Theory-Building Based on Case Studies

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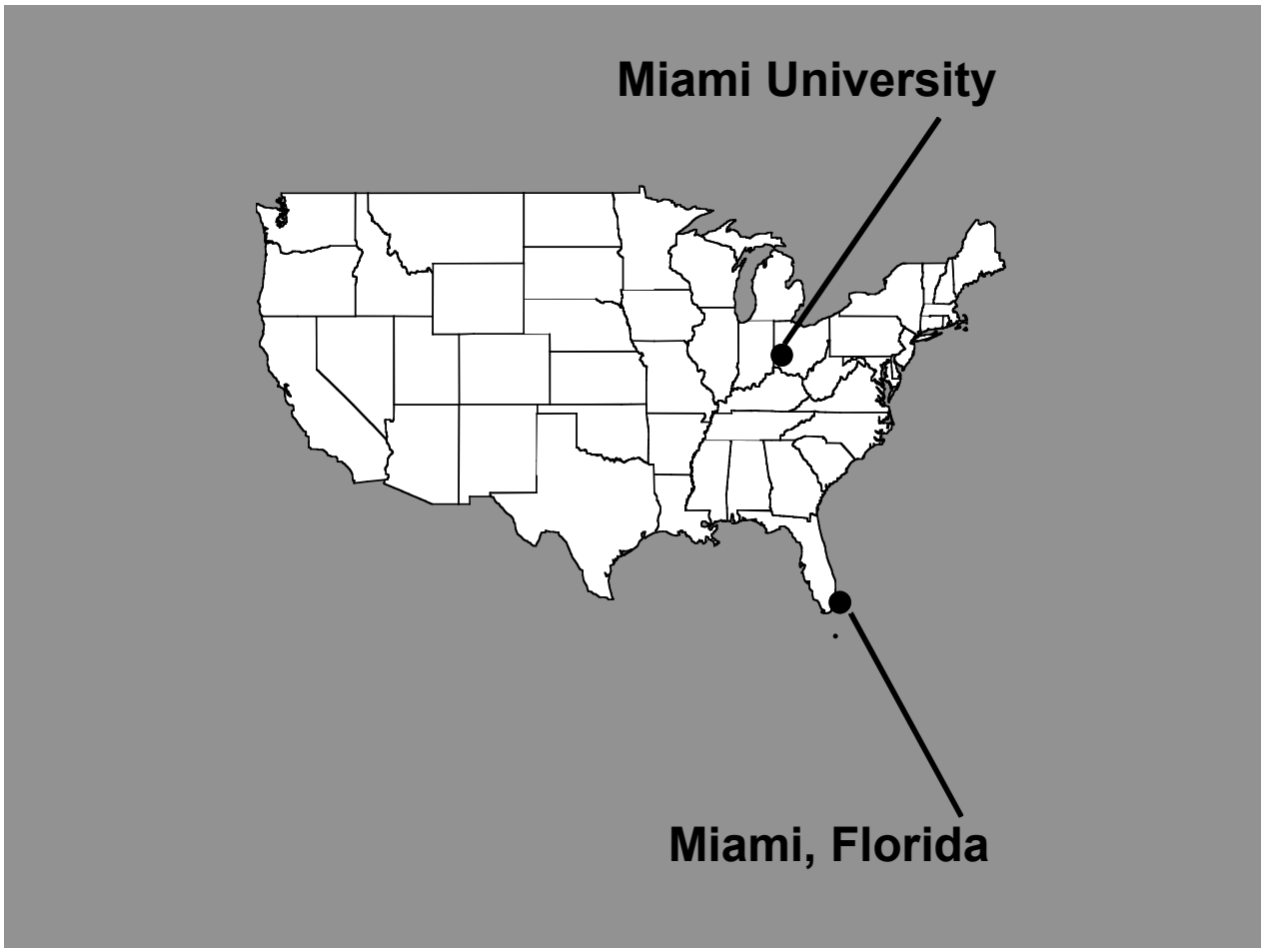


Case studies can serve many purposes

- Enriching understanding
  - Narratives allow identification with protagonist
  - Typical and unusual cases
  - Limits and possibilities
- Clinical training
- Context of discovery
  - Source of hypotheses
- Context of justification: Scientific theory building
  - This is my topic. A plea for explicit theory.
  - Talk is epistemological more than methodological.

