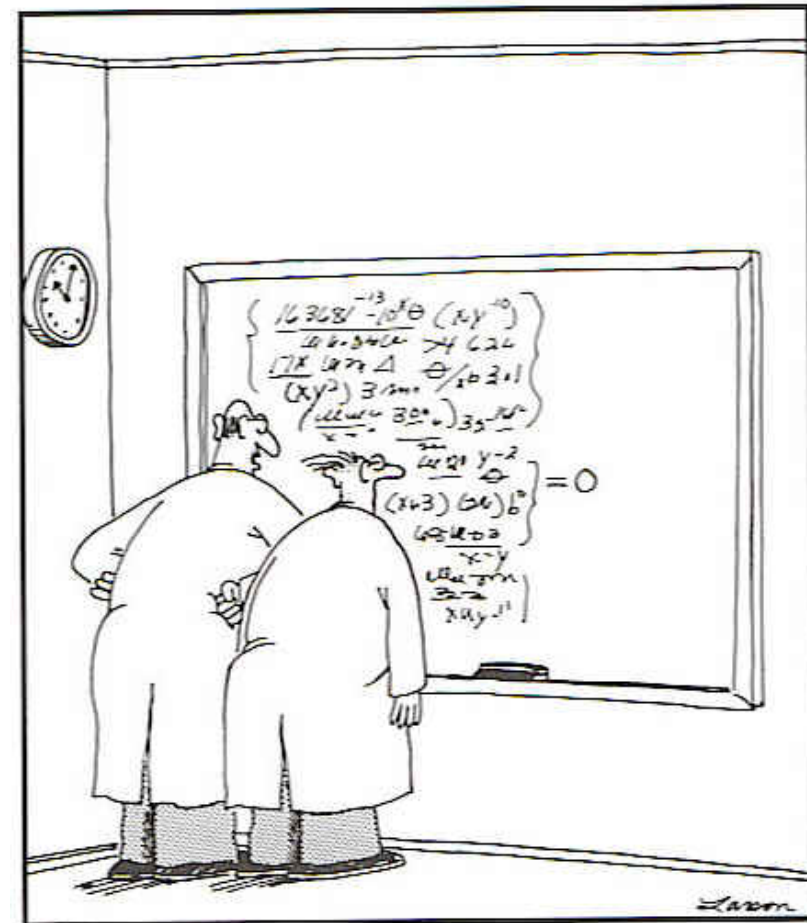


MNSES9100 Autumn 2013 – Introduction

Prof. Deborah Oughton
*Center for Environmental
Radioactivity, Norwegian
University of Life Sciences, and
University of Oslo's Ethics
Programme*

Three Areas

- ▶ Philosophy of Science
 - What is science?
- ▶ Research Ethics
 - How should scientists behave
- ▶ Science and Society
 - Education, dissemination funding, patents, ...



"No doubt about it, Ellington—we've mathematically expressed the purpose of the universe. God, how I love the thrill of scientific discovery!"

Lecture Plan

- ▶ Monday
 - Introduction; Philosophy of Science; Popper
 - Science and Education – *Svein Sjøberg*
- ▶ Tuesday
 - Research Ethics – ethical theory – Environmental Ethics – *Espen Gamelund*
 - 1500–1700 Essay Writing – email Q&A (ppt + FAQ on website)
- ▶ Wednesday
 - Science, pseudo–science and ideology
 - Science and Technology Studies (STS) – *Beate Elvebakk*
- ▶ Thursday
 - IT Ethics (*Charles Ess*) and Ethical Guidelines
 - Research Ethics – Misconduct
 - The Modern University – *Beate Elvebakk*
- ▶ Friday
 - Publication and Authorship, Ethical guidelines
 - Science, Uncertainty and risk

Essay Seminars – Optional

- ▶ 18th–22nd November (list to be circulated Wednesday morning)
- ▶ Each student attends a morning or afternoon session
- ▶ Opportunity to get feedback on essay ideas
- ▶ Essay submission 20th December

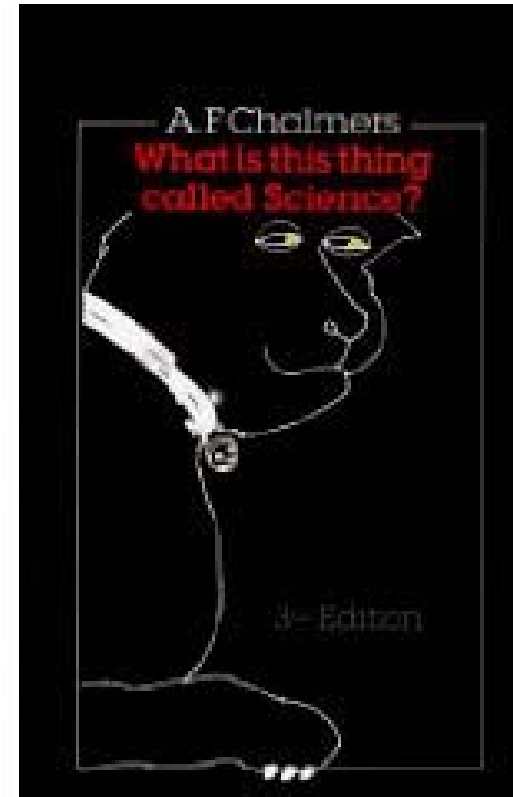
Attendance and exam

- ▶ 80% for lectures (register)
- ▶ Essay seminar not strictly obligatory (but getting approval for an outline is!)
- ▶ Exam: 6–8 page essay (pass/fail)

