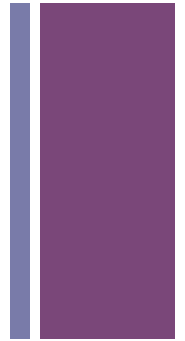


Introduction to Social Science Methods: An Overview of Quantitative and Qualitative Methods

D-Lab
Nora Broege
Carmen Brick
Oct. 21-22, 2015

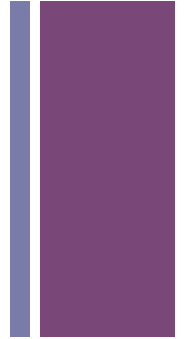
+ Introduction to Social Science Methods: An Overview of Qualitative and Quantitative Methods

- Part I: Research Design
- Part II: Quantitative Research
- Part III: Qualitative Research



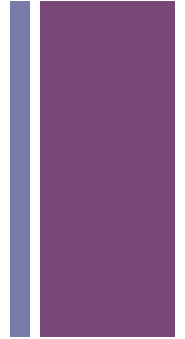
+ Research Design

- Identify the problem to be studied



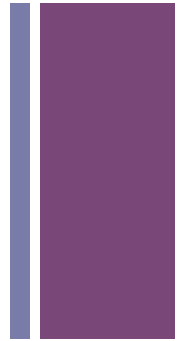
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- Identify the problem to be studied
 - Transform problem into a testable hypothesis/hypotheses
 - → An idea that will be tested through systematic investigation



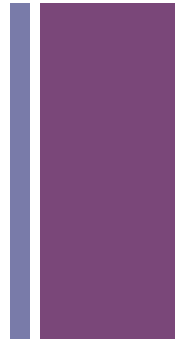
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- Identify the population you need to examine in order to test your hypothesis/hypotheses



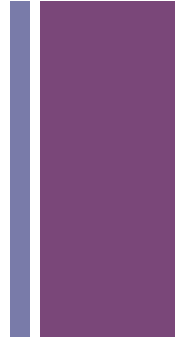
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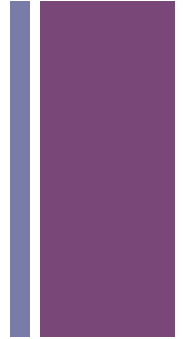


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 - Identify the sample you can reasonably access to gather data
- Determine the appropriate method for data collection

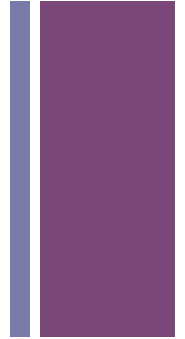


+ Research Design



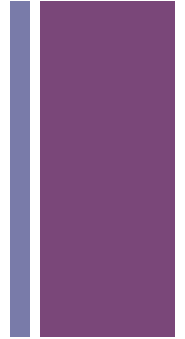
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- Determine the appropriate set of instruments to collect data

+ Research Design



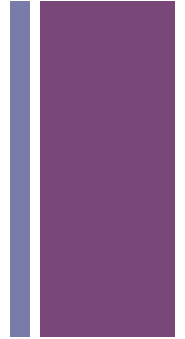
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- Collect data

+ Research Design



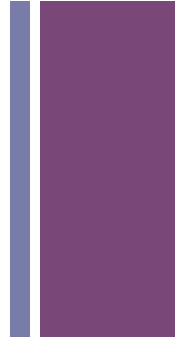
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- Determine the appropriate method for data collection
- Determine the appropriate set of instruments to collect data
- Collect data
- Analyze data

+ Research Design



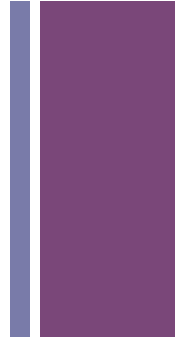
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- Determine the appropriate method for data collection
- Determine the appropriate set of instruments to collect data
- Collect data
- Analyze data
- Interpret results

+ Research Design



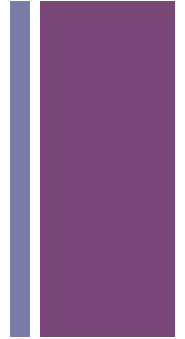
- Unit of analysis/observation
 - Individuals or aggregates
 - Groups, institutions, organizations

+ Research Design



- Unit of analysis/observation
 - Individuals or aggregates
 - Groups, institutions, organizations
- Primary v. secondary data

+ Research Design

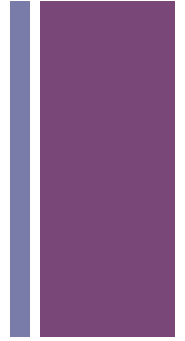


- Unit of analysis/observation
 - Individuals or aggregates
 - Groups, institutions, organizations

- Primary v. secondary data
 - Will you be collecting your own data or using preexisting data?
 - Often easier to use secondary data:
 - International data
 - Can't get a large enough sample size
 - Can't get nationally representative sample
 - Time constraints

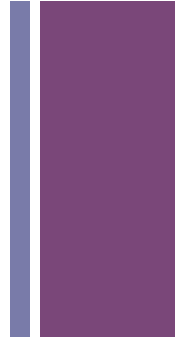
+ Methods

- Depending on:
 - Type of data you want/need
 - Sample size
 - Access
 - Location
 - Time
 - Resources



