26:010:557 / 26:620:557
Social Science Research Methods

Dr. Peter R. Gillett

Associate Professor

Department of Accounting & Information Systems

Rutgers Business School – Newark & New Brunswick

Overview

- Theories, Hypotheses and Models
- Social Science Research
- The Scientific Approach
- Problems and Hypotheses
- Constructs, Variables and Definitions
- Theory Building
- Normative, Descriptive, Prescriptive Models
- Foundations of Measurement
- Reliability
- Questions

Question

Chalmers, applying Kuhn says, “Much of modern sociology lacks a paradigm and consequently fails to qualify as science.” If this is so is all social science research called into question? Last semester we saw in our Strategy seminar that there are no accepted paradigms but a group of loosely connected hypotheses and proofs. What has stopped social science from developing accepted and standard paradigms?

Vocabulary

- Metaphysics
  - Ontology / ontological
- Epistemology
  - Epistemic
- *a priori* v. *a posteriori*
- Epigenetic
- Axiological
- Ostensive
- *Otiose*
- Connotation
  - Denotation
  - Intension
  - Extension
- Anomie
- Intensionality
- *Clapham omnibus*
- *Anodyne*
- Diachronic

Question

We have covered many philosophical schools about science itself. What is their implication for methodology? Or more basically, what is methodology? What is the relationship between science and methodology?

Question

Nothing is wrong with data mining . . .

Because data mining implies no theoretical relationship between factors is predefined, is the result of data mining only identification of correlations and nothing more?

Theories, Hypotheses and Models

- What is a theory?
- What is theory?
- What are hypotheses?
- What are models?
- What do we test empirically?
- How are they related?
- What is the scientific method?
- Examples of theories / models

Social Science Research

- What is research?
- What are the goals of research?
  - Understanding
  - Explaining
  - Predicting
  - Manipulating
  - Controlling

Social Science Research

- What is medical research?
- What are its goals?
- Do accounting firms conduct research?
- For what purpose?
- What is (academic) business research?
- What are its goals?

Business Research

- Is the primary goal of Business Research explanation or prediction?
- Are these the only two important choices?
  - If so, why?
  - If not, what alternatives matter?

The Scientific Approach

- Peirce's Four Ways of Knowing:
  - Method of tenacity
    - Repetition
  - Method of authority
    - Bible, Professor, ….
  - Method of intuition
    - *A priori*
  - Method of science

The Scientific Approach

- Science versus common sense:
  - Use of conceptual schemes and theoretical structures
  - Systematic empirical testing of theories and hypotheses
  - Control
  - Preoccupation with relationships
  - Ruling out metaphysical explanations
- Note Kerlinger's *positivist* attitude towards metaphysics!

The Scientific Approach

- Broad views of science
  - Static: adding to the body of facts, laws, theories, hypotheses and principles
  - Dynamic: an activity with a discovery emphasis
- Functions of science
  - A discipline aimed at improvement
  - The establishment of general laws and the connection of our knowledge of separate known events, to make reliable predictions of unknown events (Braithwaite)

The Scientific Approach

- Sampson's views
  - Conventional perspective
    - A mirror of nature, accurate description, with science as an objective referee
  - Sociohistorical
    - Science as a story, with no neutral arbitrator

The Scientific Approach

- ***The basic aim of science is theory***
- Theories are explanations of natural phenomena
- "A theory is a set of interrelated constructs (concepts), definitions, and propositions that represent a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena" (K&L, p.11)
- Theories are tentative explanations, evaluated empirically (K&L, p.13)

The Scientific Approach

- "Scientific research is systematic, controlled, empirical, amoral, public and critical investigation of natural phenomena. It is guided by theory and hypotheses about the presumed relations among such phenomena." (K&L, p.14)
- What we test is not variables, but the *relation* between variables.
- We do not usually test hypotheses *directly* – we test deduced implications of hypotheses.

Problems and Hypotheses

- A problem is an interrogative sentence or statement that asks: What relationship exists between two or more variables?
  - The problem should express a relation between two or more variables
  - It should be expressed clearly and unambiguously in question form
  - It must imply possibilities of empirical testing

Problems and Hypotheses

- A hypothesis is a conjectural statement of the relation between two or more variables
  - Hypotheses are statements about the relations between variables
  - Hypotheses carry clear implications for testing the stated relations
- Hypotheses are the working instruments of theory
- They can be tested and shown to be probably true or probably false
- They enable scientists to get outside themselves

Problems and Hypotheses

- Problems and hypotheses direct investigations
- They help an investigator confirm or disconfirm theory
- A hypothesis is never really proved or disproved
- Hypotheses should avoid *values* and *methodological problems*
- They should be neither too general nor too specific
- They are commonly multivariable (N.B. *not* multivariate!)