Overview of presentation

- What is a theory?
- Theory-building case study research.
  - Unique features of cases can inform theory.
  - Case study strategy vs. hypothesis-testing strategy
- Logical operations in theory-building.
  - Deduction (logical consistency)
  - Induction (empirical observation)
  - Abduction (theory construction)
- Appendix 1: Procedural suggestions for case studies
- Appendix 2: Theory-building vs. enriching research

Theories are Made of Words

- Scientific theories are descriptions stated in words or numbers or diagrams or other signs.
- Theories express ideas about the world, such as how psychotherapy works.
- Signs are tangible and observable, and they also point to something besides themselves.
  - The word *green* is a mark on a page or a vibration in the air; it also refers to a color that people see.
- Insofar as they are composed of signs, theories are public and observable, unlike the ideas they express, which are private.

Experience and Sign Meaning

- People share experience through signs.
  - Words carry experience from one person to another.
  - When I say “I walked through the green woods,” to the extent that you understand me, you share a bit of my experience.
  - To the extent that you understand this talk, you are sharing my thinking about case studies.
- The experience of a sign can be called the sign's *meaning*.
- Sign meanings differ across people and time.
  - Different meanings for author and addressee.
  - Sign meanings change with use.
  - Theorist's intended meaning may not be understood by readers.

Research provides quality control on theory

- Scientific research compares theoretical descriptions with observations.
- Researchers gather appropriate observations, to see how well they correspond to the theory.
- If the *experience* of the observations corresponds to the *experience* of the description, the theory is a good one.
- I call this the *experiential correspondence* theory of truth.

Importance of theory in psychotherapy

- Theories are the way scientific research affects practice.
- Psychotherapy theories (e.g., psychodyanamic, person-centered, cognitive-behavioral) are rich conceptual tools that psychotherapists use to understand clients and guide interventions.
  - A good theory describes the way you think psychotherapy really works.
- Thus, the quality of the theories can powerfully affect the quality of the treatment clients receive.
  - Inaccurate, confused, or internally contradictory theories can lead to inappropriate, inefficient, or damaging treatment.

Unique features of cases can inform theory
(George Rosenwald, 1988, multiple case study)

- Theories aim to encompass many cases.
- Case data are realistic and rich.
  - Each case provides lots of information rather than a single data point.
  - Each case includes unique features.
  - Unique features are not error.
- Empathy as well as external observation.
- Case studies can use these observations to inform theory.
  - This is the payoff from case study.

The Blind Men and the Elephant

John Godfrey Saxe (1816-1887)

- It was six men of Indostan
  To learning much inclined,
  Who went to see the Elephant
  (Though all of them were blind),
  That each by observation
  Might satisfy his mind.

- The First approached the Elephant,
  And happening to fall
  Against his broad and sturdy side,
  At once began to bawl:
  "God bless me! but the Elephant
  Is very like a wall!"

- The Second, feeling of the tusk
  Cried, "Ho! what have we here,
  So very round and smooth and sharp?
  To me `tis mighty clear
  This wonder of an Elephant
  Is very like a spear

- The Third approached the animal,
  And happening to take
  The squirming trunk within his hands,
  Thus boldly up he spake:
  "I see," quoth he, "the Elephant
  Is very like a snake!"

- The Fourth reached out an eager hand,
  And felt about the knee:
  "What most this wondrous beast is like
  Is mighty plain," quoth he;
  ""Tis clear enough the Elephant
  Is very like a tree!“

- The Fifth, who chanced to touch the ear,
  Said: "E'en the blindest man
  Can tell what this resembles most;
  Deny the fact who can,
  This marvel of an Elephant
  Is very like a fan!"