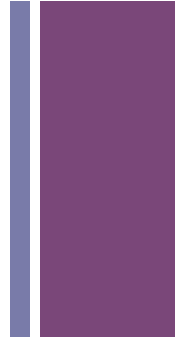
+ Methods

- Depending on:
 - **Type of data you want/need**
 - Cross-sectional, longitudinal
 - Quantitative or qualitative
 - Sample size
 - Access
 - Location
 - Time
 - Resources



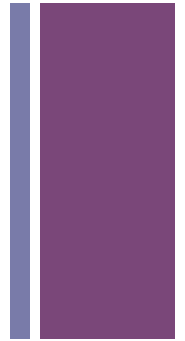
+ Methods

- Depending on:
 - Type of data you want/need
 - **Sample size**
 - Generalizability
 - Small- or large-N
 - Access
 - Location
 - Time
 - Resources



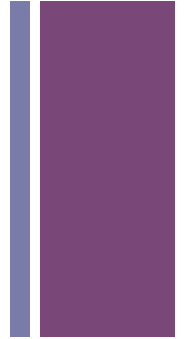
+ Methods

- Depending on:
 - Type of data you want/need
 - Sample size
 - **Access**
 - Is it a protected population? (e.g. minors/students)
 - Can you gain access?
 - Human subjects
 - Location
 - Time
 - Resources



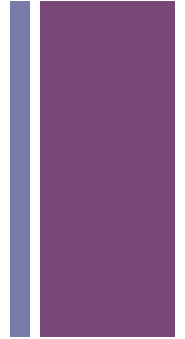
+ Methods

- Depending on:
 - Type of data you want/need
 - Sample size
 - Access
 - **Location**
 - local, state, national, international
 - Time
 - Resources



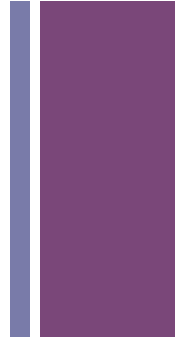
+ Methods

- Depending on:
 - Type of data you want/need
 - Sample size
 - Access
 - Location
 - **Time**
 - Timeline for data collection
 - Resources



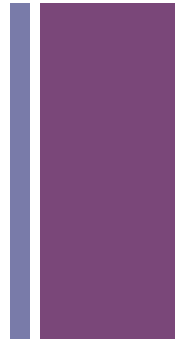
+ Methods

- Depending on:
 - Type of data you want/need
 - Sample size
 - Access
 - Location
 - Time
 - **Resources**
 - Are you conducting the research alone? (do you have RAs)
 - Cost of instrument design
 - Cost of data collection
 - Cost of analysis

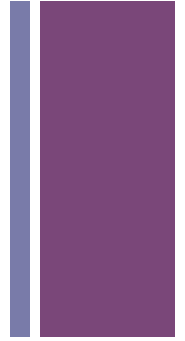


+ Quantitative Research

- Systematic empirical investigation of observable phenomena using statistical (computational) techniques
- Aims at causal explanation - answering “Why”
- Numeric analysis and measurement are the key parts of quantitative research that state the fundamental connection between observation and analytic statement(s)
- Quantitative methods are mostly used to justify the hypotheses and draw a general conclusion on selected hypotheses
- Statistics, tables and graphs, are often used to present the results of these methods.



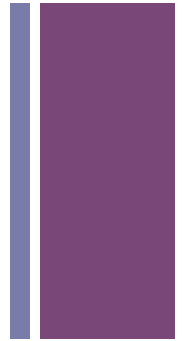
+ Quantitative Research



- Based on the idea that aspects of environment can be quantified, measured and expressed numerically.
- The information about a phenomenon of environment is expressed in numeric terms that can be analysed by statistical and spatial methods.
- The observations can be directly numeric information or can be classified into numeric variables

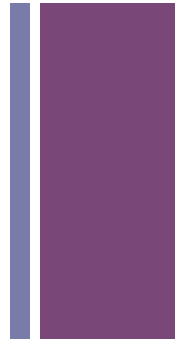
+ Quantitative Research

- Systematic empirical investigation of observable phenomena using statistical (computational) techniques
- Aims at causal explanation
 - Primarily answering “Why”
- Characteristics of quant research
 - Scientific
 - Positivist
 - Objective
 - Experimental
 - Macros (events/processes/relations)
 - Deductive
 - Hard/factual
 - Representative/generalizable
 - Apolitical
 - Realist