Problems and Hypotheses

- Hypotheses should be
  - Testable
  - In harmony with existing knowledge
  - Parsimonious
  - Relevant to the question of interest
  - Susceptible of quantification (?)
  - Able to yield a large number of consequences
  - Logically simple
  - General in scope

  (Wanda Wallace)

Problems and Hypotheses

- Null hypothesis
- Alternative hypothesis
- Alpha risk: risk of Type I errors
- Beta risk: risk of Type II errors
- Type I errors: incorrect rejection of true null
- Type II errors: incorrect acceptance of false null
- Type III errors: working on the wrong problem

Constructs, Variables and Definitions

- Concepts, Constructs and Variables
  - A *concept* expresses an abstraction formed by generalization from particulars
  - A *construct* is a concept with the added meaning of having been deliberately and consciously invented or adopted for a special scientific purpose
  - A *variable* is a symbol to which numerals or values are assigned

Constructs, Variables and Definitions

- A *constitutive* definition defines a construct using other constructs
- An *operational* definition assigns meaning to a construct or a variable by specifying the activities or operations necessary to measure it and evaluate the measurement
  - Measured
  - Experimental (manipulated)

Constructs, Variables and Definitions

- The objects studied in the physical sciences are typically presented to us in nature – they are in some sense objective
- Social sciences, however, investigate theories that use constructs we have devised ourselves; it is important that the constitutive and operational definitions of these constructs are consistent with each other, and also with the expression used to name them
- In particular, be wary of constructs defined or measured differently in different studies that appear to be about the same things, but may not always be so

Constructs, Variables and Definitions

- Independent variables
  - Presumed causes
  - Antecedent
  - Manipulated by the experimenter
  - Predicted from
- Dependent variables
  - Presumed effects
  - Consequent
  - Predicted to
- Stimulus – Response
- Predictor – Criterion

Constructs, Variables and Definitions

- Active variables
  - Manipulated by the experimenter
- Attribute variables
  - Measured
- Continuous variables
  - Capable of taking on an ordered set of values within a given range
- Categorical variables
  - Assigned to subsets based on characteristics

Constructs, Variables and Definitions

- Latent variables
  - Unobserved entities presumed to underlie observed variables
    - Preferable to some alternative terms
    - Can now be assessed via analyses of covariance structures such as Structural Equation Modeling (using specialized software such as LISREL or EQS)

Theory Building

- “A theorist is considered great, not because his theories are true, but because they are interesting.” (Murray Davis, 1971)
- “Theories do not gain hegemony because they are better than their predecessors, but because they are able to attract adherents and withstand attacks from those who hold other positions.” (Graham Astley, 1985)

Theory Building

- Gioia & Pitre (1990) define theory as any coherent description or explanation of observed or experienced phenomena
- Appropriate approaches to theory building depend on the paradigmatic assumptions brought to bear on a topic
- Paradigms (based on Burrell and Morgan, 1979)
  - General perspective or way of thinking
    - Functionalist (*dominant* paradigm)
      - Objective, maintain status quo
    - Interpretivist
      - Subjective, maintain status quo
    - Radical Humanist
      - Subjective, radically change constructed realities
    - Radical Structuralist
      - Objective, radically change constructed realities