Course Literature

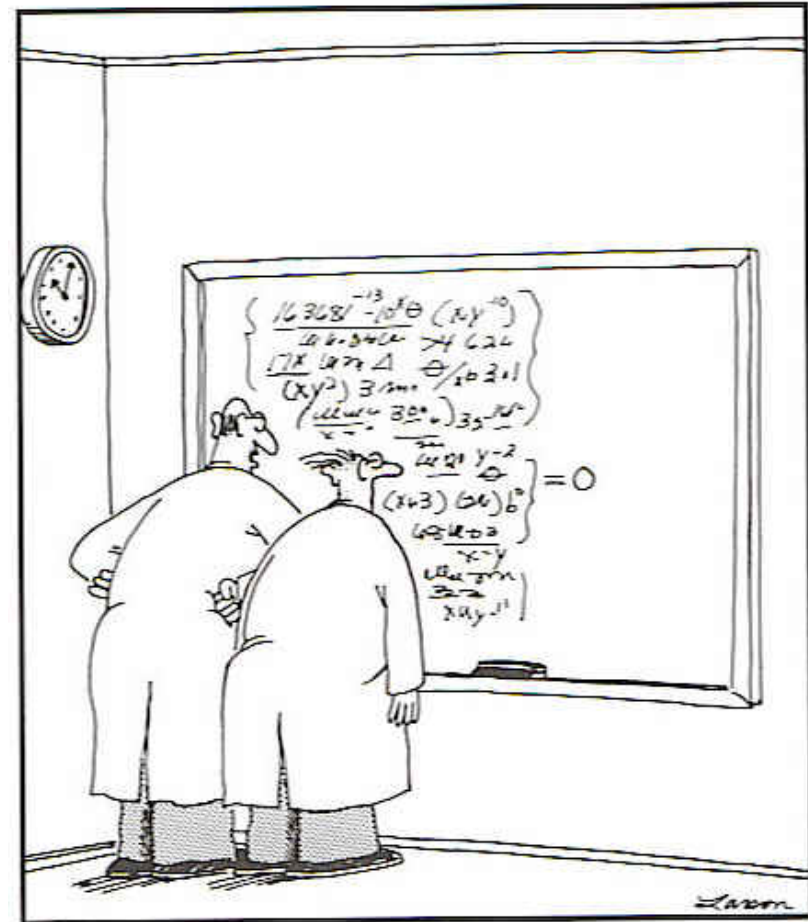
- ▶ Book: Chalmers: *What is this thing called science?*
- ▶ Articles: Links and pdf files
- ▶ pdf files will be available on the website until 20th December

- ▶ Additional:
plato.stanford.edu/contents.html



Three Areas

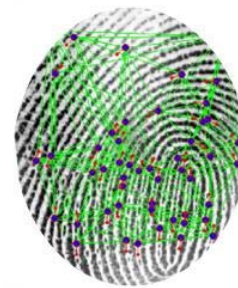
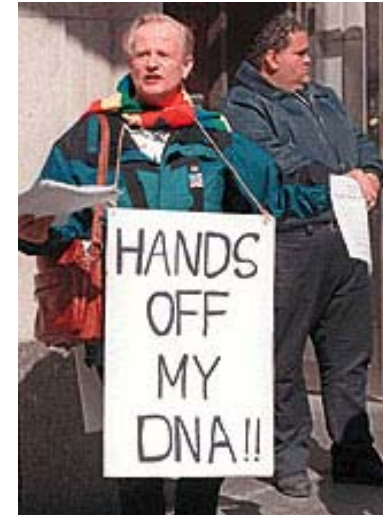
- ▶ Philosophy of Science
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"No doubt about it, Ellington—we've mathematically expressed the purpose of the universe. God, how I love the thrill of scientific discovery!"

Research Ethics: Three areas of responsibility

- ▶ Scientific community: research norms, misconduct, publication
- ▶ Research subjects: humans, animals
- ▶ Society: the public, environment, risk, dissemination



Fingerprint Analysis Software



Dolly, library.thinkquest.org

#overlyhonestmethods



- ▶ [Morgan Edwards@mangoedwards](https://twitter.com/mangoedwards)

I can't send you the original data because I don't remember what my excel file names mean anymore

[#overlyhonestmethods](#)

- ▶ [Mags Lum@ScientistMags](https://twitter.com/ScientistMags)

There should have been more experiments but our funding ran out so we published it anyway. [#overlyhonestmethods](#)



- ▶ [Dean Burnett @garwboy](#)

What the... We didn't do any of this!
Has my supervisor edited it without
telling me? Oh, great. Now I'll look
stupid [#overlyhonestmethods](#)