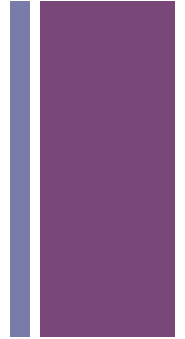


	Designs & Techniques	Methods	Details	Sample
Q U A N T I T A T I V E	Experimental Designs	Lab Experiment	Applying scientific method to experimentally examine an intervention in a controlled setting	2 or more groups
		Field Experiment	Applying the scientific method to experimentally examine an intervention in a real world setting	2 or more groups
		Quasi-Experimental	Selecting a group to test a variable w. out random pre-selection processes	2 or more groups
	Descriptive Designs	Survey/Questionnaire	Series of ques & other prompts to gather info from respondents	Large (most often), representative, often random sample
		Meta-Analysis	Statistical method for combining the results from a set of studies that address related hypotheses	2 or more pre-existing studies
		Case Study	In-depth investigation of an individual, group or event	At least 1 individual, group or event
		Applied Behavioral Analysis	An examination of individual responses to an intervention(s)	At least 1 individual
M E T H O D S	Longitudinal	Experiments, surveys, case-study, applied-behavioral analysis	Applying a specific method & corresponding instruments to a sample over time	Individuals, groups or institutions over time (may be the same or similar)
	Pre-Test Designs	Pilot Study	Small scale preliminary study conducted before main research to check feasibility of research design, time line, instruments, etc ... & make necessary changes	Small group who can inform/comment on research design
		Usability Testing	Evaluating a product (i.e. instrument) by testing it on a sample of potential uses	Small group who can inform/comment on validity and reliability of instrument



EXPERIMENTAL DESIGNS

+ Experimental Research



- Compare two or more groups that are similar except for one factor or variable
- Can occur in lab or field (natural setting)
- Conditions can be highly controlled; variables can be manipulated by the researcher
- Tend to use randomized samples
- 2 groups – treatment & control

+ Quant Research - Experiments



- How does a factor influence the behavior of an individual or a group?
- Lab experiments
 - Require lab settings
 - Controlled environment
 - Results highly reliable
 - Develop cause & effect relationships
 - Can only use small samples – often too costly for large-N
 - Can only study snapshot of present (not past)
- Field experiments
 - Occur in naturally occurring environments
 - Examining an intervention in the real world
 - Subjects don't always know they are involved in experiment
 - Seen as having higher degree of external validity since occur in real world

+ Experiments - Examples

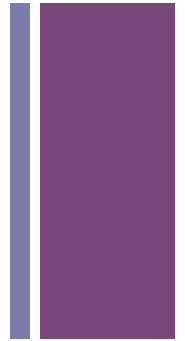
- Lab

- Milgram exp
- Zimbardo Prison exp

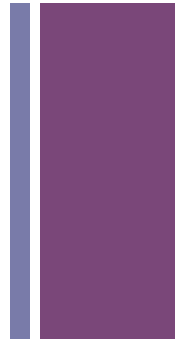
- Field

- Drug/pharmaceutical trials
- Poyner on reducing theft in public spaces



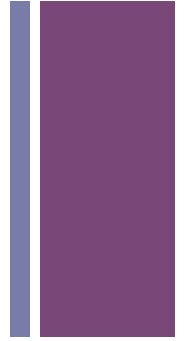


DESCRIPTIVE DESIGNS



DESCRIPTIVE DESIGNS SURVEYS

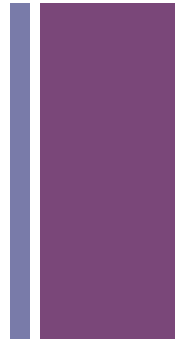
+ Survey Research



- Use set of predetermined, standardized, questions
- Collect answers from representative sample
- Answers are categorized and analyzed so tendencies can be discerned

+ Quant Research - Survey

- Used to assess thoughts, opinions, feelings, habits, activity logs
- Primary v. secondary data
 - Developing survey instruments to conduct primary data can be difficult – may require piloting questionnaire
 - Order of the questions is v. important
 - Often easier to use secondary survey data or instruments
 - Instruments have been proven reliable
- Can be issues or reliability & validity relating to self-reports
 - Response bias
 - Can be checked/corrected by test-retest of questions and standardization procedures



+ Survey - Examples

- [General Social Survey](#)
- [US Census](#)

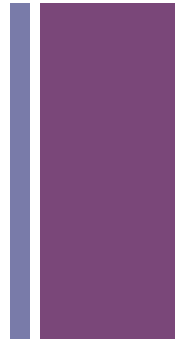


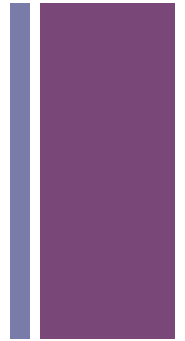
AMERICAN
COMMUNITY
SURVEY

U.S. CENSUS BUREAU

The GSS Data Explorer BETA

A New Gateway to Data from the General Social Survey





DESCRIPTIVE DESIGNS META-ANALYSIS

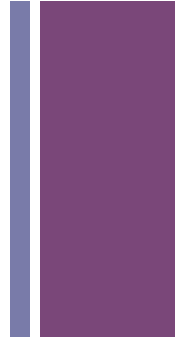
+ Meta-Analysis



- Numerous experimental studies with reported statistical analysis are compared
- Distinguishes trends
- Effect size (the influence of the independent variable on the dependent variable) can be compared
- Similar studies can yield a common truth
- Conducting research about previous research