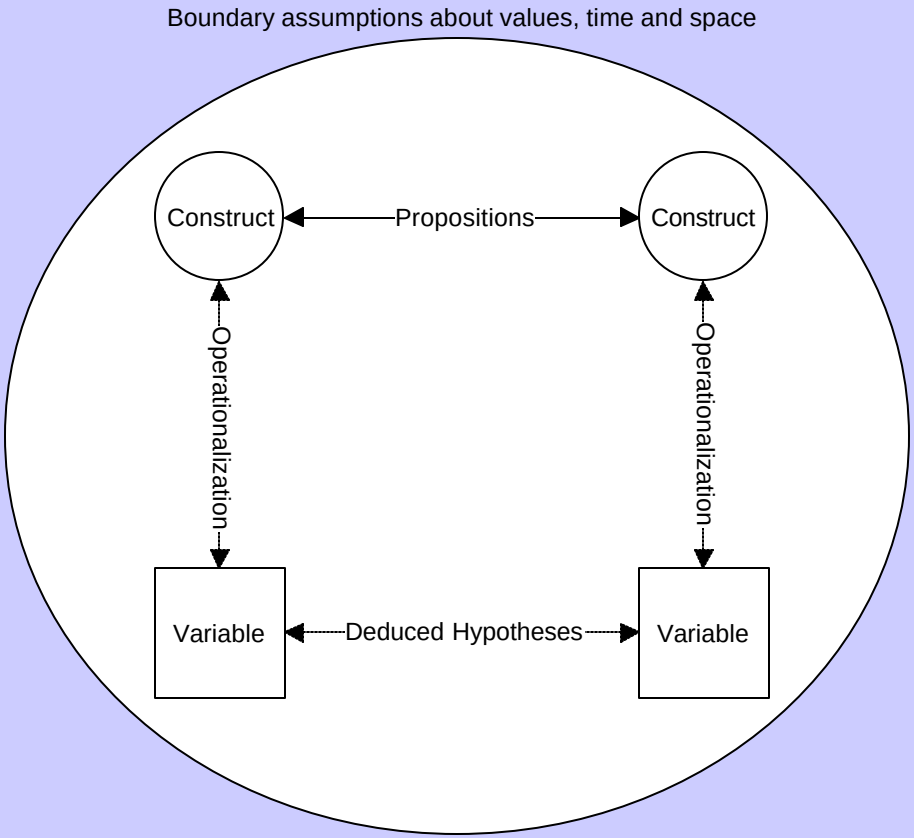
Theory Building

- "A theory is a statement of relations among concepts within a set of boundary assumptions and constraints . . . The purpose of theoretical statements is twofold: to organize (parsimoniously) and to communicate (clearly)

  . . .

  In more detailed terms, a theory may be viewed as a system of constructs and variables in which the constructs are related to each other by propositions and the variables are related to each other by hypotheses." (Samuel Bacharach 1989)

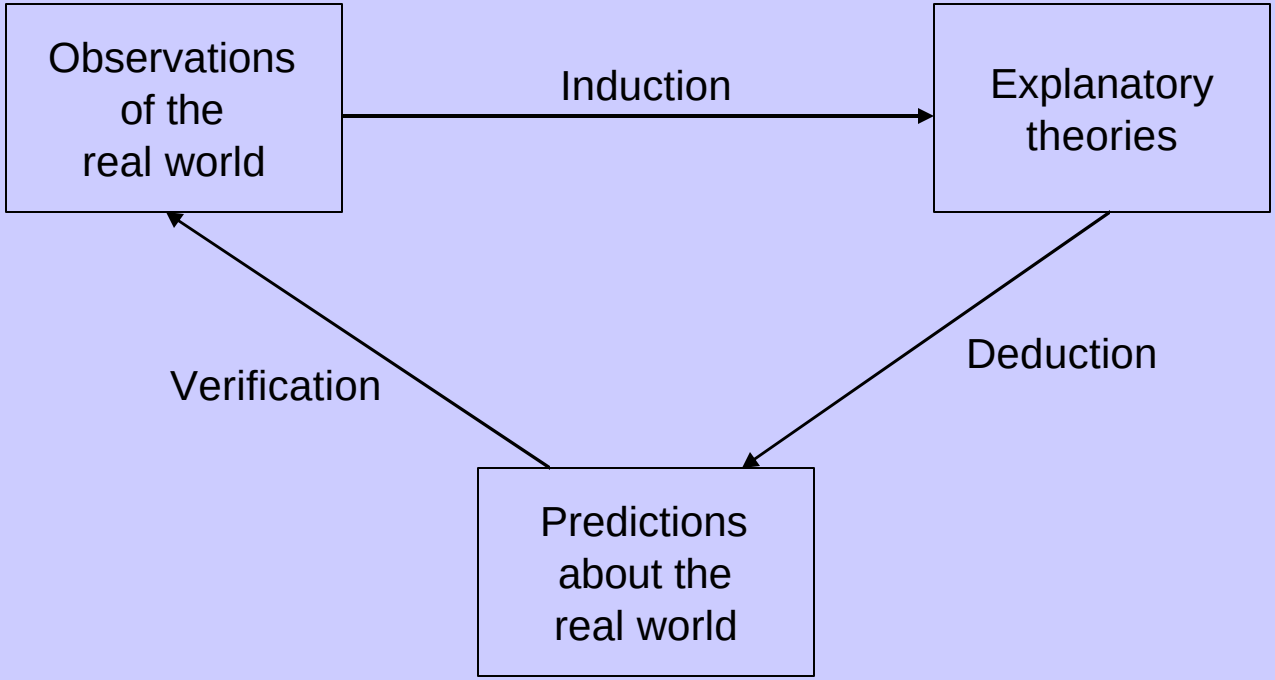
Theory Building



Theory Building

- "The two primary criteria upon which any theory may be evaluated are (a) falsifiability and (b) utility." (Bacharach)
- Brief and Dukerich argue against the usefulness criterion
- Qualitative v. quantitative research
  - Naturalistic inquiry

