

# GS Salon: After the Science Wars

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## The standard account of science

Keywords: **enlightenment rationality, empiricism, objectivity**

Objective facts about the world exist, and as theories and experiments are refined science converges toward them.

- *There's always a place at the edge of our knowledge, where what's beyond is unimaginable, and that edge, of course, moves.* – Leon Lederman
- Quantum mechanics supplanted classical mechanics because it explains more (atomic) phenomena, but still agrees with it exactly in the “correspondence limit” of macroscopic experiments.
- The discovery of DNA clarified the molecular basis of heredity, and allowed quantitative methods to sharpen the study of evolution.

**Objectivity:** inquiry into nature unadulterated by personal perspectives, conflicting interests, or societal position. Scientific facts are publically available/verifiable

### **Falsification, hypothetico-deductive logic**

- *It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.* – Feynman
- Example, Pasteur/Tyndall disproof of spontaneous generation:  
Hypothesis: micro-organisms are generated by the air.  
Implication: in sterilization/fermentation experiments with swan-neck flasks, it shouldn't matter if the neck is oriented downward.  
Observation: cultures don't grow with neck oriented down.  
Conclusion: reject spontaneous generation.

## Classically problematic aspects of science

Hume's **problem of induction:** on what grounds is inductive inference justified?

- The sun will rise tomorrow because it has risen in the past
- All observed swans are white, so all swans are white (?)
- Nature has regularity; the future will be “like” the past

**Underdetermination** of theories by data

- The Copernican and Ptolemaic solar system models accounted (at least at first) for the same observations

# Postmodernist accounts of science

Questions the first aspects of the standard account

**Paradigm shifts, whig history:** Thomas Kuhn's *The Structure of Scientific Revolutions*

## Relativism

- Observes that beliefs on some topic might differ, and which belief one holds depends on one's circumstances
- In each circumstance, belief is constructed in the same manner.
- Concludes an equivalence principle: all positions are equally veridical.
- *There is no sense attached to the idea that some standards or beliefs are really rational as distinct from merely locally accepted as such.* – Barnes and Bloor

Science operates in support of existing social **power structures** and **norms**

**Activity:** Consider how the following quotes from science papers and textbooks implicitly call on agreed-upon community assumptions or broader social norms

1. *Oogenesis is wasteful... During the 40 or so years of a woman's reproductive life, only 400 to 500 eggs will have been released,... all the rest will have degenerated.*  
– Alberts et al., *Molecular Biology of the Cell* (1983)
2. *Perhaps the most amazing characteristic of spermatogenesis is its sheer magnitude: the normal human male may manufacture several hundred million sperm per day*  
– Vander et al., *Human Physiology* (1980)
3. *The object of the experiment was to observe these [phenotypic] variations in the case of each pair of differentiating characters, and to deduce the law according to which they appear in successive generations.*  
– Mendel (1865)
4. *Computer simulations of substitution of favorable mutants and of the long-term increase of deleterious mutants verified... the reality of the Muller ratchet mechanism*  
– Felsenstein (1974)
5. *...given the sheer diversity of the effects reported here, it seems parsimonious to us to propose that most of this variation is driven by the appearance and drift of genetic modifiers of mutation rate.*  
– Harris and Pritchard (2017)

## Social construction of scientific realities

Positioned in opposition to scientific **realism**: *Realism typically amounts to an intuition that truths are more dependent upon the natural world than upon the people who articulate them: there is a way the world is, and it is possible to discover and represent it reasonably accurately.*

– Sismondo

*Postmodernism is part of a recent tradition in the humanities that opposes the idea that language should be analyzed as a system used to represent, or “stand for” objects and situations in the world. – Godfrey-Smith*

Scientists objected to (and lampooned) what they perceived as **obscurantism** and **anti-rationalism** in postmodern critiques of science, and adoption of scientific terms.

**Activity:** Here are some quotes from papers of the sort that may have earned ridicule from the scientist side. Is this fair? How are postmodern attitudes being invoked? Do they share any characteristics with language that might be found in science papers?

1. *Let us accept the diagnosis of “our brave scientists” at face value and take it as a proved fact that Ramses died of tuberculosis. How could he have died of a bacillus discovered in 1882 and of a disease whose etiology, in its modern form, dates only from 1819 in Laenec’s ward? Is it not anachronistic? The attribution of tuberculosis... to Ramses II should strike us as an anachronism of the same caliber as if we had diagnosed his death as having been caused by a Marxist upheaval, or a machine gun, or a Wall Street crash. – Latour*
2. *Perhaps history itself has to be regarded as a chaotic formation, in which acceleration puts an end to linearity and the turbulence created by acceleration deflects history definitively from its end, just as such turbulence distances effects from their causes.  
– Baudrillard*
3. *Whereas men have sex organs that protrude and become rigid, women have openings that leak menstrual blood and vaginal fluids. From this perspective it is no wonder that science has not been able to arrive at a successful model for turbulence. The problem of turbulent flow cannot be solved because the conceptions of fluids (and of women) have been formulated so as necessarily to leave unarticulated remainders. – Hayles*
4. *We can clearly see that there is no bi-univocal correspondence between linear signifying links or archi-writing, depending on the author, and this multireferential, multi-dimensional machinic catalysis. The symmetry of scale, the transversality, the pathic non-discursive character of their expansion: all these dimensions remove us from the logic of the excluded middle and reinforce us in our dismissal of the ontological binarism we criticised previously. – Guattari*
5. *...a liberatory science cannot be complete without a profound revision of the canon of mathematics. As yet no such emancipatory mathematics exists, and we can only speculate upon its eventual content. We can see hints of it in the multidimensional and nonlinear logic of fuzzy systems theory.*
6. *If deconstructivist construction holds, we have to choose between realism and postdialectic situationism. In a sense, the characteristic theme of Pickett’s analysis of postdialectic textual theory is a self-referential reality.*

## Sokal Affair

- Hoax paper accepted and published in *Social Text*: “Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity”, written by physicist Alan Sokal
- *It cites all the best people. It whacks sinners (white men, the ‘real world’), applauds the virtuous (women, general metaphysical lunacy). And it is complete, unadulterated bullshit.* – Kamiya on Sokal’s paper.
- Response: lolz from scientists, accusations of bad faith from humanities scholars
- There have been a few similar hoaxes since, including one very recent (yesterday) meant as an exposé of “grievance studies”.

## Public understanding of science

### Evolution

- The defense in the “intelligent design” trial (Kitzmiller et al. Vs Dover area school board) called STS researcher Steve Fuller as a witness to undermine teaching evolution by placing ID as an equally valid alternative.
- Paul Feyerabend (philosopher of science) argued that creationism is equally valid and worthy of being taught, (and also advocated for astrology alongside astronomy).

### Climate change

- *Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, you need to continue to make the lack of scientific certainty a primary issue.* – Luntz (republican strategist)
- Latour, worried about climate impacts, later moderated his stance: *Is it enough to say we did not mean what we meant?*

## Post-truth politics

Polarity reversal: some have observed that the alt-right has adopted postmodern attitudes, and the left realist ones:

- *[Karl Rove] said that guys like me were ‘in what we call the reality-based community,’ which he defined as people who ‘believe that solutions emerge from your judicious study of discernible reality.’ [...] ‘That’s not the way the world really works anymore,’ he continued... ‘we create our own reality’.*
- *alternative facts*
- *truth isn’t truth*