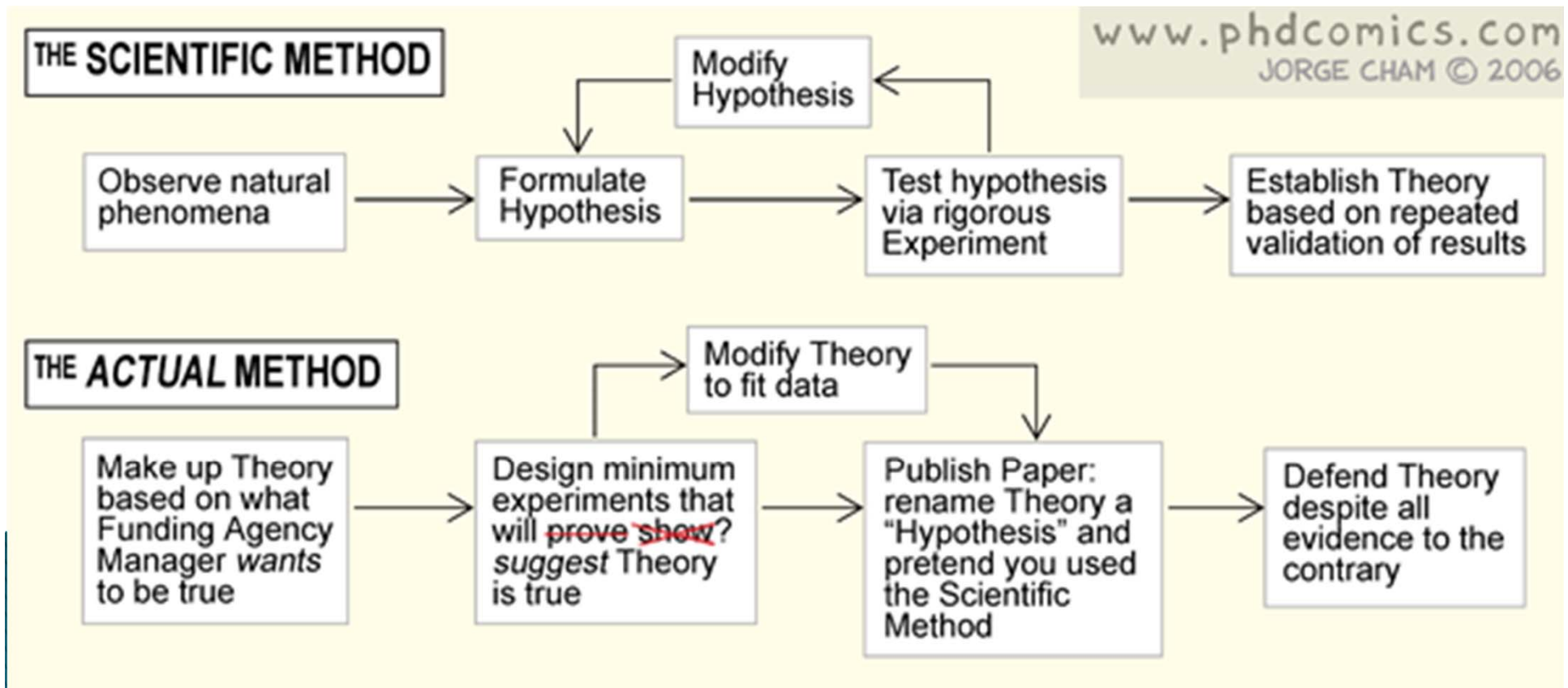
- ▶ [Adriana Heguy@AdrianaHeguy](#)

A Northern blot was run instead of
realtime QPCR because the PI is old
and does not trust results unless he
sees a band [#overlyhonestmethods](#)



▶ David C Logan@angerstusson

"Experiment was repeated until we had three statistically significant similar results and could discard the outliers" [#overlyhonestmethods](#)



Misconduct concerns



Diederik Stapel, November 2011



Publication and Authorship

- ▶ Guidelines for publication and review – The International Committee of Medical Journal Editors (ICMJE) – “Uniform Requirements for Manuscripts Submitted to Biomedical Journals” (the Vancouver Convention) www.icmje.org

THE AUTHOR LIST: GIVING CREDIT WHERE CREDIT IS DUE

The first author
Senior grad student on the project. Made the figures.

The third author
First year student who actually did the experiments, performed the analysis and wrote the whole paper. Thinks being third author is “fair”.

The second-to-last author
Ambitious assistant professor or post-doc who instigated the paper.

Michaels, C., Lee, E. F., Sap, P. S., Nichols, S. T., Oliveira, L., Smith, B. S.

The second author
Grad student in the lab that has nothing to do with this project, but was included because he/she hung around the group meetings (usually for the food).

The middle authors
Author names nobody really reads. Reserved for undergrads and technical staff.

The last author
The head honcho. Hasn't even read the paper but, hey, he got the funding, and his famous name will get the paper accepted.

Science Ethics and Society



*Myriad Genetics
US Supreme Court Case*



*Italian
Earthquake
Court Case*



ETIKK

What is the Right Thing to Do?

