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***Social Science Methods
in Accounting Research***

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Overview

- Logical Reconstructionism (a reminder)
- Orthodoxy Attacked
- Theories of Scientific Progress
- Explanation, Causation and Unification
- Justification of Evaluative Standards
- Scientific Realism
- Descriptive Philosophies of Science
- The New Experimentalism
- Scientific Laws
- Some Key Themes of Contemporary Philosophy of Science
- Some Philosophical 'isms'
- Questions
- Some Questions to Ponder

Logical Reconstructionism

- Philosophy of science emerged as a distinct academic discipline after the Second World War
- Norman Campbell hoped that a study of the foundations of empirical science would be as fruitful as the new development of axiomatic methods had been for mathematics
- The proper domain of the philosophy of science was recognized as the context of justification
- A hierarchy of levels was developed
 - * Each level is an interpretation of the one below
 - * Predictive power increases from base to apex
 - * The 'observational level' is distinguished from the 'theoretical' level
 - * Statements of the observational level provide a test-basis for statements of the theoretical level

Logical Reconstructionism

■ The Deductive Pattern of Explanation

- * Carl Hempel and Paul Oppenheim
- * The deductive pattern of explanation of a phenomenon deduces the conclusion from General Laws and Statements of Antecedent Conditions (including boundary conditions and initial conditions)
- * Explanations based on statistical laws are not deductive; they can thus only provide (strong) inductive support

Logical Reconstructionism

■ Nomic v. Accidental Generalizations

- * How can we tell when our explanations involve general laws, and when they involve only accidental generalizations?
- * General laws support counterfactual conditionals; accidental generalizations do not

Logical Reconstructionism

■ Theory Replacement

- * Emphasis on 'growth by incorporation'
- * Ernest Nagel distinguished two types of reduction
 - ◆ Homogeneous reduction
 - ➔ A law is subsequently incorporated into a theory which utilizes substantially the same concepts (e.g., Galileo's law reduced to Newtonian mechanics)
 - ◆ Deductive subsumption
 - ➔ A law is subsumed by a theory that lacks some of the concepts in which it is expressed (e.g., reduction of classical thermodynamics to statistical mechanics)
- * Nagel formulated conditions for reduction to succeed

Orthodoxy Challenged

■ Paul Feyerabend

- * Observation reports are parasitic on theories
- * “The interpretation of an observation-language is determined by the theories which we use to explain what we observe, and it changes as soon as those theories change”
- * The contrast “observable – non-observable” is a context-dependent contrast

Orthodoxy Challenged

■ Duhem-Quine Thesis (again)

- * It is misleading to speak of the “empirical content” of an individual statement
- * Any statement can be retained as true provided that sufficiently drastic adjustments are made elsewhere in the system
- * There is no sharp boundary between synthetic statements whose truth is contingent upon empirical evidence and analytic statements whose truth is independent of empirical evidence

Orthodoxy Challenged

■ Covering-Law Model

- * The explanation of individual events is an instantiation of either
 - ◆ The deductive-nomological (DN) pattern, or
 - ◆ The inductive-statistical (IS) pattern
- * Bromberger's 'flagpole' example
- * Neither pattern is sufficient
- * Is either one necessary?

Orthodoxy Challenged

■ Non-statement view

* Frederick Suppe

- ◆ A theory is a non-linguistic entity which is related to, but different from, a set of linguistic formulations
- ◆ It describes a replica, an idealized physical system

Orthodoxy Challenged

■ Goodman's New Riddle of Induction

- * “All emeralds are green” is a law-like generalization
- * “All emeralds are grue” is an accidental generalization
- * Positive instance seem to support both
- * We need to look at the past track-record for successful predicates
- * Confirmation is not just an exclusively logical relation between sentences

Orthodoxy Challenged

■ Feyerabend's Incommensurability Thesis

- * Examples of reduction cited by orthodox theorists do not satisfy their own conditions for reduction
- * High level theories are observationally incommensurable
- * There is no theory-independent observation language with respect to which theories may be evaluated
- * It is not always possible for a theory to agree with all the facts in its domain
- * "Philosophy of science is a subject 'with a great past'"

Orthodoxy Challenged

- Feyerabend is self-consciously anarchistic
 - * Can his thesis of freedom of choice in scientific method be sustained within a research community?
 - * He may be right, at least, in the claim that there is no universal, unchanging, privileged single scientific method

Theories of Scientific Progress

■ Thomas Kuhn

* 'Normal Science'

- ◆ Increasing precision
- ◆ Extending scope
- ◆ Determining the value of universal constants
- ◆ Formulating quantitative laws
- ◆ Deciding which alternatives are most satisfactory

Theories of Scientific Progress

■ Thomas Kuhn

* 'Revolutionary Science'

- ◆ Falsification is not relevant to paradigm rejection
- ◆ Emergence of a viable competing paradigm
- ◆ No paradigm-independent language for observations
- ◆ Abandonment of one paradigm and adoption of another by a critical mass of scientists
- ◆ Gestalt shift
- ◆ Kuhn eventually conceded his use of 'paradigm-shift' was equivocal

Theories of Scientific Progress

- What is a paradigm (Chalmers)?
 - * General theoretical assumptions and laws
 - * Techniques for their application
 - * Very general metaphysical principles that guide work within the paradigm
 - * General methodological principles

Theories of Scientific Progress

■ Criticisms of Kuhn

- * Just a form of relativism?
- * Ambivalent on progress through revolution in science
- * Is it a purely descriptive account or a theory of scientific development?
- * Changed the meaning of paradigm in *Postscript*?

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

* Lakatos

- ◆ 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 argues 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

Key Themes of Contemporary Philosophy of Science

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

Some Philosophical 'isms'

- Dualism
 - * The physical and the mental are two distinct categories of reality
- Realism
 - * There is an external world independent of mind to which our true statements correspond
- Monism
 - * There is only one basic category of reality
- Idealism
 - * All reality is in the mind
- Materialism
 - * All reality is material in character
- Immaterialism
 - * Objects are mere collections of qualities

Some Philosophical 'isms'

- Phenomenalism
 - * Physical objects should be analyzed in terms of sensations or perceptions
- Atomism
 - * The basic components of reality are atoms
- Platonism
 - * Forms or Ideas exist independently of human knowledge of them
- Nominalism
 - * Only particulars are real (not universals)
- Reductionism
 - * Any claim of the form “All A’s merely B’s”
- Constructivism
 - * Things ordinarily regarded as independent of human thought are really the product of human thinking

Some Philosophical 'isms'

- Skepticism
 - * Humans cannot attain knowledge
- Rationalism
 - * Reason is the source of all knowledge
- Empiricism
 - * Experience is the source of all knowledge
- Instrumentalism
 - * The purpose of a scientific theory is prediction
- Scientific realism
 - * Entities required by successful scientific theories are real and the theories are true
- Naïve realism
 - * The world is as it appears to our senses

Some Philosophical 'isms'

■ Foundationalism

- * Knowledge rests on a small set of certain truths

■ Positivism

- * A commitment to (empirical) natural science as the best – or only – means of attaining genuine knowledge
- * Came to the fore in the work of Auguste Comte
- * Frequently qualified in some way; e.g., Logical Positivism

Questions



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?