

Outline

pre-conditions buildup of axioms

- Kuhnian problems (normal science revolutions in comm. sci. 24)  
 Quinean problems - holism - think on grounds required for idea of 'constitutive priori' in Comp  
 motivation / inspiration from Kuhn & Corap

Calculus  
 pre-conditions  
 for 2nd law  
 p. 36  
 Law of  
 Grav  
 etc. of  
 empirical  
 law requiring  
 const. 2nd law

Friedman's conception of constitutive 'a priori' / coordinative principles  
 →  $\sqrt{2} \approx$  Law as example of both: fundamental asymmetry in methodology  
 theoretical & epist. rules of physics serves  
 idea of constitutive 'a priori' - Quinean 'extra  
 ment' is irreducible

- "body"  $\approx$  has mass, acceleration, velocity, spatial position  
 - rule for giving phys. system to math. law of

Eucl. geom (points in Eucl. geom = spatial position,  
 lines = phys. paths, tangents = velocity, etc)

- successive approx. of constitutive priors in revolutionary transformations - prob. of  
 - communicative vs instrumental reasons rationality

-  $\Phi$  as provider of meta law to provide criteria of rationality,  
 reasonability of law

→ possibly by providing a ground for "winner" form of  
 communicative rationality,  $\Phi$  debates provide shared  
 language w/ which competing sides can understand each  
 other, agree on some rules of the game, even if they  
 can't come to stable, complete agreement

→ Kuhnian picture of sci, normal vs revolutionary, Friedman's  
 use of Holism's 2 kinds of rationality to (in part)  
 address the prob. of trans-revolution rationality

Probs for Friedman: is the weak form of 'communicative  
 rationality'  $\Phi$  can provide during revolutionary periods  
 sufficient to fully drive off the worries about rationality  
 - anti-rational? can 'mutual understanding' (possibility threat)  
 by itself do so, if one cannot advert to real shared  
 ground in real empirical fact - well? Here, I think, Friedman  
 will want to point out that there are shared empirical facts in  
 parties accept - just that they play diff. roles in the  
 competing laws (recall Russell's characterization of 'objectivity' as  
 'shared descriptions' - ed. Comp. J. ... to R. ...)

# Lecture: Struc / Sense Theor - Friedman Dyns Reiser

30 Jun  
2017

①

## Three intractable probs for Friedman

- 1) Kuhnian revs / incommensurability / rationality of theory choice
- 2) how theory acquires empirical content
- 2.5) Quine holism: attack on rationalized a priori

Sketch of Kant [see notes from <sup>lectures on</sup> 'Phi sci of Kant', 22 Oct 2014 and 12 Nov 2014]

- $\Phi$  grounds sci knowledge: explanation of necessary preconditions of <sup>infallible Kantian sense</sup> experience that makes theory, experimentation, and therefore fruitful combination possible
- Kant assumes we have fully reliable, warranted sci knowledge
- yet there is, in face of Humean skepticism about synthetic a priori judgments, how is this possible?
- N.B.: Kant wants completely secure, unassailable, warrant for sci knowledge, an assumption that Newtonian theory is the final, best theory! [contra, e.g., Newton himself]

Synthetic judgement: not analytic, not true formally in virtue of structure of concepts

a priori judgement: necessary and not grounded in experience and "constitutive of object of knowledge"

⇓ anatomy of scientific theories: a priori / constitutive <sup>as</sup> empirical laws - the former provide the ground for what we would call today the semantics of the latter; the semantics of the former themselves are fixed 'transcendentally'

Friedman

Fundamental claim: Phil discussions, argument, investigation (by providing a new Kantian framework of relativized a priori) both make possible scientific revolutions and at the same time provide epistemic warrant for providing grounds (objective, reasonable) for choosing the new theory as superior (contra Kuhn), and does so by the difference in epistemic / semantic / structural roles played by diff't parts of "theory", viz., constitutive a priori and empirical laws (contra Quine holism, rejection of analytic / synthetic distinction)

→ quote p. 23: "Science, if it is to continue to progress -"

Fundamental problem: articulate sense of "constitutive a priori", diff't from Kant's (which we know now can't work), that can do the job

⇒ Reichenbach & Carnap to the rescue!

with subtle  
between  
anal. /  
induct  
ep and  
empirical  
experiences  
if they  
still  
initial  
or  
sensible

→ relativized and dynamical conception of 'a priori', as "constitutive of object" (Reichenbach) and articulating / grounding the idea of 'possibility' relevant to investigation using / based on a theory (Carnap's frameworks), viz., "constitutive of correctness of reasoning"  
→ note, this is not the same 'possible' as in "what makes investigation possible at all", but rather "given my conception of how the theory tells me how the world may be and what are acceptable ways of investigating it, what are the live possibilities for what I may find? (and so, correlatively, what will count as countervailing evidence against my theory?)"

