

# Scientific Realism

A Confutation of  
Convergent Realism

Larry Laudan

# Preliminaries

- What is **Realism**? Something about truth realism about the **aim of science**  
**semantic realism** – two levels
  - contra* **social constructivism**
  - contra* **instrumentalism**
- epistemic realism**
- What is **Convergent Realism**?
- Why does Laudan call his argument a “confutation”?
- What argument is he arguing against?

## ***The Miracle Argument.***

“The positive argument for realism is that it is the only philosophy that doesn’t make the success of science a miracle.”

– Hilary Putnam

# Pre-history: The Underdetermination Argument

Empiricist thought: An infinite number of rival theories exist, only one of which can be true, and even all *possible* empirical observations could not distinguish them to tell us which is more likely to be true.

→ We don't have a right to think our theories are true.

EEEI: Empirically equivalent theories are evidentially indistinguishable.

Counterargument that has won the day: Where are these theories? They are mere logical possibilities.

Better argument: EEEI is false. No measure of confirmation can sustain the claim.  
(Roush 2006, Chapter 6)

# Convergent E-Realism

R1: Theories in mature sciences are approximately true, later truer.

R2: The terms (observational + theoretical) of theories in mature sciences refer.

R3: Successive theories preserve theoretical relations and referents.

R4: Acceptable new theories do and should explain success of predecessor theories.

R5: R1-R4 entail mature theories should be successful. They are the best or only explanation for the success of science.

**Thus, the success of science confirms R1-R4.**

Oh, dear. What are the arguments for all of this?

(What do “refer”, “referent”, “reference” mean?)

# Abductive Argument #1

***abductive argument***: an argument that is not deductively valid (so it's ampliative) and whose crucial step involves a "best/(only possible) explanation" claim.

1. Approximate **truth** → empirical **success**.
2. Genuine **reference** → empirical **success**.
3. Scientific theories are empirically **successful**.

-- -- -- -- --

→ (Probably) theories are approx. true and genuinely referring.

## **How the argument works:**

The conclusion is an explanation of 3. (because of the truth of 1., 2.), and it is the best, or only possible, explanation of 3.

# Abductive Argument #2

1. If earlier theories in a mature science are A-true, and their central terms refer, then later more successful theories will preserve the earlier theories as limiting cases. (Compare Kuhn-loss.)
2. Scientists seek to and do successfully preserve earlier theories as limiting cases.

-- -- -- -- --

→ (Probably) earlier theories in a mature science are A-true and genuinely referential.

That is, this conclusion ***explains*** observation 2., because of the claim in 1. Best or only possible explanation? If yes, then conclusion is true if premises are true.

If no, then what do we get?

What kind of explanation of success does the opposition have?

# Confirmation, Explanation

When the realist says the success of science *confirms* the truth and reference of its theories, or that the truth and reference of theories *explains* the success, what does she mean?

Note: the realist's argument is supposed to be empirically based, just like science itself.

$e$  confirms  $h$  iff  $P(h/e) > P(h)$

iff  $P(e/h) > P(e)$  ?

$e$  confirms  $h$  when  $P(h/e)$  is high?

