

Lecture 18: Gathering Data

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Systematic Pluralism

- **Main theme: methodological pluralism**
 - ↪ Given the limitations of any give strategy
 - ↪ More than on approach is a logical necessity
 - ↪ Temper it by being systematic
- **Variety of data gathering methods**
 - ↪ Experiments
 - ↪ Case studies
 - ↪ Narratives
 - ↪ Survey questionnaires
 - ↪ Interviews
 - ↪ Participant observations
 - ↪ etc

Systematic Pluralism

→ Descriptive:

➤ how things are

- ↪ Enumerative surveys
- ↪ Descriptive analysis of secondary records
- ↪ Descriptive (and relational) meta analysis

→ Relational:

➤ how things are in relation to other things

- ↪ Analytic surveys
- ↪ Participant observations
- ↪ Quantitative method for historical comparison

→ Experimental:

➤ by manipulating specific independent variables

➤ How things get to be the way they are

- ↪ Strong inference studies
- ↪ Role play experiments
- ↪ Naturalistic experiment (as representative of a variety of strategies)

Enumerative Surveys

- **Purpose:** count/enumerate a representative example and infer frequency about the whole
 - ↳ *Sample* is a small part of something
 - ↳ *Population* is total number of parts from which sample is taken
 - ↳ Eg, interface error and root cause studies
- **Important:** sampling population in its normal surroundings
 - ↳ Eg, how many have a specific attribute
 - ↳ How often does an event occur

Enumerative Surveys

- There can be relational aspects implicit in its findings
- Example: Protests in colleges
 - ↳ Coded in summary categories
 - Instruction/curriculum issues
 - Faculty
 - Freedom of expression
 - Student/administrative
 - Extra-curricular
 - ↳ Coded type of institution
 - Public liberal arts, public university
 - Independent liberal arts, etc
 - ↳ Primarily descriptive
 - possible to relate events, issues, school types, regions
 - ↳ Various results
 - Only a small minority actually participated - But very visible
 - Most likely at large universities: Active, Celebrities, Likely to be covered

Descriptive: Secondary Records

→ Sources in public domain

- ↪ Federal census
- ↪ Raw data depositories
- ↪ School records

→ Available aspects:

- ↪ Demographic
- ↪ Socio-psychological
- ↪ Political
- ↪ Socio-economic, etc

→ Possible topics

- ↪ Population growth
- ↪ Industrialization
- ↪ Urbanization
- ↪ Migration, etc

Descriptive: Secondary Records

- Can generate historical profiles for regions, cities, etc
- Relationally, can compare urban against rural
- Example: the appearance of animals in western art
 - ↳ Used secondary sources: art books, etc
 - ↳ Steady decline in animals in western art
- Example: parallel change study
 - ↳ Used company quality and version histories
 - ↳ Showed shape of the problem
 - Various levels of concurrency
 - How much concurrency within each level

Meta Analysis

- Re-analysis of someone else's data is *secondary analysis*
- *Meta Analysis* is one kind of secondary analysis
 - ↳ Widely accepted set of statistical procedures for comparing and combining results
- **Benefits:**
 - ↳ By combining results increase power
 - ↳ Identify effects not noticed in single study
- Used as both descriptive and relational

Meta Analysis

→ Example:

- What is the frequency of recording and observer errors in psych experiments
- And when they occur, what is their bias

↪ Literature search on estimates of frequency of recording errors

↪ 21 studies met required criterion:

- 300 observers, 140k observations

↪ Limitations:

- Cannot be regarded as truly representative
- Don't know about over/under estimating

↪ Results:

- About 1% of all observations wrong
- 2/3rds supported observers' hypothesis

Meta Analysis

→ Example:

➤ sex differences in influencability

↳ Textbooks asserted women were more easily influenced than men

↳ Traditional theory: social differences due to socialization process

➤ Men taught to be independent thinkers

➤ Women seldom so taught

↳ Results

➤ Pronounced differences in the distribution of experimental findings

✓ Work published before 1970

✓ Work during the women's movement in the 70s

➤ New studies show few if any significant sex differences

➤ Suggests historical period was a major influencing factor

✓ In interpretation? Or in influencability?