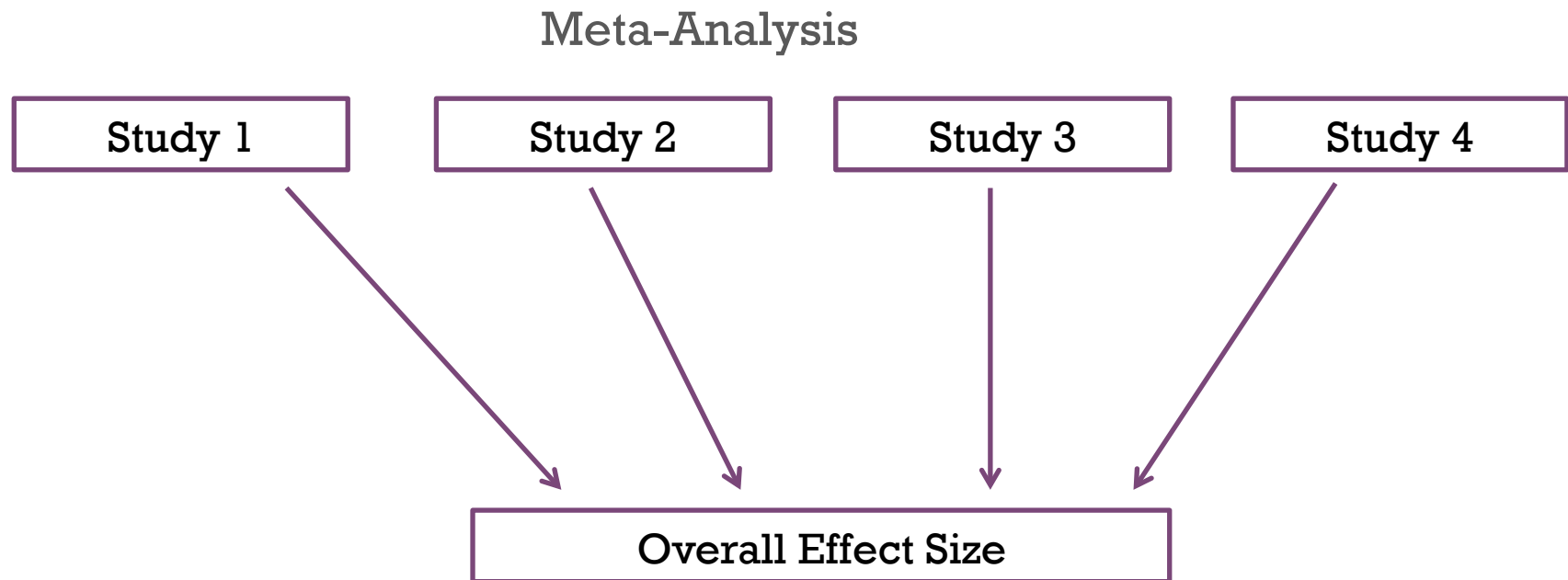
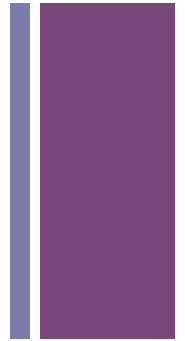