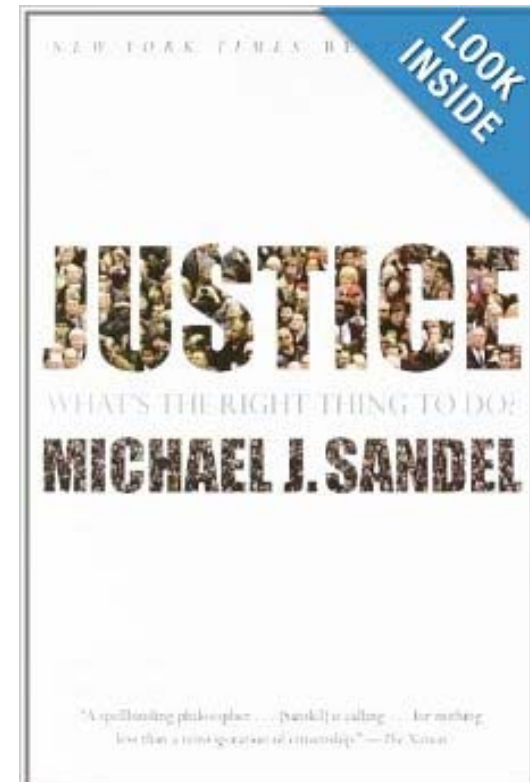
Ethical Theories

- ▶ Utilitarianism – Welfare?
- ▶ Deontology – Autonomy/Freedom?
- ▶ Virtue Ethics – The common good?

Theory – Tuesday

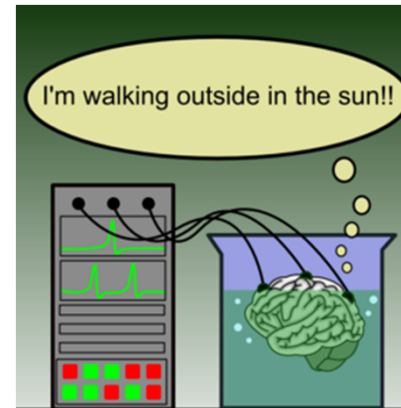
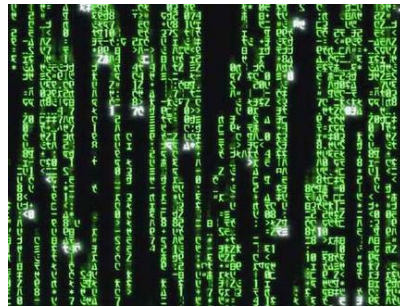
Practical Application – Thursday
Friday

www.justiceharvard.org



What do Philosophers of Science do?

Methodology: Study of the scientific method
Epistemology: Study of knowledge
Ontology: Metaphysics/ «What is»



What do Philosophers of Science do?

► Ask:

- What defines scientific method?
- Why is scientific knowledge different from other forms of knowledge?
- Can we distinguish between science and philosophy, poetry, technology, religion...
- What is the difference between a scientific theory and a non-scientific theory?
- Can science help us believe in the truth of an external world?



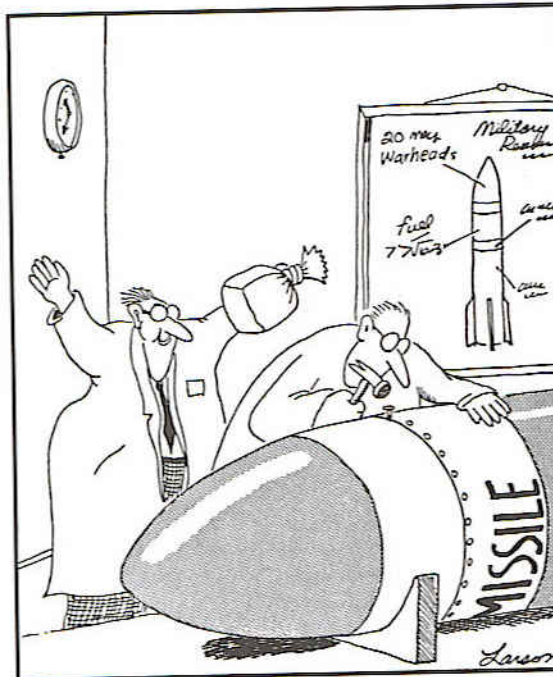
Why bother with philosophy?

- ”It might be thought that either philosophers or sociologists would have been able to illuminate the nature of science and why it has been so successful... not only have they failed to do so but some have instead provided what they regard as good reasons for doubting whether science really does provide an understanding of the way in which the world works...while providing no real threat to science they have become an increasingly vocal group, with an unfortunate influence on the study of science and its history...
- ”Fortunately for science these philosophical claims have no relevance to science and can be ignored...defining the nature of science is of only marginal interest, for it has no impact on their day to day activities”

Lewis Wolpert: *The Unnatural Nature of Science* (Faber and Faber: London. 1992)

Reasons to learn about philosophy

- ▶ Intellectual: educational, scholarly, informed opinion
- ▶ Practical/Social: society's perception of science and scientists is influenced by what they think science is.



"So please welcome our keynote speaker, Professor Melvin Fenwick—the man who, back in 1952, first coined the now common phrase: 'Fools! I'll destroy them all!'"



Figure 1 The bizarre climax of the sensational Scopes trial occurred on the afternoon of 20 July 1925 when Clarence Darrow (right) questioned William Jennings Bryan (left) about the literal truth of the Bible. The Scopes trial remains the most famous event in the evolution-creationism controversy. Photograph courtesy of Bryan College.