The Hypothetico-Deductive Method



Normative, Descriptive, Prescriptive Models

- Models
  - A model is “a representation of reality to explain the behavior of some aspect of it” (Montgomery & Urban, 1969)
  - Some researchers use ‘model’ and ‘theory’ interchangeably
  - Some researchers distinguish
    - Theoretical models (causal models)
    - Descriptive models based on studying behavior

Normative, Descriptive, Prescriptive Models

- Models
  - Representations of particular aspects of some domain problem based on specifying
    - Relations between constructs derived from theory (theoretical models)
    - Relations between measured variables
      - As a result of operationalizing theoretical models
      - Derived from studies of observations (descriptive models)

Normative, Descriptive, Prescriptive Models

- Normative theories specify relations that *should* exist between constructs
  - Thus, for subjective Bayesians, Bayes Rule' is normative for belief revision
- Descriptive theories specify relations *discovered* to exist between constructs
  - Thus, Einhorn & Hogarth's is a descriptive model of belief revision
- Prescriptive theories specify relations *required* to exist between variables
  - Many audit firms adopted implementations of the Audit Risk Model that staff were required to apply during audit planning

Operationalization

- Recall that *operationalization* involves specifying procedures for
  - Measurement

    or
  - Experimentation
- We will evaluate two features of measurement
  - Reliability (this week)
  - Validity (next week)
- Over next two weeks we will also study experimentation

Foundations of Measurement

- Measurement
  - The assignment of numerals to objects or events according to rules
- Number
  - A numeral that has been assigned quantitative meaning
- Assigned
  - A mapping – a rule of correspondence
- Meaningful measurement
  - Requires rules that are isomorphic to reality

Foundations of Measurement

- Isomorphism
  - Identical form
  - 1-1 correspondence
  - X and Y are isomorphic iff
    - Each member of X corresponds to exactly one member of Y
    - Each member of Y corresponds to exactly one member of X
  - Of course, if X is ‘unobserved’ reality, it may be hard to know!

Foundations of Measurement

- In fact, all we can measure is *indicants* of the *properties* of objects
- Indicants are specified by operational definitions
- Our starting point is to define the objects of the universe of discourse
- Measurement requires that this universe be broken down into at least two subsets – this is *classification*, which may be:
  - Dichotomous
  - Polychotomous

References

- Astley, W.G. 1985. “Administrative science as socially constructed truth”. *Administrative Science Quarterly (*30), pp. 497 – 513.
- Bacharach, S.B. 1989. “Organizational theories: Some criteria for evaluation”. *Academy of Management Review* (14), 496 – 515.
- Brief, A.P. and J.M. Dukerich. 1991. “Theory in organization behavior: Can it be useful?”. *Research in Organizational Behavior* (13), pp. 327 – 352.
- Davis, M.S. 1971. “That’s interesting!”. *Philosophy of the Social Sciences* (1), pp. 309 – 344.
- Gioia, D.A. and E. Pitre. 1990. “Multiparadigm perspectives on theory building”. *Academy of Management Review* (15), pp. 584 – 602.

References

- Ghiselli, E.E., J.P. Campbell and S. Zedeck.1981. *Measurement Theory for the Behavioral Sciences*. W.H. Freeman and Company.
- Allen, M.J. and W.M. Yen. 2002. *Introduction to Measurement Theory*. Waveland Press, Inc.
- Nunally, J.C. and I.H. Bernstein. 1990. *Psychometric Theory*. McGraw Hill.
- Pedhazur, E.J. and L. Pedhazur Schmelkin. 1991. *Measurement, Design and Analysis*. Lawrence Erlbaum Associates, Inc.

References

- For web sites of academics with strong personal views on the inadequacy of the ‘standard views’ on science and theory building, you might enjoy visiting:

- http://www.dharma-haven.org/science/