Quant Research – Meta-Analysis

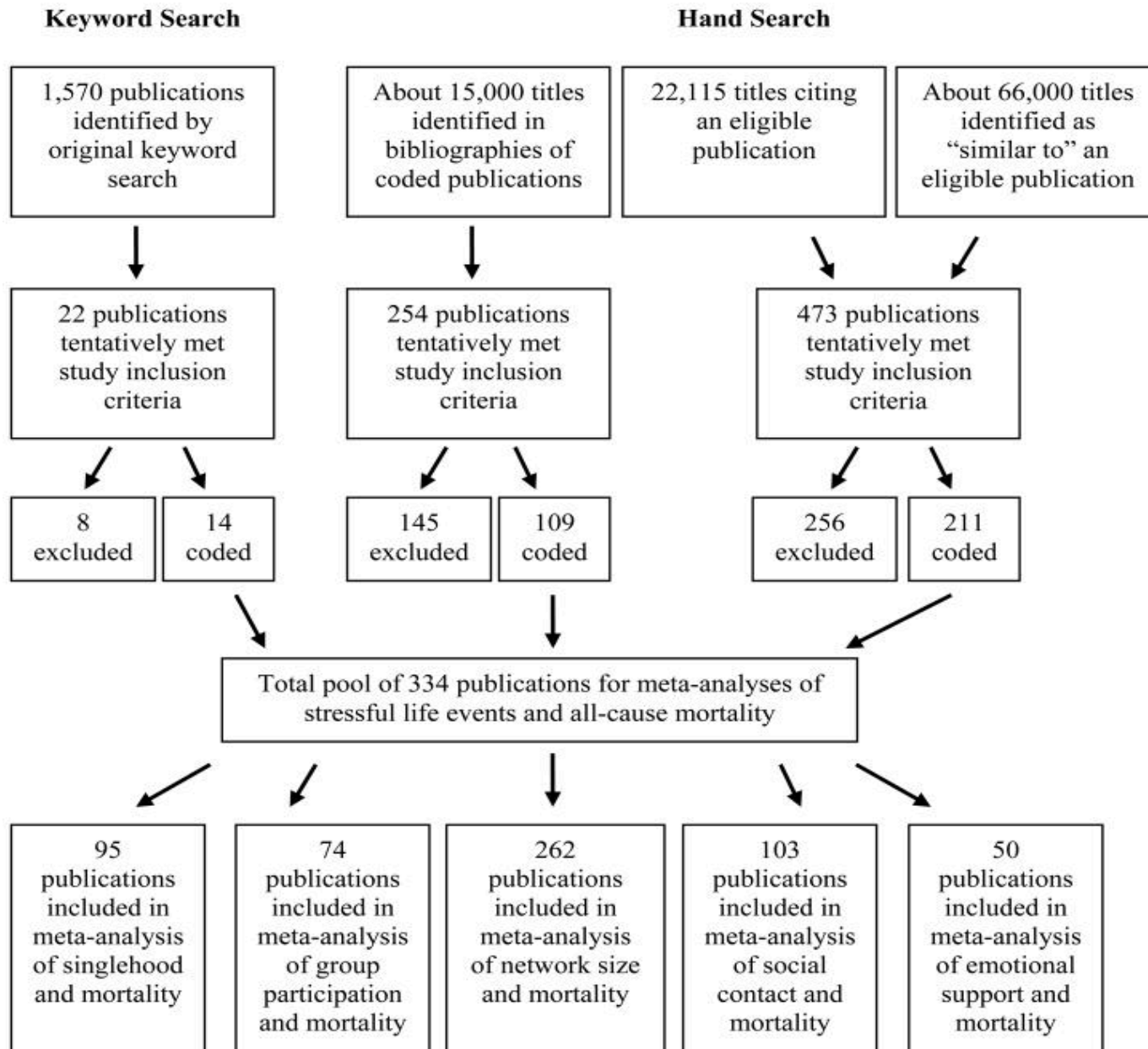


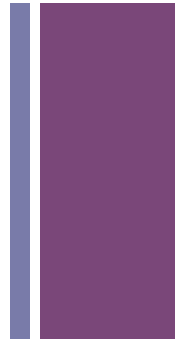
- Using a statistical approach to combine the results from multiple studies in an effort to increase power (vs. individual studies)
- Improves estimates of effect size
- Can also resolve uncertainty when reports disagree
- Can only be used if a common statistical measure is included across studies
- Results generalizable to larger population
- Precision & accuracy of estimates can be improved as you add more data
- Hypothesis testing can be applied to summary estimates
- Does not predict the results of a single, larger study
- Can't control for sources of bias – a meta-analysis of badly designed studies will produce bad statistics

+ Meta-Analysis - Examples



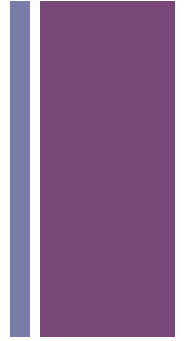
+ Meta-Analysis - Examples





DESCRIPTIVE DESIGNS CASE STUDIES

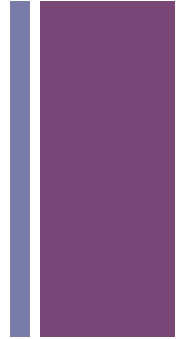
+ Quant Research - Case Study



- Also called single case design
- Describes numerically a specific case (can be organization, group, event, action or individual)
- May test or generate hypotheses
- Results often presented with tables and graphs

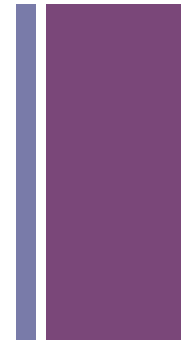
+ Quant Research – Case Study

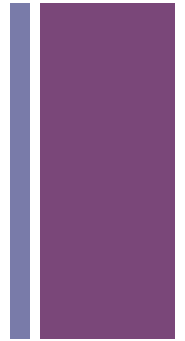
- Up-close, detailed examination of a subject & related contextual conditions
 - → an empirical inquiry that investigates a phenomenon within its real world contexts
- Holistic approach
- Not to be confused w. qualitative research – can be a mix of quantitative and qualitative data
- No random sample – information oriented sampling
 - Outlier cases may reveal more than a representative case
- 3 types of cases:
 - explanatory
 - exploratory
 - Multiple-case study
 - Intrinsic
 - Instrumental
 - collective



+ Case Study - Examples

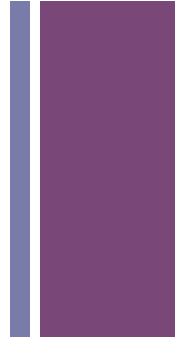
Case study type	Details	Example
Explanatory	Seeking an answer to a question on the causal links in real life interventions that may be too complex for survey or experimental strategies	Analyzing a web-based e-commerce site in Colombia
Exploratory	Explore situations when intervention has no clear, single set of outcomes	An observational study of the development and implementation of a teacher-student relationship
Multiple-case	Explore differences btwn & within cases – goal is to replicate findings across cases	Applying the multiple case study method to different social services available to violent crime victims
Intrinsic	When intent is to better understand the case, it's particularities and ordinariness	An examination of how Alzheimer's effects couplehood/ couples
Instrumental	Provides insight into an issue or helps to refine a theory – the actual case is of secondary interest (unlike intrinsic)	Examining the components of individual behavior that indicate the potential for domestic violence
Collected	Similar to multiple-case	A collective case study of stress among HS math teachers