Lysenko and Khrushchev Wikipedia



79% back creationism in schools

By Anne Cleveland
 A poll conducted by the American Family Life Survey, a conservative research organization, shows that 79 percent of Americans support teaching creationism in public schools. The poll was conducted in 1999 and is the first since the passage of the federal law in 1987.

The poll was conducted by the American Family Life Survey, a conservative research organization, which has been conducting surveys since 1978. The poll was conducted in 1999 and is the first since the passage of the federal law in 1987.

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Figure 2 This front-page headline on the 11 March 2000 issue of The Denver Post announced Americans' continuing and overwhelming desire to have creationism taught in public schools.

Decades after monkey trial, debate hasn't evolved much

Theory's detractors say 'popular revolt' under way

By TODD ACKERMAN
 Houston Chronicle

Even before he became a Christian, Jeff Farmer was an opponent of evolution.

His interest in such matters was twofold: As a wildlife artist, Farmer studied animal anatomy, and as a landscape designer, he read voraciously about architecture. The more research he did, says Farmer, the less scientific evidence he found for evolution.

"I grew up, like most people, assuming evolution was 'true,'" says Farmer, a 1987 Ph.D. graduate of Houston

graduate who wrote an opinion column for the Chronicle earlier this month calling evolution a "proud illusion."

"But, ultimately, textbooks in evolution couldn't answer my most fundamental question: Why can't we clearly and convincingly see it in the fossil record?"

Three-quarters of a century after the Scopes monkey trial, Americans' resistance to evolution remains about the same. Since the National Board of Education in August de-emphasized teaching that man descended from a common ancestor, newspapers around the country have been inundated with supportive let-

ters to the nation's presidential candidates have taken notice, and polls show as many people reject evolution as accept it.

The question to the point that leading evolution opponents are warning that a "popular revolt" is under way.

The state of affairs is vexing to scientists who believe that evolution is as well documented as Earth's revolution around the sun. To deny evolution often means behaving like Earth is less than 10,000 years old, that modern dating is false, that life on Earth exists precisely much as it did at the beginning of time. No wonder.

See EVOLUTION on Page 16A.

Figure 3 Decades after the Scopes trial, the evolution-creationism debate rages on in the United States. This article appeared on the front page of the Houston Chronicle on 18 September 1999.

naturenews

Published online 17 September 2008 | Nature | doi:10.1038/news.2008.1116

News

Creationism stir fries Reiss

Royal Society's director of education stands down.

[Daniel Cressey](#)

The director of education at one of the world's premier scientific bodies has been forced from his job in a row over approaches to creationism in the classroom.

Michael Reiss, a professor at London's Institute of Education and an ordained minister in the Church of England, yesterday stepped down from his post as director of education at Britain's Royal Society. The move, which appears to have been forced, follows a letter to the president of the Society, Martin Rees, from three Nobel-prize winning fellows "greatly concerned" by remarks Reiss was reported to have made at the British Association for the Advancement of Science's annual "Festival of Science" on 11 September.

Reiss's remarks on the need to engage in dialogue with the creationist views some children express in science classes resurrected claims that, as a priest, Reiss should not have been appointed in the first place. "When he was appointed there were concerns that he would push a religious agenda," says Richard Roberts, chief scientific officer of New England Biolabs in Massachusetts, a fellow of the society who in 1993 won the Nobel Prize in Physiology or Medicine. The fact that "Professor Reiss is a clergyman ... in itself is very worrisome," said the letter that Roberts sent on behalf of himself, Harold Kroto, of Florida State University in Tallahassee, and John Sulston, of the University of Manchester, UK.

Professor Michael Reiss
 Institute of Education

October 11, 2007

Al Gore's inconvenient judgment

Lewis Smith, Environment Reporter

The nine inconveniences

Al Gore's award-winning climate change documentary was littered with nine inconvenient untruths, a judge ruled yesterday.

An Inconvenient Truth won plaudits from the environmental lobby and an Oscar from the film industry but was found wanting when it was scrutinised in the High Court in London.

Mr Justice Burton identified nine significant errors within the former presidential candidate's documentary as he assessed whether it should be shown to school children. He agreed that Mr Gore's film was "broadly accurate" in its presentation of the causes and likely effects of climate change but said that some of the claims were wrong and had arisen in "the context of alarmism and exaggeration".