Analytic Surveys

→ Purpose of descriptive surveys:

↳ *Count*

↳ Oriented towards representativeness

→ Purpose of analytic surveys:

↳ *Explore relations among variables*

↳ Finding associations and explanations of what goes with what

→ An example of naturalistic observations:

↳ behavior of the real world as opposed to the laboratory

→ Questionnaires and interviews require

↳ Planning

➤ Often unstructured interviews to get sense of problem

↳ Pilot work

➤ To improve materials used

↳ Pre-test

➤ on a representative sample

Analytic Surveys

- Once satisfied with soundness of measuring instrument, then survey
- Incorporate controls to help in analysis of relationships
 - ↳ Exclude, hold constant or randomize
 - ↳ Eg, summer time, older siblings
- Window of opportunities - may not be able to plan
 - ↳ Eg, aftermath of murder
 - ↳ Used previously pre-tested material
 - ↳ Use control group

Participant Observer

- Best next bet to being an alien to get an objective view of human nature
- Group/community is studied from within by researcher who makes careful observations of behavior as it proceeds
 - ↳ Eg, Harvey Siy as participant in all reviews
- Study people in their natural setting
 - ↳ More appropriate than analytic survey for
 - complex social relationships
 - Intricate patterns of interaction
 - that cannot be precisely quantified or anticipated

Participant Observer

- Borrowed from sociologists and anthropologists
- Distinguish between
 - ↳ *Events*: relatively instantaneous occurrences
 - ↳ *States*: of appreciable duration
- Variation: supplementing observations with interviews
 - ↳ Eg, asking developers what they are doing
- In all societies humans relate by role and by affect (emotion)
 - ↳ Research diaries help us to examine cultural context of social facts

Synchronic and Diachronic

- Cross-sectional vs longitudinal
- Diachronic is relational
- Examines descriptions at varying points in time
 - ↳ Time is the independent variable
 - ↳ Descriptions are the dependent variable
- Useful for
 - ↳ Trends and growth patterns
 - ↳ Persistent, continual, regularly recurrent patterns

Synchronic and Diachronic

→ Eg, study of art records to determine whether right-handedness was a recent or age-old trait

↳ Two rival hypotheses

- Physiological predisposition
- Social or environmental pressure

↳ Tested by counting unimanual tool usage in art representations

- 12k examples from 15k BC to 1950, world sources
- 92.6% used right hand
- Geo/historical distribution uniformly high

↳ Seems to support

- physiological interpretation
- age-old trait

→ An example of diachronic research where secondary records were the basis for an historical comparison

→ Various kinds of metrics employed

↳ depending on the domain

Strong Inference

- Recognized by the fact that competing hypotheses vie against each other
- Assumption: stronger conclusions than if studying only one hypothesis at a time
- Exploring a tree of related hypotheses
 - ↳ Alternate predictions to represent rival Hypotheses
 - ↳ Design study with alternative outcomes
 - ↳ Do research to get clean result

Synchronic and Diachronic

→ Long history in natural sciences

- ↳ Avoid affection for a hypothesis, pressing facts to fit hypothesis
- ↳ Strong inferences formalizes method to do avoid this

→ Problems:

- ↳ not always possible to get clean unequivocal results
- ↳ May get support for more than one hypothesis

Simulations

→ Different strategies

- ↳ Heuristic - studies to generate ideas
- ↳ Methodological- develop, improve technique of inquiry
- ↳ Exploratory - serendipity
- ↳ Fact-finding - magnitude, property of dependent variable
- ↳ Boundary - fix range

→ Learn what happens under conditions designed to mimic the natural environment in some definite way

- ↳ Useful when morally impossible
- ↳ Serve a training function
- ↳ Telescope time and predict future from present
- ↳ When real situation too costly

→ Fundamental task is scaling down natural environment to a lab size that still contains key elements

Lab Realism

→ Two important criteria for assessing effectiveness of lab simulations

↳ *Experimental realism*

➤ Psychological impact on participants

↳ *Mundane realism*

➤ Extent to which lab events are likely to be encountered in naturalistic settings

→ *Inferential validity*

↳ When internal validity and mundane reality criteria are met

➤ Free of confounding variables

➤ Simulates naturally occurring events

Lab Realism

→ Example: Rumor mongering

↳ Two important issues

- Leveling - obliteration of some details
- Sharpening - pointing up other details