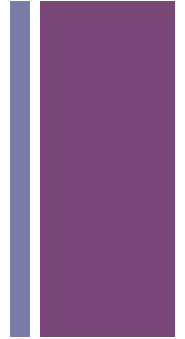
DESCRIPTIVE DESIGNS APPLIED BEHAVIORAL ANALYSIS

+ Quant Research - Applied Behavior Analysis



- Developing and analyzing procedures that produce effective and beneficial changes in behavior
- Examine the individual's responses in different situations (conditions) across time
- Usually conducted in experimental form
- Also known as behavior modification

+ Quant Research – Applied Behavioral Analysis

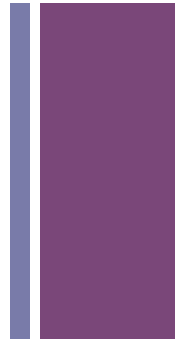


- All studies require:
 - At least 1 participant
 - At least 1 behavior (dependent variable)
 - At least 1 setting
 - A system for measuring the behavior
 - At least 1 treatment/intervention
 - Manipulations of the independent variable so that its effects on the dependent variable may be analyzed
 - A beneficial intervention (for the participant)
- Usually small-N studies
- Require manipulation and control of method

+ Applied Behavior Analysis - Example

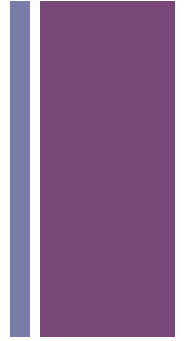
■ Testing interventions for autistic students

STRUCTURED TEACHING TECHNIQUES (DTT = Discrete Trial Teaching)	NATURALISTIC TEACHING TECHNIQUES (PRT = Pivotal Response Treatment)
<p>Teaching motor imitation:</p> <p>Prompt imitation of actions (e.g. clap hands)</p> <p>↓</p> <p>reinforce correct response with edible or preferred toy</p>	<p>Teaching motor imitation:</p> <p>A child likes cars. Prompt imitation of actions using preferred toy (e.g. drive car)</p> <p>↓</p> <p>reinforce correct response with car toy</p>
<p>Teaching identification of colours:</p> <p>Using shapes in different colours</p> <p>↓</p> <p>reinforce correct colour with edible or preferred toy</p>	<p>Teaching identification of colours:</p> <p>A child likes manipulating play-dough</p> <p>Use play-dough with different colour pieces</p> <p>↓</p> <p>reinforce correct colour by offering the playdough of the colour identified</p>
<p>Teaching identification of familiar people:</p> <p>Using flashcards with photos of familiar people</p> <p>↓</p> <p>reinforce correct name with edible or preferred toy</p>	<p>Teaching identification of familiar people:</p> <p>Play with familiar people</p> <p>↓</p> <p>reinforce correct name with tickles or cuddles from that person</p>



LONGITUDINAL DESIGNS

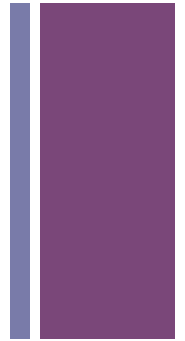
+ Quant Research - Longitudinal



- Individual or group research conducted across time, often decades
- Cohort Study: data is gathered from the same subjects repeatedly, over time
- Panel study: data is gathered from similar subjects, over time
- May be conducted using other methods (surveys, case studies)
- Studying developmental trends, the lifespan

+ Quant Research - Longitudinal

- Subject attrition is major problem
 - “missing data”
 - Replacing with participants w. similar characteristics
- Preserving confidentiality is also difficult
- Specific standardized tools may change over time
- Mostly observational – observe the state of things w.out manipulation → may have less causal power than experiments
- **BUT** the inclusion of repeated observations at the individual level → more power than cross-sectional observational studies
- Exclude time invariant unobserved differences
- Include temporally ordered events
- Allow researchers to distinguish short v. long term phenomena



+ Longitudinal - Example

- Survey Data

- National Longitudinal Survey of Youth (ages 12-16 in 1997)



- Case Study

- "UP" – British documentary of 14 British children starting in 1964



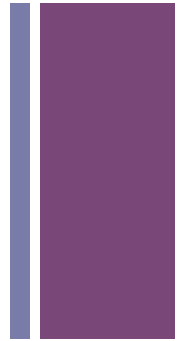
+ Quant Methods - Instruments



- Online
 - [Survey Monkey](#)
 - [Zoomerang](#)
 - [Poll Daddy](#)
 - [Additional online survey instruments](#)
- Printed images, paper/pencil
- Electronic devices: Smart phones, ipads, bio-physio readers, computers

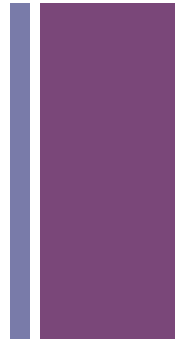
+ Measurement Criteria

- Objectivity - researchers stand outside the phenomena they study. Data collected are free from bias
- Accuracy – Are the methods adequate to answer your questions; reveal credible information; convey important information?
- Precision – How trustable are the measure; how confident is the result?
 - Pilot testing & Usability testing