"Født sånn eller blitt sånn"



Dagbladet.no

The Times

deborah.oughton@umb.no

A Brief History of the Philosophy of Science

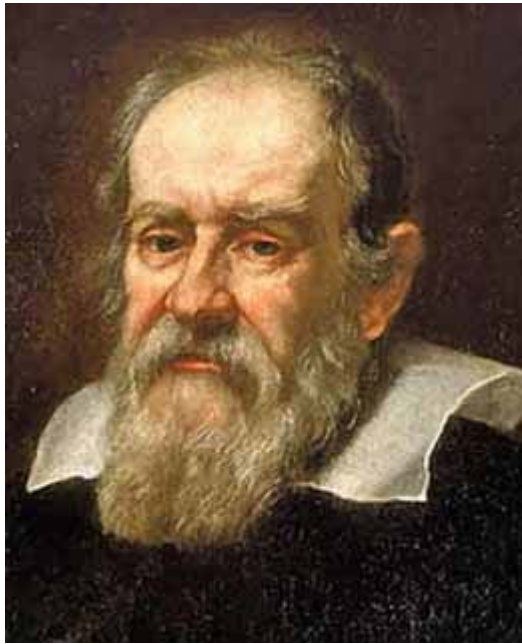
- ▶ Aristotle and Plato – no distinction between science and philosophy
- ▶ Greeks to the Age of Enlightenment – mysticism, religion, ideology



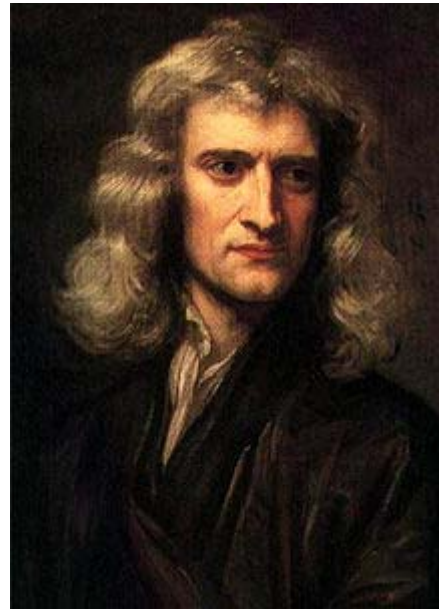
Aristotle



Age of Enlightenment 16–17th Century



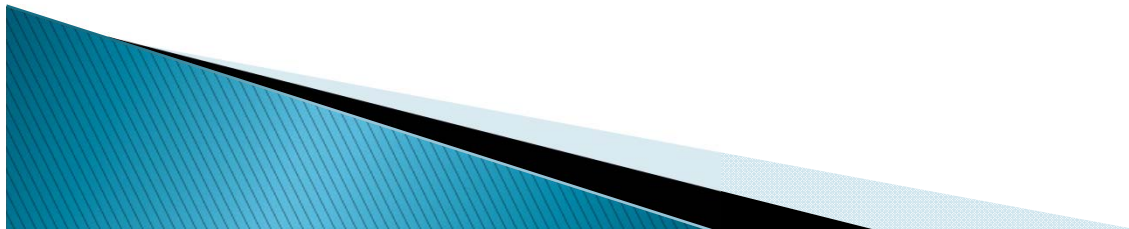
▶ Galileo



Newton



Harvey



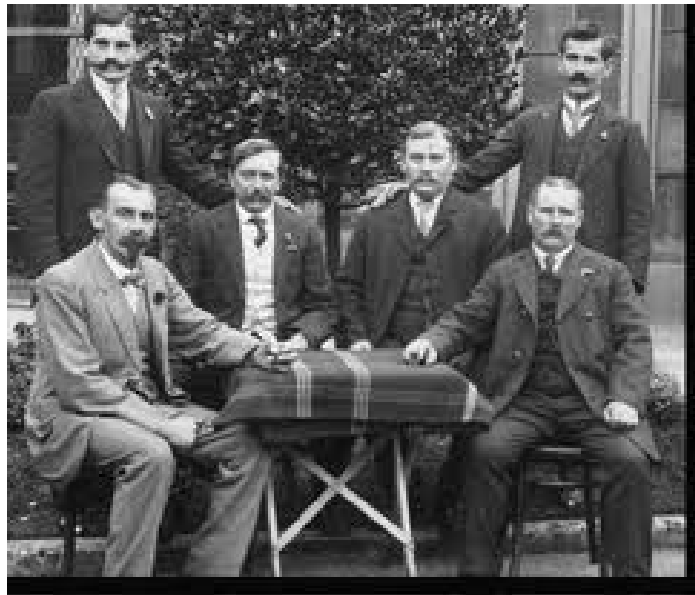
A Brief History of the Philosophy of Science

- ▶ 16–17th Century
 - Francis Bacon: Experimentation, inductivism, "*Science is knowledge; knowledge is power*".
 - Rene Descartes: human reasoning; "*I think therefore I am*"



History (cont.)

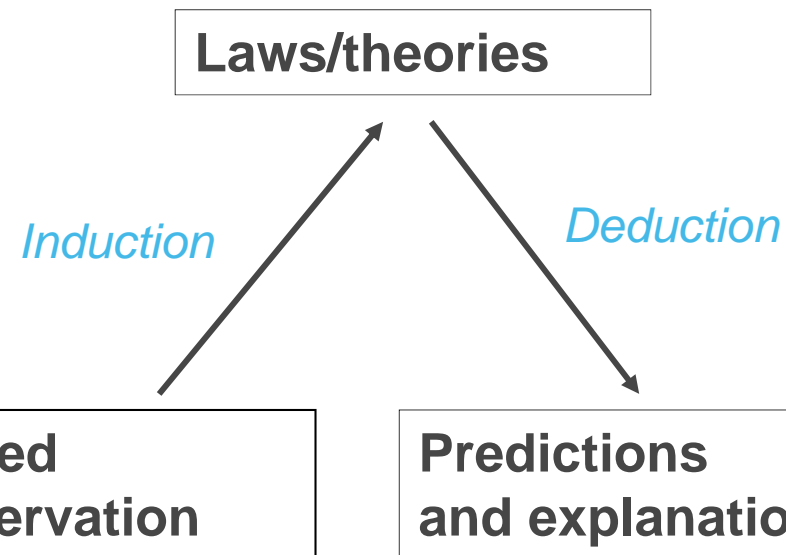
- ▶ Vienna Circle (early 20th century)
 - Logical positivism, verificationism
 - Rudolph Carnap, Otto Neugarth, Moritz Schlick



