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***Social Science  
Research Methods***

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# Overview

- Some Key Themes of Contemporary Philosophy of Science
- Causes and Conditions
- Methodology in Science
- The Reduction of Sciences
- Philosophy of Social Science
- Questions
- Necessary Truths
- Accounting Research
- Theories, Hypotheses and Models
- Some Questions to Ponder

## *Key Themes of Contemporary Philosophy of Science*

- Positivism
- Falsifiability (Popper)
- Paradigm Shifts (Kuhn)
- Theory-ladenness of Observations
- Under-determination of Theory by Data:  
Duhem-Quine Thesis
- Incommensurability of Theories

# *Theories of Scientific Progress*

## ■ Imre Lakatos

### ★ Scientific Research Programmes

- ◆ Continuity important
- ◆ Research programmes more important than individual theories
- ◆ Progressive v. degenerative research programmes
- ◆ Hard-core assumptions v. protective belt
- ◆ Methodological rules (negative or positive heuristics) tell us what research paths to avoid or what paths to pursue
- ◆ Contrary to Duhem and Kuhn, Lakatos insisted that there are rules of appraisal for sequences of theories
- ◆ Novel predictions as a measure of progress

# *Theories of Scientific Progress*

## ■ Imre Lakatos

### ★ Scientific Research Programmes

- ◆ Is this approach historically accurate?
  - Hard cores?
  - Methodological decisions?
- ◆ Must all science be like the physics of the last 300 years?

# *Theories of Scientific Progress*

## ■ Larry Laudan

- ★ Science as a problem-solving activity
- ★ Progress is:
  - ◆ More problems solved
  - ◆ Resolution of anomalies
  - ◆ Restoring conceptual harmony among supposedly conflicting theories

# *Explanation, Causation and Unification*

## ■ Wesley Salmon's Causal Model

- ★ Lack of causal relatedness is why DN pattern is subject to 'flagpole' counterexample and IS pattern cannot account for leukemia
- ★ A cause is an event by which structure is produced and propagated
  - ◆ Conjunctive fork
    - Atomic bomb - leukemia correlation
  - ◆ Interactive fork
    - Direct physical interactions; e.g. collisions

# *Explanation, Causation and Unification*

- Peter Railton's Deductive-Nomological-Probabilistic Model
  - ★ A DN argument for the probability of an event
  - ★ A causal account of the underlying mechanism
  - ★ Specific information about the actual occurrence of the event

# *Explanation, Causation and Unification*

## ■ Philip Kitcher

- ★ 'Explanatory success' explains 'causal relatedness' and not *vice versa*

# Confirmation Theory

## ■ Bayesianism

- ★ A quantitative theory of confirmation
- ★  $P(h|e) = P(e|h) * P(h) / P(e)$
- ★  $P(h|e) - P(h)$  measures degree of evidential support
- ★ What do these probabilities mean?
  - ◆ Frequencies – objective interpretations
  - ◆ Logical relations between hypotheses and statements
  - ◆ Subjective rational beliefs (most Bayesians adopt this)
- ★ Bayesianism is a theory of *inference*

# *Explanation, Causation and Unification*

## ■ Bayesianism

- ★ How do we evaluate  $P(e)$ ?
- ★  $P(e) = P(e|h) * P(h) + P(e|\sim h) * P(\sim h)$ 
  - ◆ But what, in fact, are the alternatives to  $h$ ?
- ★ If prior probabilities are totally subjective they can hardly be used to choose between competing theories
- ★ Sufficiently strong priors cannot be overturned by evidence!
- ★ How can we gain access to private degrees of belief?
- ★ No account of what counts as appropriate scientific evidence

# *Explanation, Causation and Unification*

## ■ Clark Glymour

- ★ A theory of inference is not a theory of scientific explanation
- ★ Old evidence is discounted
- ★ ‘Bootstrapping’ – one part of a theory is invoked in support of another
  - ◆ E.g. Newton’s Principia

# *Explanation, Causation and Unification*

## ■ Comparative Confirmation

### ★ Goodman

- ◆ Instances known prior to formulation of hypothesis may not confirm it

### ★ Latakos

- ◆ Hypothesis should imply the evidence
- ◆ There should be a competing 'touchstone' hypothesis that either implies the contrary of the evidence, or implies neither the evidence nor its contrary