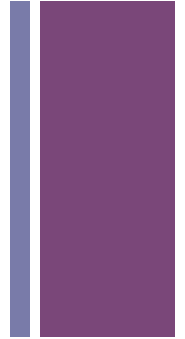


+ Measurement Criteria

- Objectivity - researchers stand outside the phenomena they study. Data collected are free from bias
- Accuracy – Are the methods adequate to answer your questions; reveal credible information; convey important information?
- Precision – How trustable are the measure; how confident is the result?
 - Pilot testing & Usability testing
- Reliability - if something was measured again using the same instrument, would it produce the same or nearly the same results?
 - Yielding consistent results over time or under similar conditions

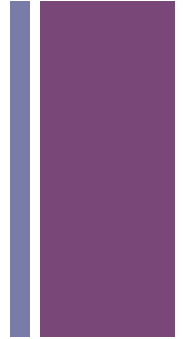


+ Measurement Criteria



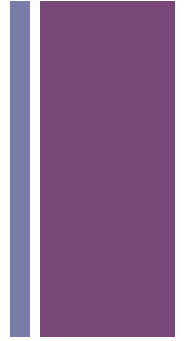
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- Reliability - if something was measured again using the same instrument, would it produce the same or nearly the same results?
 - Yielding consistent results over time or under similar conditions
- Validity – do the measures reflect all the facets you are attempting to study?

+ Content Validity



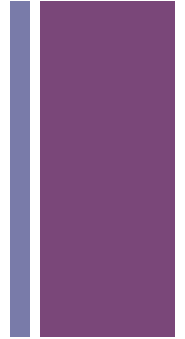
- The extent to which the items on a testing tool (that being used to measure the dependent variable) reflect all of the facets being studied
- All aspects are sampled (e.g. aural skills final exam)

+ Criterion-Related Validity



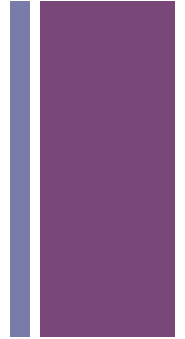
- Also called predictive validity
- The extent to which a testing tool yields data that allow the researcher to make accurate predictions about the dependent variable

+ Construct Validity



- The extent to which the testing tool measures what it is supposed to measure
- Relationship between the items on the tool and the dependent variable
- Also relates to actual (physical) construction of a written tool (e.g. Dean's Survey) and how this impacts the accuracy of the results

+ Internal Validity



- Relates to the internal aspects of a study and their effect on the outcome:
 - Researcher planning and preparation
 - Judgment – participants should feel free of judgement
 - Control for potential confounding variables

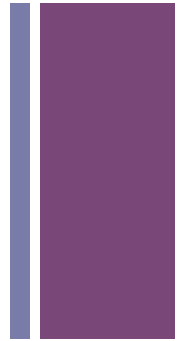
+ External Validity



- Relates to the extent to which findings can generalize beyond the actual study participants
- “How valid are these results for a different group of people, a different setting, or other conditions of testing, etc.?”

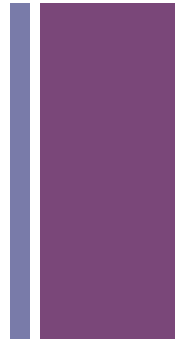
+ Quantitative Research

- Summarizing data
 - variables; simple statistics; effect statistics and statistical models; complex models



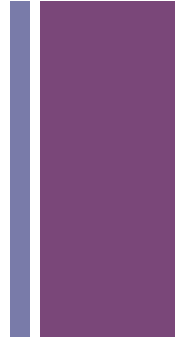
+ Quantitative Research

- Summarizing data
 - variables; simple statistics; effect statistics and statistical models; complex models
- Generalizing from sample to population
 - precision of estimate, confidence limits, statistical significance, p value, errors

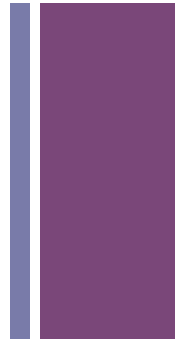


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+ Quantitative Research

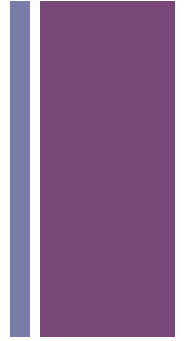


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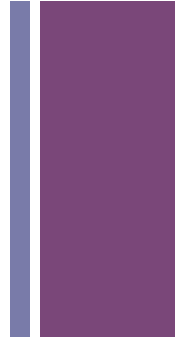
- Data are a set of values of one or more variables
 - A variable is something that has different values.
 - Values can be numbers or names, depending on the variable:
 - Numeric – year of birth
 - Counting - number of natural disasters
 - Ordinal – highest level of education (values are numbers or names/labels)
 - Nominal – gender (values are names/labels)

+ Independent Variable



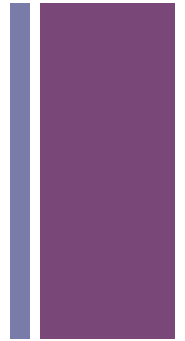
- The variable that is controlled or manipulated by the researcher
- The variable that is thought to have some effect upon the dependent variable
- The one difference between the treatment (experimental) and control groups