Inductivism

Theories justified by induction
– the ONLY basis for scientific
knowledge: LOGICAL POSITIVISM

- ▶ Scientific knowledge is derived from observation statements by induction
- ▶ Observation supplied a secure basis upon which scientific knowledge can be based
- ▶ Science starts with observation

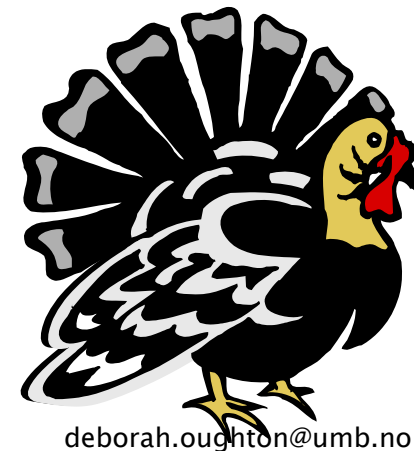
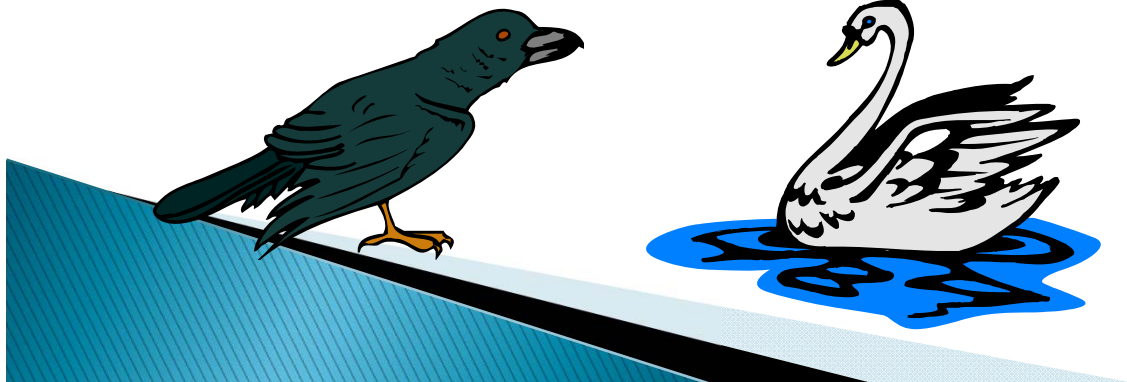


Logical Positivism

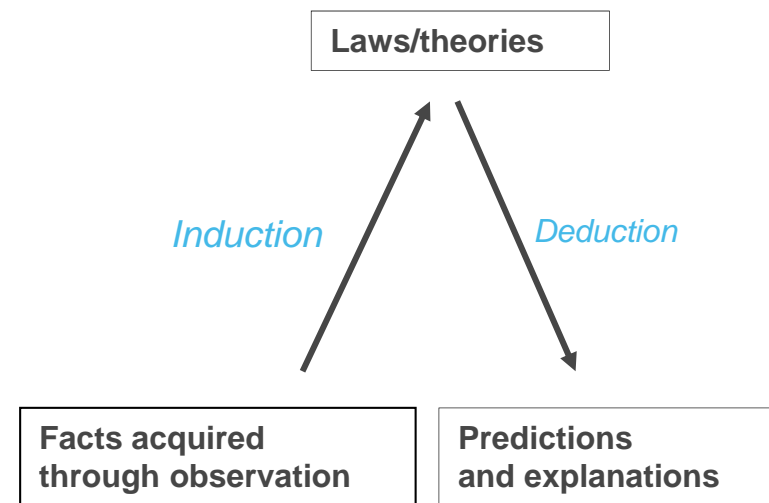
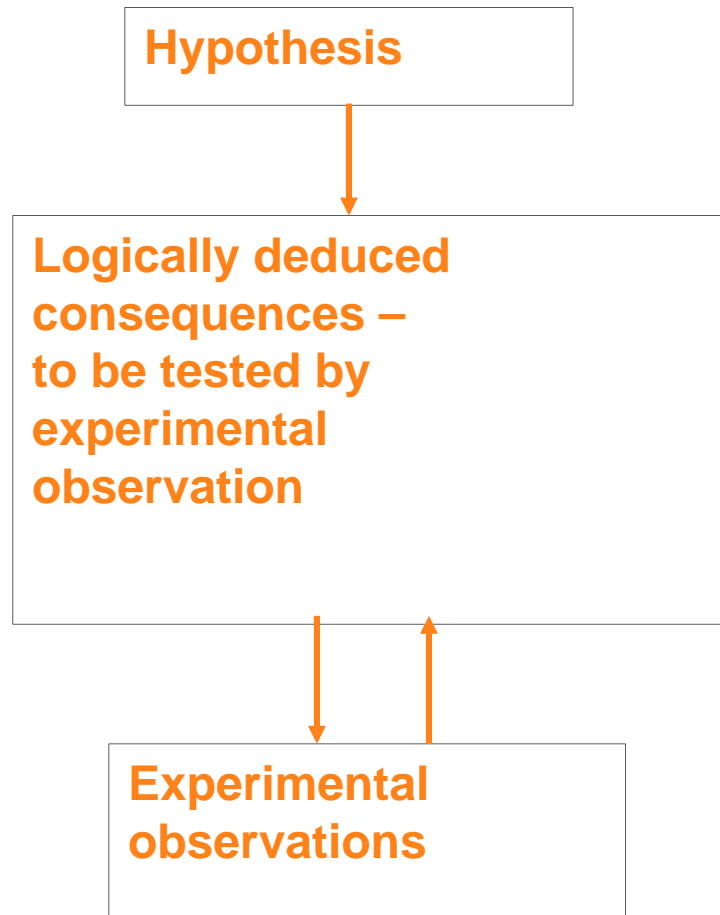
- ▶ Vienna Circle: Planned to create an oasis of reason in a sea of irrationality. Saw philosophy as the "hand-maiden of science", working to clarify issues for natural science.
- ▶ Bertrand Russell: attempted to formalise the foundations of mathematics from a set of logical axioms (*Principia Mathematica, 1910*)
- ▶ Ludwig Wittgenstein: redefinition of truth from one of correspondence to objective fact to one of agreement between persons

