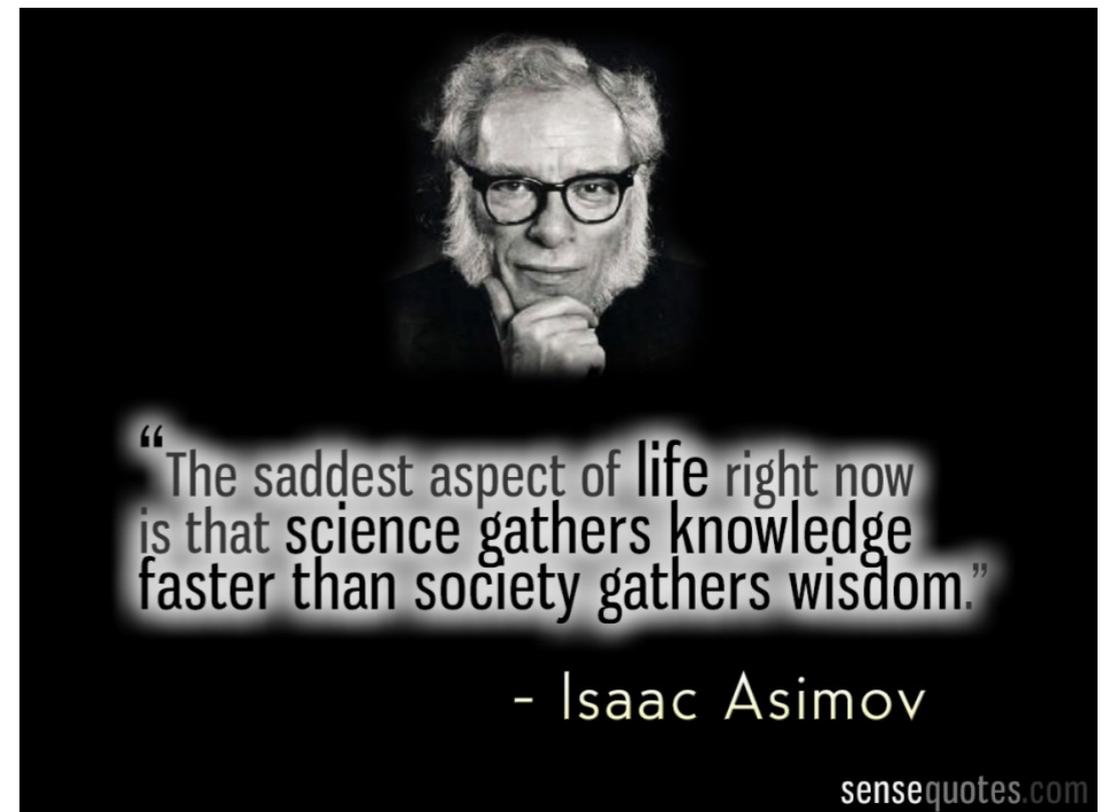


# Lecture 11

## Science and Society

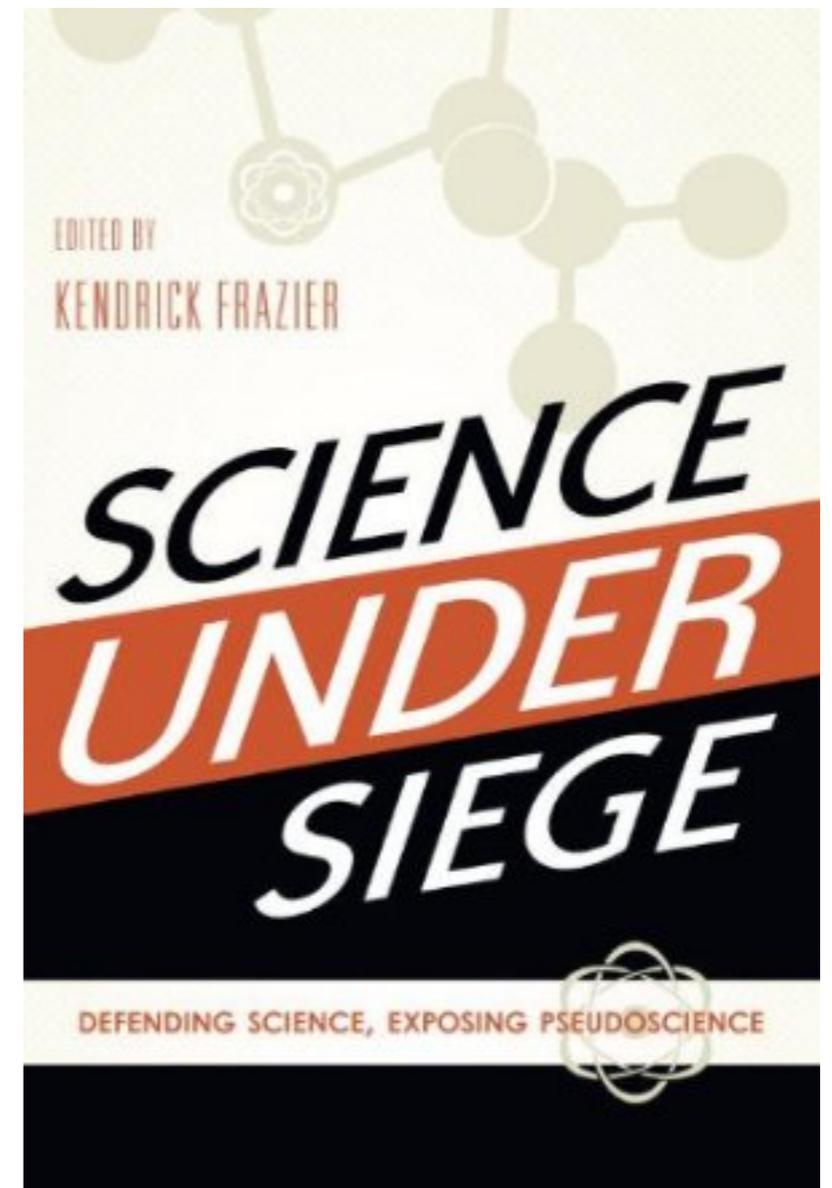


# Science in Society

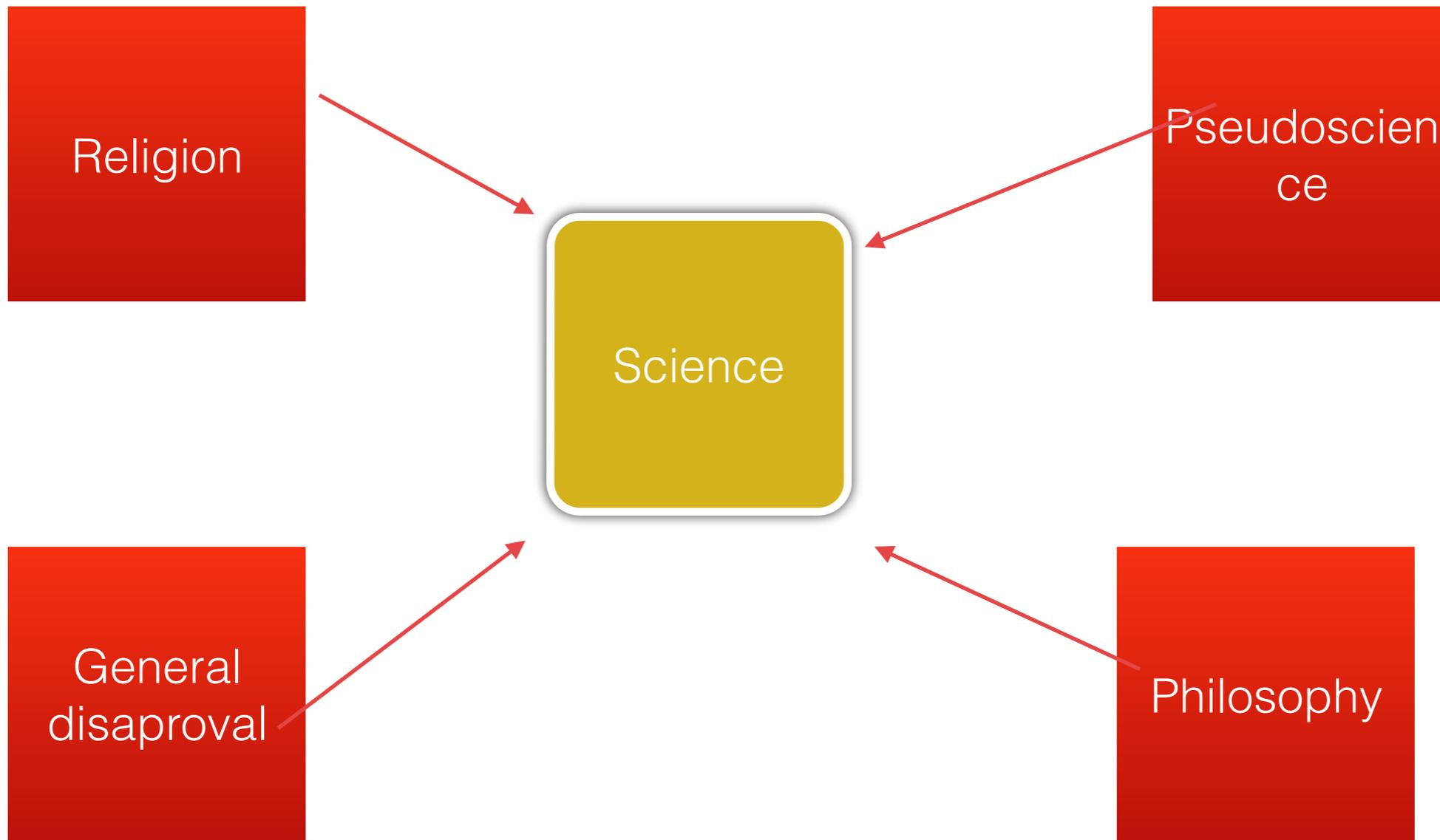
- Generally, science is considered a good thing.
- Science has given us technology, healthcare, space travels and so on.
- Science has given us knowledge and wisdom.
- Science has to some extent satisfied our need to understand the world.
- So who doesn't like science?

