Inference to the Best Explanation

Preliminary Remarks

- Last two weeks: Models of Explanation

- Explanation seems to be a virtue that is highly sought after.

- This week: Drawing inferences that rely on the notion of comparative explanation.

Theory Construction and Choice

- Context of Discovery vs. Context of Justification
- In an ideal case, all relevant evidence would be available and we could *construct* or *choose* the right theory accordingly.
- How *do* scientists construct theories or choose between competing theories? How *should* they...?
- Methods:
  - Deductively
  - Inductively
  - Abductively…

Inference to the Best Explanation (1)

- Notion introduced by C.S. Peirce as ‘abduction’.
- G. Harman branded it ‘inference to the best explanation’ or ‘IBE’ for short.
- Two central features:
  - Comparative in nature.
  - Ampliative, i.e. inductive in the broad-sense.

IBE: If a theory *X* explains some evidence better than any of its rivals, then it is reasonable to choose *X* over the others.

More contentiously: Not merely choose X over its rivals, but believe in X’s *truth* or *approx*. *truth*.

Inference to the Best Explanation (2)

- IBE ≠ mere (enumerative) induction
- Beyond the traditional conception of evidence.

(1) Accordance with evidence : ‘precision’, ‘depth’.

- QED predicts fine-structure constant to several decimals.

(2) The power to explain disparate phenomena : ‘generality’, ‘breadth’, ‘unifying power’, ‘comprehensiveness’.

- Electroweak theory unifies electromagnetism and weak nuclear force.

(3) Simplicity

- Newton’s laws vs. Ptolemaic/Copernican systems.

(4) Others: Fertility, Testability, etc.

Inference to the Best Explanation (3)

Alleged benefits:

- Not limited to the 'poverty' of evidence.
- More realistic account of scientific practices.
- Mitigates underdetermination problem.

Example

- Why did dinosaurs become extinct?

  A. Meteorite Hypothesis

  B. Dinosaurs were ill-adapted Hypothesis

  C. Alien Hypothesis

  D. None of the above

- Current scientific view: *A*

  Insufficient evidence: No observed correlation between meteorite impact and extinction.

  <u>Reasons for choosing A</u>:

  1) Evidence: (a) impacts occur (on earth and elsewhere); (b) sufficiently strong impact at the appropriate time in history.

  2) Simplicity and Unification: Meteorite impact explains dinosaur extinctions, iridium deposits, and their correlations.

IBE in Scientific Realism Debate

- Largely methodological concern hijacked for the epistemological concerns of the scientific realism debate.
- Explanationist defence of realism (Boyd and Putnam):

  [The empirical success of science, not just a body of evidence, requires explaining. The *best*, indeed the *only*, explanation for this success, is realism.]
- *No miracles argument* is an instance of IBE.
- Anti-realist (constructive empiricist) reply:

  - explanation a pragmatic feature with no epistemic import.
  - besides, constructive empiricism offers the best explanation for empirical success of theories

Problems

- Main problem: There is no guarantee that the best available explanation will be close to the correct one.

Alternatively: There is no guarantee that the notions of simplicity, depth, comprehensiveness, unification, etc. are connected to truth.

Can we be sure that the world is a place where simple, strong, and unified explanations are true, and complex, weak, and disunified ones false?

Food for Thought

- The plausibility of IBE seems to depend on how we unpack the notion of explanation. Can we make sense of explanation without appeal to such hard-to-pin-down notions as simplicity and unification?

Reading

- Bird, A. (1998) *Philosophy of Science*, ch.2, pp. 85-94.
- Lipton, P. (1991) *Inference to the Best Explanation*, ch.4, London: Routledge.