Problems with Inductivism

- ▶ Inductive arguments are not logical
- ▶ Observation cannot be separated from theory
- ▶ Science doesn't start with observation

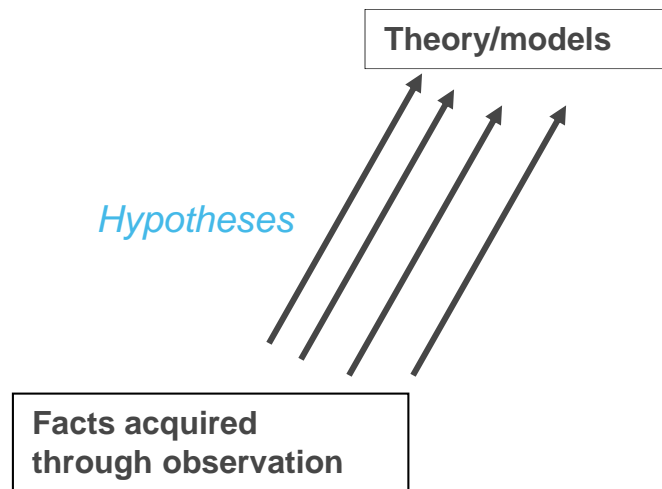


Hypothetico-deductive method



Abduction

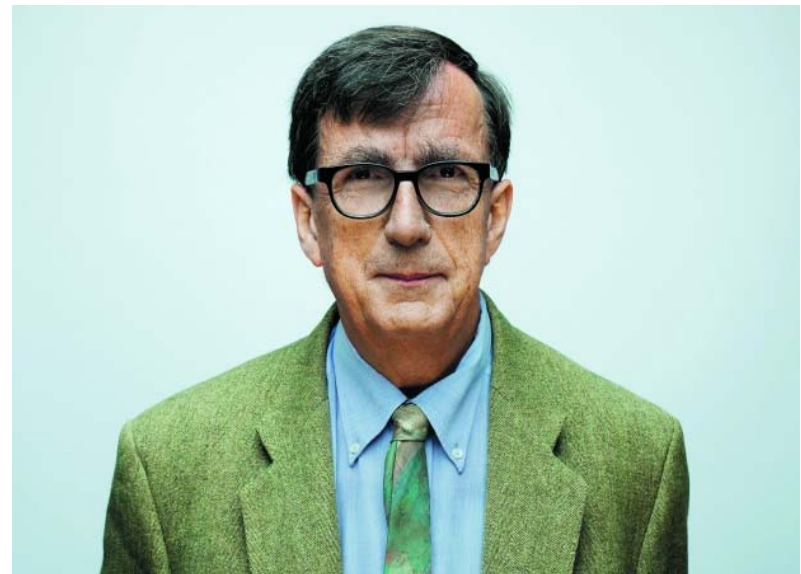
- ▶ Abduction – the selection of the best hypothesis to explain observations – and the reasoning to do this.



William of Ockham

History (cont.)

- ▶ Karl Popper (1943): *The Logic of Scientific Discovery*
- ▶ Thomas Kuhn (1970): *The Structure of Scientific Revolutions*
- ▶ Paul Feyerabend (1975): *Against Method: Outline of an Anarchistic Theory of Knowledge*
- ▶ 1970s–21st century: increased focus on social and political institutions (Ian Hacking, Bruno Latour, Philip Kitchner, Shelia Jasanoff)



Bruno Latour, Morgenbladet (Marcel Braun)