+ Dependent Variable



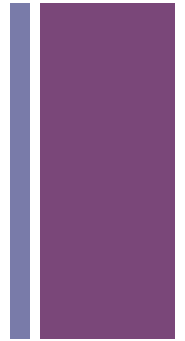
- That which is measured
- The outcome
- That which is influenced or affected by the dependent variable

+ Quantitative Research



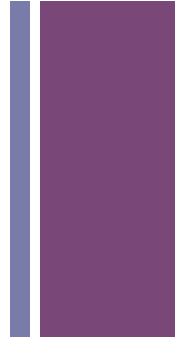
Y (dep variable)	X (ind variable)	Model/Test	Effect statistics
Numeric	Numeric	Regression	Slope, intercept, correlation
Numeric	Nominal	T-test, ANOVA	Mean difference
Nominal	Nominal	Chi-square	Frequency difference or ratio
Nominal	Numeric	Categorical	Frequency ratio per ...

+ Analysis Programs



- Software (all except SAS available on D-Lab machines)
 - Stata
 - SPSS
 - SAS
 - R
 - Python
 - GIS
 - Excel

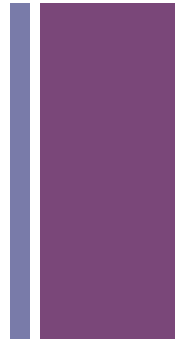
+ Pros of Quantitative Research?



- Clear interpretations
- Make sense of and organize perceptions
- Careful scrutiny (logical, sequential, controlled)
- Reduce researcher bias
- Results may be understood by individuals in other disciplines



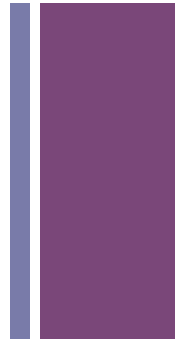
Cons of Quantitative Research?



- Can not assist in understanding issues in which basic variables have not been identified or clarified
- Only 1 or 2 questions can be studied at a time, rather than the whole of an event or experience
- Complex issues (emotional response, personal values, etc.) can not always be reduced to numbers
- Difficulties in distinguishing opinions and facts from surveys
- Results from surveys sometime have serious limitations
- People's perceptions and scientific observation may contradict

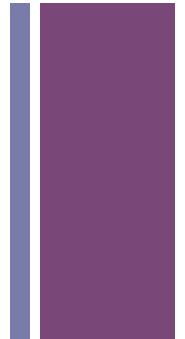
+ Quantitative vs. Qualitative

- There is/shouldn't be a rivalry between quantitative and qualitative methods
 - Each can be used to confirm the other
- Quantitative data and findings have underlying qualitative dimension
 - Qualitative data can also add description, detail and texture to quantitative data
- Quite often availability of data and its characteristics determine the method and what is possible – not a preference for one over the other



+ Quantitative vs. Qualitative

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 - Qualitative data can also add description, detail and texture to quantitative data
- Quite often availability of data and its characteristics determine the method and what is possible – not a preference for one over the other
- Both quantitative and qualitative research can aim at description of built environment
- Complementary - not contradictory
 - different kinds of research questions and objects of research
 - different perspectives on the same research objects / questions (methodological triangulation)



+ Best Practices – Sample Size

- Sample size
 - Data collection – a large enough sample so that missing data won't become an issue
 - Sample size calculator - how to generalize to population

Determine Sample Size

Confidence Level: 95% 99%

Confidence Interval:

Population:

Sample size needed:

Find Confidence Interval

Confidence Level: 95% 99%

Sample Size:

Population:

Percentage:

Confidence Interval:

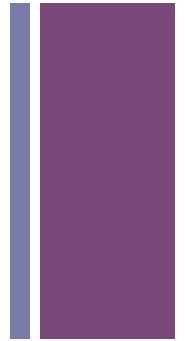
+ Best Practices – Things to Consider

- Time constraints
 - Choose the method that best suits your research time
 - 1 year is not enough for a longitudinal study
- Resource constraints
 - Choose the method that best suits your budget and resources available
 - If you don't have access to a lab, a lab experiment is unrealistic
- Access
 - Do you have access to a generalizable sample?

+ Best Practices

■ Ethics

- Maintaining respect for participants
- Can participants opt out at any point?
- Balancing benefit & harm
 - Will participation cause harm?
 - Does the potential benefit outweigh any potential harm (psychological effects, stress, anxiety, time)
- Will the method allow protection of anonymity?
 - Anonymity – pseudonyming is key!!
- How involved will the researcher be – will he/she bias results?



+ Thank You!

■ References/Resources

- *The Practice of Social Research* – Earl Babbie
 - *Statistical Methods for the Social Sciences* – Agresti & Finlay
 - Sage Research Methods - <http://srmo.sagepub.com/>
 - Ethics: [Guidelines for Research Ethics](#)
 - Best Practices: [NIH Office of Behavioral and Social Sciences Research](#)
 - Statistics – www.ats.ucla.edu
 - Workshops & consulting – www.dlab.berkeley.edu
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- If you have any further questions or comments, please feel free to email me, nbroege@berkeley.edu