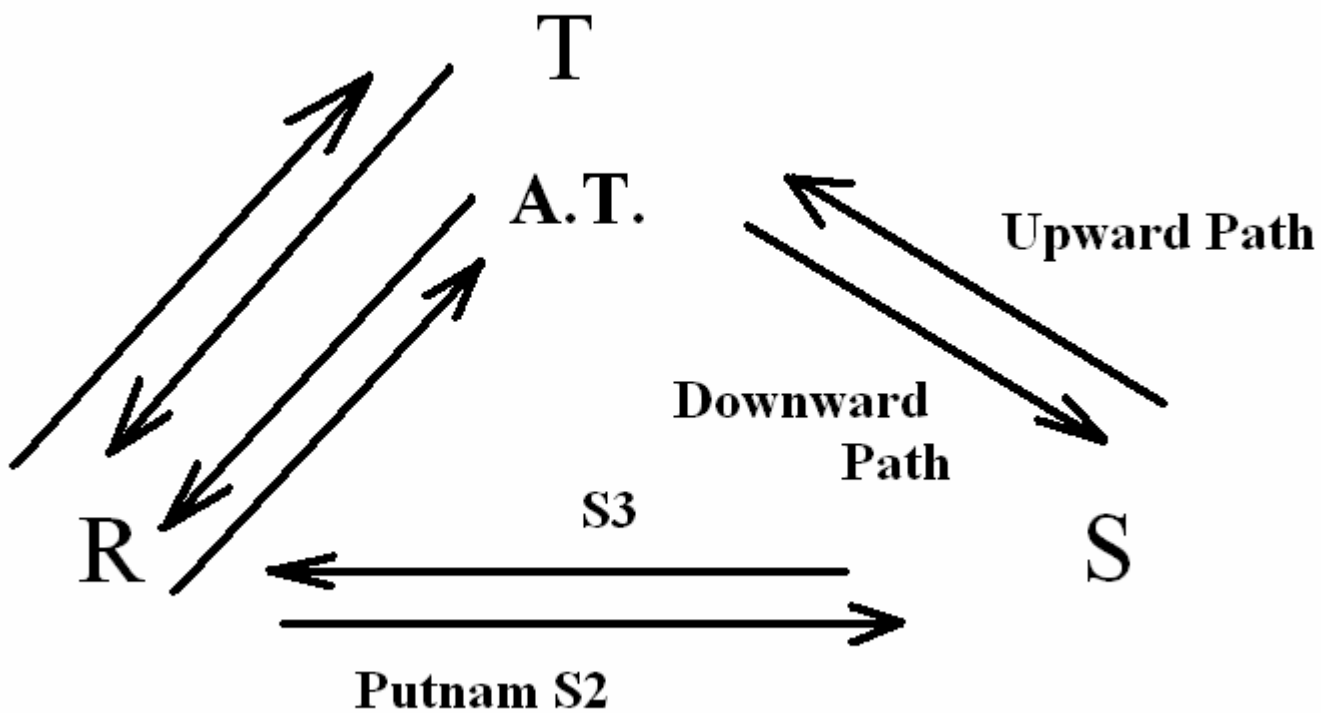
$h$  explains  $e$  iff  $P(e/h) > P(e)$ ? (Salmon)

$h$  explains  $e$  iff  $P(e/h)$  is high? (Hempel)

Do  $e$  or  $h$  have to be *true* statements in order to fulfill the role the realist needs? 7

# Realism *in flagrante*

The Supporting Claims:



# Realism and intuitions

In light of Laudan's arguments, the argument of the scientific realist looks like the old ad jingle:

*If you believe in peanut butter, clap your hands.*

*If you believe in peanut butter, you gotta believe in Peter Pan.*

But look again. The ultimate conclusion the realist wants is about *our* theories. Do you believe that the theory of evolution (two parts) is true, or merely a convenient calculating device?

1. Human beings and chimps have a common ancestor.
2. Human beings and spiders have a common ancestor.

Now whose side are you on in this debate over realism?

# Reference and Success

Conclusion realist wants: the world probably contains entities very much like those postulated by our most successful theories.

S1: The theories in the mature sciences are successful. (prediction, explanation, manipulation)

S2: A theory whose central terms refer will be a successful theory.

S3: If a theory is successful we are justified in thinking its central terms refer.

S4: All the central terms in theories of mature sciences do refer.

S4 explains S1 because of S2. S2 justifies S3. S1 and S3 provide justification for S4.

# Reference and Success

S2: Referring theories likely successful.

1. Chemical atomic theory of 19<sup>th</sup> century.

Laudan: though referring, singularly *unsuccessful*. Hmm.

Wikipedia: all but two of the claims in Dalton's theory are still believed.

Doesn't this instead show that unsuccessful theories can be (mostly) true? Whose view would that support?

2. Other referring unsuccessful theories:

Proutian theory all heavy atoms composed of Hydrogen, Wegenerian theory of continental plates.

Distinguish: unsuccessful because of

1) in principle impossibility of success

2) skill

3) false auxiliaries ?

# Reference and Success

S2': Referring theories are likely to be *usually* successful.

Laudan: Take a language with referring terms. If it has negation you can take all the true sentences and negate them. You will then have a set of sentences that is referring but false.

Laudan slides from 'false' to 'unsuccessful' here. (113)

Realist: those aren't real theories.

Laudan: consider all the unsuccessful atomic theories, or the versions of the wave theory of light that failed, or embryological theories of development up to late 19<sup>th</sup> century. Referring but unsuccessful.

Reply: Not just referring but approximately true

# Reference and Success

S2 was supposed to justify S3, and now S2 is toast. But maybe S3 can be justified independently.