Contra-Quine

- development of Newton's theory in which a new mathematics (calculus), a new physical framework (Newtonian mechanics: Laws of motion, def'n's), and new empirical laws (gravitation) were developed ~~and so~~ en bloc and ~~are~~ mutually supported each other seems prime facie to support Quine holism

(3)

but - closer examination shows they play very different epistemic/semantic/structural roles  $\Rightarrow$  Structure of theories:

[see lecture notes 'Phi Sci of Kant', 05 Jun 2015, p.1]

- math: ① calculus <sup>and Euclidean geometry</sup> provides fw (meaning, standards of formal correctness) for formulation of, e.g., 2<sup>nd</sup> Law
- mechanics, kinematics, space & possibilities: ② 2<sup>nd</sup> Law: constitutive of notion of "physical system"; defines "inertial motion" (constitutive of notion of "free dynamical evolution")
- dynamics, empirical facts, what is actually realized: ③ law of gravity: empirical law, requires 2<sup>nd</sup> Law for meaningfulness (what counts as mass, what counts as acceleration)

$\Rightarrow$  each of former can be "true" while latter is false

$\Rightarrow$  ① & ② are "a priori" in deep sense! [in the context of the theory]

$\Rightarrow$  GR is similar

- ① tensor calculus, Riemannian geometry
- ② Einstein's principle of equivalence (defines 'inertial' and 'gravitational' gives standard/meaning of 'acceleration')
- ③ Einstein field equation: "variably curved st" has no empirical meaning without principle of equivalence telling us what a geodesic is, and so gives content to rel'n of how matter/stress-energy is correlated with curvature of spacetime

$\Rightarrow$  each of former can be true while latter is false

PICK UP HERE ON THURS

Contra Kuhn: radical revolutions in maths and mathematical physics are not characterized by incommensurability, entrenchment and relative resistance! what distinguishes them is their constitutive function in the context of character of our scientific knowledge, theories of experiments and how they hook up to each other

$\Rightarrow$  3 distinctive parts/phases of sci <sup>development of</sup> (contra Kuhn)

- ① normal sci
- ② revolutionary sci
- ③ post-revolutionary sci: articulation of 'meta-facts' within which revolutionary science can operate in principled way

⇒ these not distinguished by differences in epistemic warrant/  
security, but by differing functions/roles in the structure of  
our scientific knowledge, both in normal science and during  
times of revolutionary upheaval

↓  
read quote on p.46, my qualms in marginal notes <sup>about constitutive a priori</sup> as a framework, and  
p.48, my qualms about impossibility of <sup>then</sup> 'universal human  
rationality'

① in revolution, only "rules governing investigation of one part of nature"  
must be given up, not all "rules of rationality" pertaining to all  
kinds of investigation

② ∃ can still "overarching rules", such as general idea of  
physical experimentation and data-gathering (and this will be  
"local knowledge" in only a trivial, shallow, irrelevant sense)

### instrumental vs communitarian rationality

- 1) instrumental: goal-oriented measurement aimed at maximizing chance of  
success in pursuing goal, is subjective - revolutionary science
- 2) communitarian: argumentative deliberation aimed at agreement of  
consensus of opinion based on shared principles [Russell's  
"objectivity as shared descriptions": Camp's basis for epistemic warrant  
in shared meaning using words of common, simple language]  
⇒ normal science and ∅ developing "meta-frameworks"

Philosophical Debate

**Meta-Framework**

communicatively rational

External Questions

**Revolutionary Science**

instrumentally rational

L-rules

**Constitutively A Priori Part**

Internal Questions

**Normal Science**

communicatively rational

P-rules

**Properly Empirical Part**