# *Explanation, Causation and Unification*

## ■ Theory Appraisal

### ★ Kuhn

- ◆ Consistency
- ◆ Agreement with observations
- ◆ Simplicity
- ◆ Breadth of scope
- ◆ Conceptual integration
- ◆ Fertility

# *Justification of Evaluative Standards*

## ■ Latakos's Incorporation Criterion

### ★ Incorporation with excess context

◆ A criterion of theory-replacement that applies also to sequences of methodologies

### ★ Kuhn argued that it was circular

## ■ Laudan

★ Theories should be evaluated by their ability to reconstruct 'standard cases' of progress agreed by the scientific elite of the day

# *Justification of Evaluative Standards*

## ■ Normative naturalism

- ★ Evaluative standards and procedures arise within the practice of science, and are to be assessed in the same way that scientific theories are assessed – by reference to claims about the world

# *Justification of Evaluative Standards*

- Otto Neurath's 'boat' image
- Willard Van Orman Quine's 'Field of Force' image
- Are there inviolable principles (Latakos & Laudan v. Dudley Shapere)
- Laudan's 'Reticulational' model
  - ★ Theories, methodological principles and cognitive aims reciprocally interrelated

# *Scientific Realism*

## ■ Truth Realism

- ★ Scientists should formulate true theories that depict the structure of the universe
- ★ Our record of progress indicates that the universe has a structure largely independent of human theorizing and that our theories have provided an increasingly more accurate picture of that structure

# *Scientific Realism*

## ■ Entity Realism

★ The entities posited by certain scientific theories do indeed exist in reality

◆ Mars

◆ X-ray stars

◆ Neutrinos?

# *Scientific Realism*

## ■ Instrumentalism

- ★ Theories are merely calculating devices – it is the statements about observations that are true or false

## ■ Bas von Fraassen's Constructive Empiricism

- ★ Theories are 'empirically adequate' or not

# *Scientific Realism*

- Arthur Fine's Natural Ontological Attitude
  - ★ Accept science as it is
  - ★ Accept its certified results as knowledge-claims on a par with the findings of common sense
  - ★ Leave open questions about the nature of truth

# *Scientific Realism*

## ■ Realists

- ★ 'No miracle' argument

## ■ Anti-realists

- ★ 'Pessimistic Meta-Induction'

- ◆ Most highly regarded theories have been amended or discarded
- ◆ So it is probable that our current high-level theories are also false

# *Scientific Realism*

## ■ Structural Realism

### ★ John Worrall

- ◆ No claims for the truth or approximate truth of entire theories, or for the existence of unobserved entities
- ◆ Isomorphism between mathematical forms of theories and the structures of physical systems

# *Scientific Realism*

- Global anti-realism
  - ★ *Weak thesis: no language engages the world*
- Correspondence theories of truth
- Anti-realism
  - ★ *The content of a scientific theory is nothing more than the set of claims that can be substantiated by observation and experiment*
- Scientific realism
  - ★ *Science aims at true statements about what there is in the world and how it behaves, at all levels*

# *Scientific Realism*

## ■ Conjectural realism

- ★ This is the aim of science even though we have not achieved it

## ■ Structural realism

- ★ Science attempts to characterize the structure of reality, and has made steady progress, at least approximately
- ★ This progress refines the structures attributed to reality but may replace the representations

# *Descriptive Philosophies of Science*

## ■ Gerard Holton

- ★ “. . . the messages of more recent philosophers, who themselves were not active scientists, are essentially impotent in use . . . .”
- ★ Thematic principles of basic commitments:
  - ◆ Explanatory principles
  - ◆ Directive principles
  - ◆ Evaluative standards
  - ◆ Ontological assumptions
  - ◆ High level substantive hypotheses

# *Descriptive Philosophies of Science*

- Experimental practice
- Stephen Toulmin's descriptive model of Conceptual Evolution
- Cohen's criticism of the Evolutionary Analogy
- Epigenetic rules
  - ★ Science directed by rules encoded in humans as a result of evolutionary adaptation
- Is the (descriptive) philosophy of science subsumed under the history of science?

