

B. Observational

- **Extraneous Variables**
 - Observer bias:
 - observations are influenced by knowledge of hypothesis
 - Keep the observer masked or blind to the hypothesis
 - Interpretation vs. observation
 - Describing behavior without making reference to intentions is difficult

II Designs

C. Exerting quasi-experimental control

- In many studies, there seems to be experimental control but there really is not.
 - The effects of daycare: No random assignment of subject to groups
 - Rather, there is a subject assignment to treatment even if those on waiting lists are used.
- Quasi-experimental designs are ones which seem like experimental designs since there appears to be experimental control over distribution of IV.

II Designs

C. Exerting quasi-experimental control

▪ 1. Time Series

O1 O2 Treatment O3 O4

- The treatment can be assessed by the difference in scores at O1 and O2 compared to O3 and O4. But without a control group, it is hard to make valid conclusions.

▪ 2. Interrupted time series

O1 O2 Treatment O3 O4

- Where treatment is a natural occurrence (like an earthquake)

II Designs

C. Exerting quasi-experimental control

▪ 3. Equivalent time series

Treatment O1 Treatment O2 Treatment O3

- IV is repeatedly given and the treatment is temporary or transitory

▪ 4. Nonequivalent control group

Experimental: O1 O2 Treatment O3 O4

Control: O1 O2 No Treatment O3 O4

- Controls some of the internal validity problems associated with the design (but not sampling bias)

II Designs

D. Developmental Designs

▪ Assumptions of Developmental Designs

- Usually developmental research involves comparisons between children of different ages on some DV.
- What kind of IV is age?
- True IV?
 - No, age is not manipulated and there is no random assignment of subjects to groups.
 - Anyway age does not cause change in behavior.
 - Age indexes an interrelated set of biological, social, cognitive variables

II Designs

D. Developmental Designs

- Age Comparisons as a subject IV
 - But is age a subject IV-- a characteristic or trait that varies consistently across subjects?
 - Age is a special type of subject IV. Compare Age and Sex.
 - Similarity: Properties of participants which are associated with other variables.
 - Difference: Only with age do you assume that variable level 1 has been will be the same as participants in variable level 2.

II Designs

D. Developmental Designs

- Make two assumptions
 - Assume that subjects of older age has had characteristics of younger subjects
 - Assume that subjects of younger age will have characteristics of older subjects and vise-versa.
 - What is interesting about differences between 3- and 7-year-olds is that the 3s will look like the 7s in 4 years and 4 years ago, the 7 looked like the 3s.
 - NO SUCH ASSUMPTION WITH SEX: Females will never assumed to look like males and males never assumed to look like females.

II Designs

D. Developmental Designs

- Age comparison involves examining INTRA-INDIVIDUAL CHANGES rather than INTER-INDIVIDUAL DIFFERENCES
 - Intra-individual Changes: Changes within a person
 - Inter-individual Differences: Differences between people.
- Age-comparisons are neither:
 - causal relations between a true IV (age) and a DV
 - correlations between a stable subject variable IV (age) and DV.

II Designs

D. Developmental Designs

- **A. Cross-sectional Design:** Comparison of groups of participants of different ages.
 - Design typically used in developmental psychology.
- **Problems**
 1. Selection Biases
 2. Selective mortality
 3. Confounding with education, cohort
 4. Instrumentation: Measurement equivalence

II Designs

D. Developmental Designs

- **B. Longitudinal Design:** Comparison of the same participants over time
- **Problems**
 1. Repeated testing
 2. Changing instrumentation or fidelity over time
 3. Reactivity of being in a study
 4. Selective mortality
 5. Confounded w/ time of testing: Dangers in generalizing to those in other epochs.

II Designs

D. Developmental Designs

- Developmental Designs
- C. Cohort sequential: Multiple longitudinal studies with groups of staggered aged.

Born	Tested in year				
	73	83	93	03	13
53	20	30	40	50	60 ← Longitudinal
63		20	30	40	50
73			20	30	40
83				Cross-sectional → 20	30