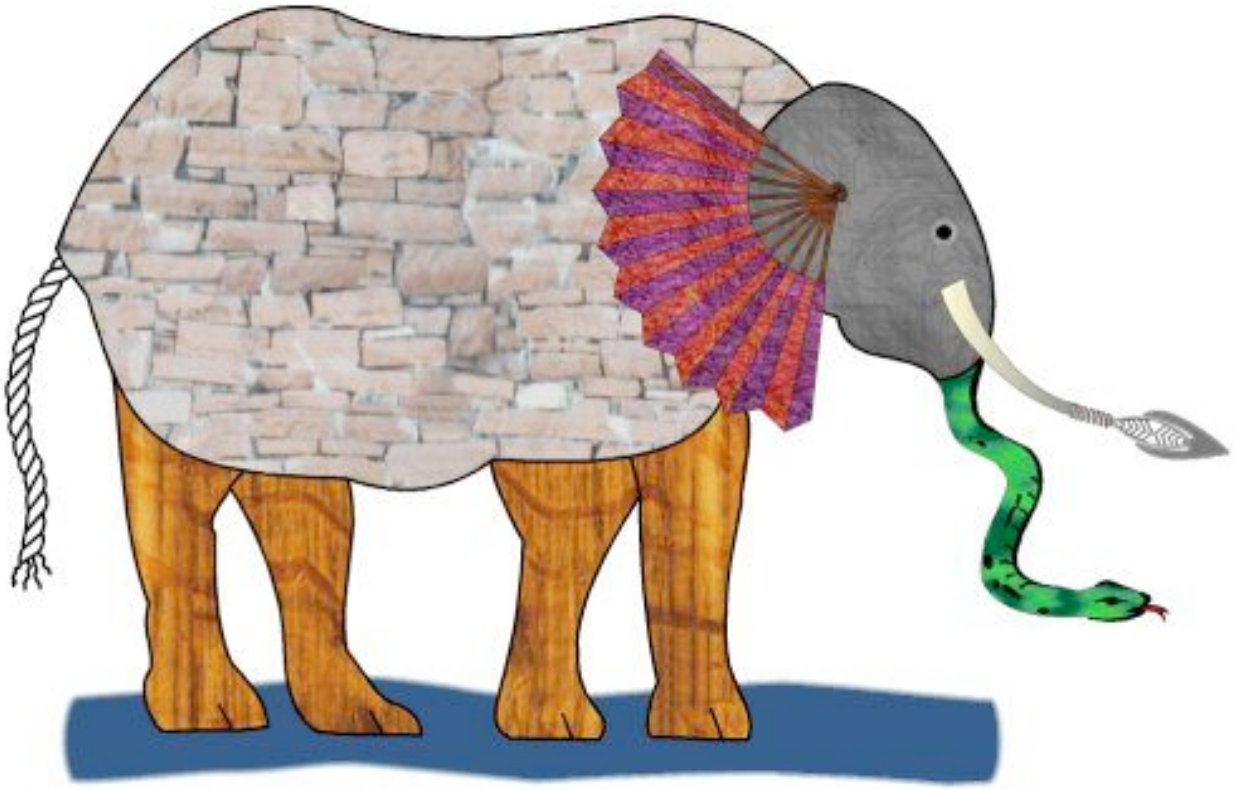
- The Sixth no sooner had begun
  About the beast to grope,
  Than, seizing on the swinging tail
  That fell within his scope.
  "I see," quoth he, "the Elephant
  Is very like a rope!“

- And so these men of Indostan
  Disputed loud and long,
  Each in his own opinion
  Exceeding stiff and strong,
  Though each was partly in the right,
  And all were in the wrong!

  Moral:
- So oft in theoretic wars,
  The disputants, I ween,
  Rail on in utter ignorance
  Of what each other mean,
  And prate about an Elephant
  Not one of them has seen!

The blind men and the elephant: Applying the parable to case studies

- The elephant has many different aspects.
  - Psychotherapy includes many different cases.
- Each case tells us something new.
- We don’t observe the same variables in every case.
- Theory must incorporate the distinctive features.
- A focus on common themes will miss the interesting parts and may leave nothing.



Hypothesis testing

vs

Case study

- Both are *empirical, scientific* research.
- Both provide quality control on theory.

- Case studies address many theoretical issues in the same study rather than only one or a few.

Statistical Hypothesis Testing Strategy

1. Derive ***one statement*** from a theory.
2. Compare the statement with many observations.
3. If the observations tend to match the statement, then confidence in the *statement* is substantially increased (e.g., not due to chance, $p<.05$)
4. This yields a small increment of confidence in the *theory*.