S3: If a theory is successful we are justified in thinking its central terms refer. (This obviously doesn't *explain* why science is successful, but might *confirm* reference directly.)

S3 can be explored empirically.  
Counterexample: Ether theory

Maxwell said that ether was better confirmed than any other theoretical entity. It was part of a very successful theory: electromagnetism.

Reply: Maxwell was just wrong.  
Electromagnetism was successful, but the ether was not needed for the success. It was assumed but was a wheel that didn't turn anything. (Kitcher 1996)

Reply?

What are the dangers of selectivity here?

# Approximate Truth and Success: The Downward Path

T1: If a theory is approximately true, then it will be successful.

Want as conclusion:

T2: If a theory is successful then it is probably approximately true.

Why doesn't the realist use:

T1': If a theory is true then it will be successful.

This seems easier to defend. (But is it true?)

We need a clear notion of approximate truth if we are going to decide whether T1 is true.

Some do not support T1. E.g., Popper's notion where an A.T. theory contains more truths than falsehoods. A randomly chosen set of observational consequences could well all be false.

# Approximate Truth and Success: The Upward Path

Indulge the realist and suppose the downward path worked. I.e., it is true that:

**T1:** If a theory is approximately true then it will be successful.

Does this warrant the conclusion in the other direction?:

**T2:** If a theory is successful then it is approximately true.

**Laudan:** Reference of central terms is required for approximate truth.  
Agree?

If so, then all we need are examples of theories that were successful but non-referring.

# Approximate Truth and Success: The Upward Path

Successful but non-referring:

Crystalline spheres, humoral theory, catastrophic geology, phlogiston chemistry, caloric theory of heat, vital forces of physiology, electromagnetic ether, spontaneous generation

(***Pessimistic Induction*** over the history of science)

Is Laudan right that these were successful? What does “successful” mean? Whose problem is it if we can’t say how to determine whether successful or not?

**Laudan:** there are also successful *referring* theories that we don’t regard as approximately true, e.g.:

Chemical atomic theories where nucleus was indivisible (1920s), Pre-tectonic plate geology (1920-1950) assumed continents don’t move.

Suppose that our theory today is by all standards more successful than any previous theory. Why couldn’t the realist say that these previous theories being non-referring (and so not A.T.) is just not relevant to the thesis that successful theories are approximately true? (Not successful<sub>16</sub> enough.)

# Convergence and Retention

C1: If earlier theories are successful (and thereby approximately true), then later theories should retain X of them.  
(conservatism)

C2: Scientists apply and succeed at C1 and get more successful theories in the process.

C3: Strategy C1 is sound because retaining theories in successful successors (C2) shows the reference and approximate truth of earlier.

What is X?

Whewell: all of the theory

Popper: True consequences

Confirmed portions

Laws and mechanisms

Reference for central terms

Limiting case

Later *explain* why earlier worked when it worked (relation to limiting case)

# Convergence and Retention

Laudan's objections:

- 1) As for retention aim, except in mechanics one does not see concern for this in scientists' writings.
- 2) Many important theoretical innovations *required* violation of this rule. Ontology had to change, and that ruins limiting case.
  - A. Are you sure?
  - B. Limiting case in Popper's sense compatible with ontology change.
  - C. Issue is selecting (again) which to require limiting case on.
- 3) Requirement that new theories explain why old theories were successful is gratuitous.

# Fallacies and Ironies

Previous Laudan arguments went to undermine the **premise claims** and **conclusions** in the realist arguments.

Now Laudan attacks the form/**validity** of the overall **argument style** employed:

- Realist commits the fallacy of ***affirming the antecedent***: inferring from T implies S (truth makes success more probable) that S implies T (success makes truth more probable). Is this fair? Read Musgrave. Are we content w/ Hume's conclusion?
- Realist claims to be making an inference from empirical data, like a scientist would make. But he/she has at most  $T \rightarrow S$ , and no independent evidence, no successful predictions, no controls. This is not an empirically well-tested hypothesis, and would never be accepted if scientific standards applied.

# Explaining the Success of Science

There are many arguments against claims that the truth of theories explains their success in prediction, manipulation, etc.

**Outstanding debt:** If not truth, then what *does* explain this success?

**Some** (van Fraassen): the success doesn't need an explanation.

**Other** possible answers?

It is clearly *possible* for a false theory to be successful. What we need is an idea of why it would be more than logically possible.

Note that there are many levels of reality. A regularity can be described in many different ways.