↳ Simulation: passing on a description of a picture; only first person actually saw it

- Assimilation by twisting to build better overall structure
- Tends to conciseness

→ Rosnow found conciseness and overgeneralization

↳ Sometimes snowball into profusion of invented details

↳ More complex than simulation studies led to believe

↳ Mundane realism issue: subjects passive receivers here

Lab Realism

→ Mook 83 - interesting defense of external validity

↪ Not trying to generalize from the lab to the real world

↪ Trying to predict real world from lab

↪ Important questions

- Is the investigator really trying to estimate from a sample characteristics of some populations
- Is purpose of the study instead to draw conclusions about a theory that predicts what these subject will do
- Is the purpose of the study to predict what would happen in a real-life situation
- It its purpose to test under carefully controlled conditions a predicted causal relationship that is viewed as a universal principle?

Role Play

→ A variant of simulation:

↳ Subject acts out a scenario; improvise with the help of a script

→ Proponents

↳ Humanistic, person centered

↳ Allows a wide latitude of response and exploration

→ Critics

↳ Unscientific because lacks adequate controls

↳ Relies on theoretical terminology that is ambiguous

Role Play

→ Greenberg 67

- ↪ Methodological experiment to assess utility of role playing
- ↪ Simulated an earlier experimental study of anxiety and affiliation (Schachter 59)
- ↪ Instructed to act as if situation were real
- ↪ Major findings were consistent with Schachter's
- ↪ Researchers interpreted success as useful if scenario is real enough

→ Opinions continue to be sharply divided

↪ Problems

- Subjects cannot predict the most interesting results that come from true experiments
- Cannot predict when results will correspond to real experiments
- Best can be said is that results might have occurred
- ↪ Essential point: researchers might use technique with eyes wide open

→ Relevant for SWE? Where, How

Emotional Role Play

→ Janis and Mann 65-68

- ↪ Demonstrating principle of saying is believing
- ↪ To demonstrate how to get people to stop smoking
- ↪ Subjects did not know purpose of experiment
- ↪ Average was one pack of cigarettes per day
- ↪ Randomly assigned to treatment, control
- ↪ Exposed to a series of sessions emphasizing dangers of smoking
 - Control: same info via tape no role playing
 - Treatment: act out participation
- ↪ Impact of the emotional role playing in producing attitude change
 - Consistently in the treatment group
 - Greater fear of harm from smoking
 - Reduced consumption by more than half
 - Persisted even after a year and a half

Naturalistic Experiments

- Some believe ideal context for behavioral studies is not the lab but natural environment
 - ↳ Hence, greater use of field experiments
 - ↳ Can be an effective way of circumventing subject experimenter artifacts
- Hauptmann 35
 - ↳ Emotional versus rational
 - ↳ Matched wards - distributed leaflets for election issues
 - ↳ Compared election results: emotional had greater impact

Naturalistic Experiments

→ Feldman 68

- ↪ National differences in helping behavior
- ↪ Repeated standard experiments
 - in Athens, Paris and Boston
 - using foreigners and natives as confederates
 - Asking directions, mail a letter, overpay
- ↪ Cross tabulated 3k subjects
 - Parisians and Bostonians treated compatriots better than foreigners
 - Athenians more helpful to foreigners than compatriots

Current State

- Technical capacity to carry out social experiments in US is not well developed
- *Nor in SWE/CS*
- In other countries used effectively to develop policy
- No guarantee similar conditions will prevail in the future
- Risk in attempting to generalize from past experimental results to future social conditions

Summary of Strategies

→ Descriptive

- ↪ Groundwork, reference points
- ↪ Establish parameters
- ↪ Raise ideas to be tested in relational

→ Relational

- ↪ Uncover relationships
- ↪ Make comparisons
- ↪ Can begin to establish validity of our constructs
 - Correlate behaviors as predicted by constructs

→ Experimental

- ↪ Test causal patterns by changing one variable
- ↪ Assess long term treatment outcomes
- ↪ Establish X precedes Y in time
- ↪ Generation of ideas for further experimentation
- ↪ Impose controls

→ Strong inference

- ↪ Repeat and test rival hypotheses
- ↪ Discover context in which valid