# *The New Experimentalism*

- Experimentation has a life of its own
  - ★ You can show how it is to be done and exhibit its results – in this sense it can be theory-independent
- Deborah Mayo
  - ★ A claim can only be said to be borne out by experiment if it has been severely tested by experiment – in such a way that it would be unlikely to pass the test if it were false

# *The New Experimentalism*

- Experimental results can be substantiated and experimental effects produced by an array of strategies involving practical interventions, cross-checking, and error control and elimination in a way that can be independent of high level theory
- Thus we can give an account of progress in science that construes it as the accumulation of experimental knowledge
- Problems emerge in attributing significance to scientific results that goes beyond the conditions in which they were produced, without relying on theory

# *Scientific Laws*

- Laws as regularities
  - ★ Humean approach
- Laws as characterizations of powers or dispositions
  - ★ Ontological reluctance?
- Non-causal laws
  - ★ Thermodynamics

# *Causes and Conditions*

- A cause is a necessary and sufficient preceding condition
  - ★ What does this mean?
  - ★ Why is it inadequate?
- What are:
  - ★ Singular causal statements
  - ★ General causal statements

# *Causes and Conditions*

## ■ INUS Conditions

- ★ *Insufficient but necessary parts of unnecessary but sufficient conditions*
- ★ *A is an INUS condition for P iff, for some X and Y, (AX or Y) is necessary and sufficient for P, A is not sufficient for P and X is not sufficient for P*
- ★ *Note that this does not say that A cannot be necessary (or unique)*

# *Causes and Conditions*

## ■ INUS conditions

- ★ *A is at least an INUS condition iff A is an INUS condition, or AX is a minimal sufficient condition, or A is a minimal sufficient condition (and so is necessary and sufficient)*

# *Causes and Conditions*

- 'A caused P' implies:
  - ★ A is at least an INUS condition for P
  - ★ A happened
  - ★ X (if any) happened
  - ★ No Y not containing A happened

# *Causes and Conditions*

- Causal fields
  - ★ Region of application of a causal statement
- 'A caused P' expands to 'A caused P in relation to field F' and the implications above are predicated upon the presence of whatever features characterize F
- Use of causal fields avoids infinitely complex sets of conditions

# *Causes and Conditions*

- The analysis of general causal statements is more complex
  - ★ Some are similar to singular statements, but we leave the details of X or Y unspecified
  - ★ Some are implicit statements of functional dependency (stronger than necessary and sufficient conditions)
  - ★ Some pick out necessary conditions (yellow fever virus) – ‘the cause’

# *Causes and Conditions*

- Necessity and Sufficiency
  - ★ *S* is a necessary and sufficient condition for *T*
  - ★ Universal propositions
    - ◆ All *T* are *S*
    - ◆ All *S* are *T*
  - ★ Not much use for singular causal statements
    - ◆ Counterfactual conditions
    - ◆ Factual conditions
    - ◆ Telescoped arguments

# *Causes and Conditions*

## ■ The Direction of Causation

- ★ Needed to distinguish A causing P from P causing A
- ★ Causal priority
- ★ Not identical with temporal priority
- ★ Linked with controllability?
- ★ Direction of explanation?

# *Causes and Conditions*

- Some alternatives to “Necessary & Sufficient” approach
  - ★ No laws
  - ★ Agency
  - ★ Probability
  - ★ Counterfactuals
  - ★ Causation is real and does not require a reductionist analysis

# *Causes and Conditions*

- Some alternatives to “Necessary & Sufficient” approach
  - ★ *Causes are fundamental*
  - ★ *Causes are directly perceived*
  - ★ *Salmon’s causal forks*
    - ◆ Conjunctive – common cause of multiple effects
    - ◆ Interactive – direct inter-temporal intersections of processes
    - ◆ Perfect – limiting case – both conjunctive or interactive
- So:
  - ★ *Which is more basic: causal laws or causal relations*
  - ★ *Are causes reducible?*

# *Methodology in Science*

- A review of by now familiar ideas
- The Problem of Induction
  - ★ Inductive support is circular
  - ★ Probability does not solve this on its own
  - ★ Falsification as an alternative
    - ◆ Has its own shortcomings
  - ★ Induction is rational by definition?
  - ★ Reliabilist defense?
    - ◆ Truth preserving but not *necessarily* truth preserving