Statistical hypothesis testing can be problematic for psychotherapy research.

- For statistical power, research must study common features (to test a single statement).
- Common features of clinical cases are often artificial (e.g., rating scale responses) or global (e.g., efficacy of a treatment) or trivial.
- Single statements (hypotheses) out of context don't do justice to clinical theory or practice.
- Therefore, research results don't interest clinicians.

Case Study Strategy

(Donald Campbell, 1979, degrees of freedom metaphor)

- Compare ***many theoretically-based statements*** with correspondingly many observations.
  - By describing case observations in theoretical terms.
  - Asking: How well does the theory describe case details?
- Each case may address different theoretical statements.
- For familiar reasons (selective sampling, low power, investigator biases, etc.), the change in confidence in any one *statement* may be small.
- But, because many statements are examined, the gain in confidence in the *theory* may be as large as from a statistical hypothesis-testing study.

Generality is carried by theory

- Case studies don't yield conclusions
  - in terms of relations between variables.
  - N=1 yields little confidence in any one statement.
- Case studies don't test hypotheses or answer simple research questions.
  - The topic or focus may not be evident at the outset.
  - Main point may not be known until the study is finished.
- Lack of hypotheses and conclusions can be profoundly puzzling.
- The product is the theory
  - improvements in generality and confidence.

Summary so far

- Each case has distinctive features that are relevant to theory.
  - Multiple case study logic (Rosenwald)
- Detailed case observations are compared to multiple theoretical statements.
  - Degrees of freedom logic (Campbell)
  - Multiple, explicit points of contact.
- Generality is carried by theory.
- Case study may be superior to quasi-experimental designs in psychotherapy research
  - Incorporates context
  - Uses distinctive or unique features

Logical Operations in Case Study Research

Deduction (logical consistency)

Induction (empirical observation)

Abduction (theory construction)

Theories should be logical

- Through logic, observations on one aspect can indirectly strengthen all aspects.
  - This is the point of doing scientific research.
  - Assumed in hypothesis-testing and case study.
- Statements of the theory and statements derivable from the theory should be logically consistent, in the sense of not including direct contradictions.
- They should also be logically interrelated.
  - Otherwise, observations on one part of a theory may have no bearing on other parts of a theory;
  - and support for a hypothesis would not extend beyond the hypothesis itself.

Two components of logic

- Formal logic = rules of inference (deduction).
  - If all A are B and C is A, then C is B
    - All men are mortal (major premise).
    - Socrates is a man (minor premise).
    - Therefore Socrates is mortal (consequent).
  - $((A \rightarrow B) \& A) \rightarrow B$
  - This is the easy part.
- Meaning of the terms
  - What are A, B, and C in the world?
    - $E=mc^2$
    - CBT > control, $p<.05$
  - This (sign meaning) is the difficult part

Formal logic requires that signs have fixed meaning

- In natural language, signs change meaning.
  - In psychological research, too, reference is often approximate and labile.
- If signs change meaning, formal logic fails.
  - Socrates is a man, yet nevertheless he is immortal.
- So, in theory-building, finding the right words is important (occupies much scientific discussion).
- Stable terms problematic in case study
  - In physical science, terms are more stable.

Logical Consistency in Psychotherapy Theories

- In physical sciences, logical consistency is supplied mathematical symbols and rules of inference.
- Psychotherapy theories often include statements that are logically unconnected with each other
  - Descriptions are usually probabilistic.
  - Hopefully not explicitly contradictory.
- Psychotherapy terms used as natural language
  - not very stable.
  - Even technical terms (*transference*, *self-disclosure*, *cognitive-behavioral therapy)* mean different things across people and occasions.
- Even for basic terms, conditions affect observations (e.g., lighting, the act of looking).

Fill in the logical gaps

- Intermediate propositions can connect theoretical statements.
- Permits observations on one statement to bear on confidence in other statements.
- Logical interconnection requires common terms.
  - E.g., "leaves are green" and "leaves make chlorophyll" are logically unconnected.
  - adding "chlorophyll is green," could suggest "leaves that look green contain chlorophyll."
  - This is the beginning of a logically interconnected theory.
- Perhaps this is the appeal of basic units:
  - Objects or events that can be represented unambiguously.

