PART AND WHOLE IN FALSE THEORIES

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Workshop call: two basic assumptions to be examined

• That physical objects are organized into levels

• That this hierarchy is founded on entities of no more than a few basic kinds
Part-hole thinking goes back to the scientific revolution

- Clock metaphor, corpuscles, and the “mechanical philosophy”
- Two components
  - Mechanical
  - Doctrine of natural laws
- Reading God’s book of nature – exact, general truths
How things have actually developed

• Developing skills at Inexact model building

• Perrin a salient example
  – Success for the mechanical philosophy?
  – Role of models and modeling assumptions
Use approximate truth to accommodate modeling practices to the goal of exact truths?

- Approximating the truth – a process converging on getting things exactly right

- Doesn’t work

- 1) Assume, first, that a notion of “approximating the truth” applies

- “Fundamental successes” by themselves leave out most of the understanding provided by physics
  - The round peg that won’t go through the square hole
  - Continuum hydrodynamics, and most of physics, similarly
Use approximate truth to accommodate modeling practices to the goal of exact truths?

- 2) Failure of approximating the truth in more than limited respects
  - Successor theories get everything we care about more accurately than their antecedents?
  - Perhaps for Relativistic theories
  - Do get much out of nuclei + electrons + photons
  - But QM broadly?
    - Spreading of the wave packet?
    - Measurement problem?
  - QFT????
    - Predicts scattering
    - Estimates some higher level parameters
    - But can’t get bound states
Use approximate truth to accommodate modeling practices to the goal of exact truths?

• Where have the early modern “corpuscles gone?
  – We lose the thread after Perrin’s “atoms”
  – Whether we think in terms of quanta or quantum fields
Recapitulation to this point

• The early modern project of
  – Divining the copuscularian mechanism
  – Reading God’s book of nature

• In practice, a vast heterogeneous lot of modeling practices

• “Approximating the truth” doesn’t bridge the gap

• Some say: Having “useful” theories is good enough
Skepticism the upshot?

• Models, like continuum models of water, merely “useful fictions”?

• QFT no better off

• Physics gives only instrumental knowledge?

• Physics fails to give us knowledge of
  – The world behind appearances?
  – And how it is put together?
  – Failure of part/whole analysis?
The red piece of paper

- I hold up a bright red piece of paper
- Stop philosophizing, attend to your experience of an external object with an intrinsic color property
- Now reflect on that experience
  - No perfectly determinate physical object
  - Colors are complex relational, not intrinsic properties
- So the experience of an external intrinsically colored object is an idealized model
- Science was supposed to correct for the inaccuracies of perception
- Science does fill in, but only with further models that are still idealized
How do imperfect models tell us about the world?

- The red piece of paper?
- Water modeled as a continuous medium?
- QFT (that, e.g., idealizes space-time as flat)
Kant for kiddies

• There is no “direct access”. Proof:
  – “Access” means “conceptual access”
  – “Direct” means “non-conceptual”
  – So direct access is non-conceptual, conceptual access

• So ALL human conceptualization (perceptual, theoretical…) is in terms of the forms that we (or our biology) provide
Repercussions of imprecision

• Limited human capacities result in ubiquitous refinability (in precision and accuracy) of ALL our representations (finite maths perhaps aside)

• Perception, continuum hydrodynamics, QFT….

• The richer the store of reliable “world pictures”, at all levels, the better we know the world
What “the world” is like

• The world is relevantly LIKE one containing
  – A determinate object with a determinate property – a red piece of paper
  – A watery continuous medium
Objection! Like WHAT?

• To intelligibly say, A is (in given respects) like B we must
  – Have B with which to make the comparison
    • Infinite regress?
  • So we need foundational truths?
Common ground

• In conversation, certain things are taken for granted
  – As true
  – As not needing justification

• In science, certain things are taken for granted
  – Kuhn’s “disciplinary matrices”
Common ground

- The term, B, needed for comparison in “A is like B”
  - Is assumed as well enough understood
    Defeasibly - susceptible to critical evaluation should problems arise

- Our use of common ground
  - Creates the illusion of precise knowledge
  - And explains how we get on without it.
An alternative metaphor

- Give up “Reading the book of nature”
- Not: There is ONE representation that will serve all purposes
- Rather: For each representational need we can (hope to) fashion a representation that will meet that need well enough for present purposes
- Progressively enriching our representational grasp of an independent way things can be
- (Painting ever more of nature’s portraits?)
Will we get that surrogate for “direct access”, a not further refinable representational store?

• In the “long run”?  
  – Who knows?  
  – Who cares? (Keynes: “In the long run we are all dead”)

• In the short run?  
  – We know we can further enrich our representational store  
  – We can strive to make the pieces work more smoothly together (“unify”)  
  – Plenty motivation enough

• Such is the honest interpretation of today’s human knowledge, or any remotely like it in its imperfections
Part and whole in physics

• We live in a world that in many ways is like one furnished with wholes and their parts

• Part-whole methodology
  – Eminently successful
  – But in many different ways
  – Important ways of enriching our growing world-picture

• Not an exclusively correct approach to representing what the world is like

• (See Richard Healey’s slides!)