# *Methodology in Science*

- The Problem of Induction
  - ★ Goodman's New Problem
    - ◆ Projectible predicates
      - Entrenched in our inductive practices

# *Methodology in Science*

## ■ Laws of Nature

- ★ Humean analysis: only constant conjunction
- ★ Laws are projected into counterfactual situations
- ★ Laws are wide-ranging generalizations
- ★ Laws are inductively supported by their instances
- ★ Systematization: laws as systematized general truths
- ★ Non-Humean alternative
  - ◆ Necessitating relationships
  - ◆ Metaphysical necessity v. epistemological a priority

# *Methodology in Science*

- Instrumentalism v. realism
- Under-determination of Theory by Data
- The Pessimistic Meta-Induction
- Confirmation and Probability
  - ★ *The Raven Paradox*
  - ★ *The Tacking Paradox*

# *Methodology in Science*

## ■ Explanation

- ★ The Covering Law Model
- ★ Are Explanations and Predictions different?
- ★ The Direction of Causation
- ★ Are all *explanations* of singular events causal?

# *The Reduction of Sciences*

Physics →

Chemistry →

Biology →?

Psychology →?

Social Sciences

What is 'special' about people?

# *The Philosophy of Social Science*

*Alex Rosenberg*

- Do social sciences, and should they, use the same methods as natural sciences?
- Naturalism
  - ★ Yes!
  - ★ But the task is to explain human action
  - ★ So we need a causal law to the effect that we always do what we believe will efficiently lead to what we desire
  - ★ Intentionality: unobservable 'aboutness' of beliefs and desires

# *The Philosophy of Social Science*

## ■ Anti-naturalism

- ★ Rules link beliefs and desires with actions
- ★ Rules should not be confused with regularities
- ★ Folk psychology: account of action and its sources implicit in everyday beliefs

## ■ Eliminativism

- ★ Aggregate generalizations about large-scale processes, agnostic on their psychological foundations

## ■ Teleology and function legitimated again

## ■ Reflexive knowledge: self-fulfilling or self-refuting predictions

# *The Philosophy of Social Science*

## ■ Historicism

- ★ Unlike natural laws

- ◆ Social process develop in a temporal order
- ◆ Social laws change over time

## ■ Value

- ★ Well-confirmed theories help us ameliorate or worsen human life
- ★ Well-confirmed theories help us control and manipulate human behavior
- ★ When is it permissible to test human subjects?
- ★ Are some inquiries best left unmade?

# *The Philosophy of Social Science*

*Martin Hollis*

- Explanation v. understanding
- Holism v. individualism
- Explanation
  - ★ 'Constant' laws lead to Determinism
  - ★ Hypothetico-deductive method & covering law model
  - ★ Even reliable predictive explanations do not tell us *why*
    - ◆ Too sketchy
    - ◆ No causes identified
    - ◆ Not interpretive – do not understand the situation from within

# *The Philosophy of Social Science*

## ■ Understanding

- ★ Interpretive – understanding episodes by seeing life as a whole
- ★ Double hermeneutic – interpreting twice
  - ◆ Identifying behavior
  - ◆ Ascribing its meaning as action
- ★ Identifying intentions
  - ◆ Empathy – identifies intentions directly
  - ◆ Explanatory understanding
  - ◆ Public meaning
    - Games
  - ◆ Moral conduct
  - ◆ Human freedom

# *The Philosophy of Social Science*

## ■ Explanation and Understanding

### ★ Rationality

- ◆ Complete consistent preferences
- ◆ Perfect information
- ◆ Perfect powers of computation
- ◆ Utility

### ★ Coordination

### ★ Cooperation

### ★ Rationality and Relativism

- ◆ Truth becomes unobtainable, or a matter of conformity

# *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?

# *Theories, Hypotheses and Models*

- What is a theory / what are theories?
- What is theory?
- What are hypotheses?
- What are models?
- What do we test empirically?
- How are they related?
- What is the scientific method?
- Bring to class next week a slide containing five instances of theories and / or models in your area

# *Some Questions to Ponder*

- What is a scientific law?
- What makes it a *law*?
- Who or what should obey scientific laws, and why?
- Does social science have scientific laws too?
- Is “Time pressure causes auditors to make more mistaken decisions” a *law*?
- What is a cause?