Explicit theory versus common expectations

- People have trouble distinguishing logical expectation from personal or cultural expectation.
  - (example of trauma and self-destructiveness)
- So, in psychological theory-building, it's important to make the logical structure explicit.
  - Fill in the intermediate steps in the inference.

Research Aims to Affirm the Consequent (Induction)

- Scientific theories cannot be fully confirmed because they concern events that have not yet happened.
- At best, research observes specific instances and confirms their consistency with theory.
  - This amounts to affirming the consequent--a classical fallacy.
  - Observing that Socrates died affirmed the consequent but is not sufficient to prove that all men are mortal.
- Affirming the consequent does make the major premise more plausible (improves the posterior odds).
- Progress can be made via multiple observations
  - Many men have died and none lived more than about 120 years.
  - Men are biological organisms: Makes relevant the observations that women and other multicellular organisms have died.
  - Embedding this in a theory of cellular vulnerability incorporates more details, e.g., effects of neurotoxic alkaloids in poison hemlock.
- Inductive logic presumes a theory--premises whose plausibility is increased by affirming the consequent.

What happens when observations don't match theory?

- E.g., observations contrary to theory or not adequately represented by theory.
- Classic Popperian disconfirmation logic: Any contradiction invalidates the theory.
- This is not really what happens.
- Instead, scientists first check methods and ancillary conditions.
- Then, if the observation still seems not to match, they modify the theory.

Abduction

- Theories are modified by *abduction*.
  - A logical operation, like deduction and induction (C. S. Peirce).
- Abduction describes constructing a hypothesis or theoretical tenet to accommodate new observations.
- If the tenet were the case, then the actual observations would be expected. Reasoning as follows:
  - If A were true, observations, B1, B2, and B3 would be among the consequences.
  - We observe B1, B2, and B3.
  - Therefore, we can provisionally incorporate A into our theory.
- This is how new elements can enter a theory.
  - Change may be a wholly new tenet or minor wording adjustment.
- Through successful abductions, a theory can expand to encompass new and unexpected observations.

Abduction does not have free rein.

- A new theoretical tenet is constrained by
  - the terms in which the new observation is described,
  - the existing theory,
  - previous observations that the theory had incorporated.
- The new tenet must be logically consistent with the rest of the theory.
- The altered theory must continue to explain) the observations previously explained by the theory.
- Abduction thus starts with a meaningful account and modifies it:
  - corrections of previous errors,
  - elaborations of previously unappreciated aspects,
  - extensions to domains not previously encompassed.
- New tenets may require adjustments in other parts of the prior theory to maintain logical consistency.

Observations *permeate* theory

- A diffusion metaphor: Particles of observation spread through theoretical interstices.
- Ideas change (by abduction) to fit observations; aspects of the observations become part of the theory.
- The theory may be explained differently, e.g., using different words, or using the new observations as illustrations.

Observations accumulate in theories

- New research results (e.g., case observations) permeate the theory.
  - But earlier thinking and results are retained.
- An alternative to the brick wall metaphor for how science is cumulative.
  - *Not* building a theoretical edifice fact by fact,
  - But elaborating and changing a theory by infusing observations.

Summary of My Argument for Theory-Building Case Studies

- Theories are clinically important.
- Research compares theoretical statements with observations.
- In case studies, detailed observations are compared to detailed clinical theories (Campbell), incorporating unique as well as common aspects of cases (Rosenwald).
- To benefit from research, theories must be logically consistent,
  - formal (deductive) rules of inference,
  - stable meanings for the theoretical terms.
- Allows empirical (inductive) observations on one tenet of a theory to affect confidence on other tenets.
- When the observations fail to match the theory, even after methodological checks, researchers may creatively (abductively) modify the theory (Peirce).
- Thus, observations on cases permeate the theory
- So the theory conveys the accumulated experience of previous researchers.

Appendix 1: Procedural suggestions for theory-building case study research

- Familiarity with the theory and courage to change it.
- Rich case record
- Analyzing case study materials
  - Gaining familiarity.
  - Selecting and focusing.
  - Interpreting.
  - Having a team helps.
- Apply the case to the theory rather than the theory to the case.

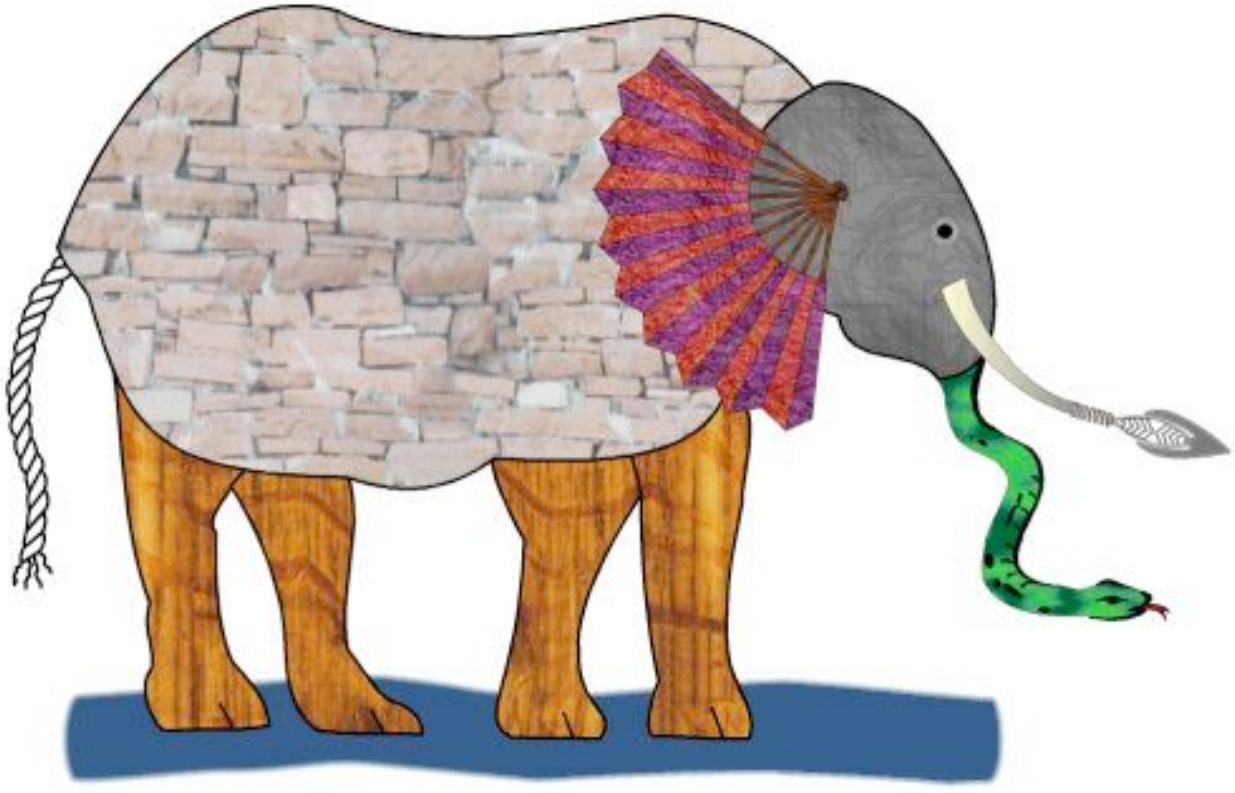
Points of Contact Form

Name_____	Team #_____	Date_____
Briefly describe the item you are examining. Include dates associated with the item if possible:		
Your Observations; Examples	Contact or Lack of Contact with Theory (Voices, problematic voices/ experiences, meaning bridges, dialogue, discrepant voices, community of self, APES, etc…)	Any Needed Elaborations of theory?

Appendix 2: Theory-Building Research versus Enriching Research

- *Theory-building research* is aimed at constructing an internally consistent, explicit understanding.
- *Enriching research* considers multiple perspectives, alternative interpretations, unpacking the history of sign meanings.
- The product of enriching research is not a theory but a deeper, broader, more profound appreciation of the phenomenon.

Theory-Building Project	Enriching Project
Build the theory	Understand the theory
Own the theory	Understand the owner
Work toward unified account	Explore multiple perspectives
Stable, fixed word meanings	Rich, allusive word meanings
Generality	Transferability
Product in the signs (theory)	Product in the people



Thank you.