# Science Under Siege!

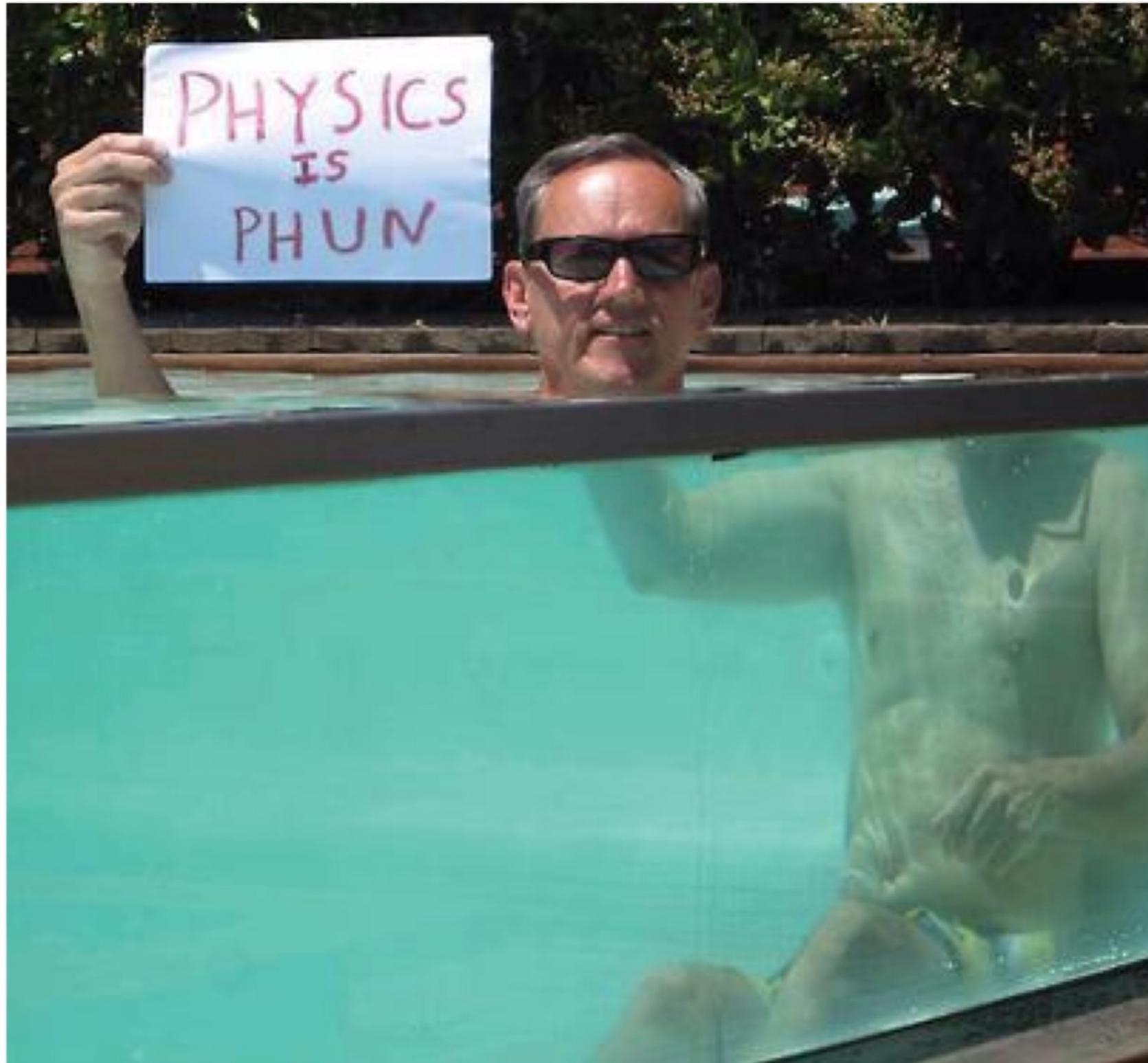
- General disapproval - Science is harmful in a lot of ways
- Religion - Science is sometimes incompatible with religious beliefs.
- Pseudoscience - Other ideas and beliefs also want to get recognition.
- Philosophically disapproval - Scientists are not as smart as they think.



# Science Under Siege!



# IFLS - We like science!



“Poets say science takes away from the beauty of the stars - mere globs of gas atoms. I too can see the stars on a desert night, and feel them. But do I see less or more? The vastness of the heavens stretches my imagination - stuck on this carousel my little eye can catch one - million - year - old light. A vast pattern - of which I am a part... What is the pattern, or the meaning, or the why? It does not do harm to the mystery to know a little about it. For far more marvelous is the truth than any artists of the past imagined it. Why do the poets of the present not speak of it? What men are poets who can speak of Jupiter if he were a man, but if he is an immense spinning sphere of methane and ammonia must be silent?”

— Richard P. Feynman

## Two spheres

Logic

Clarity

True or false

Either A or B

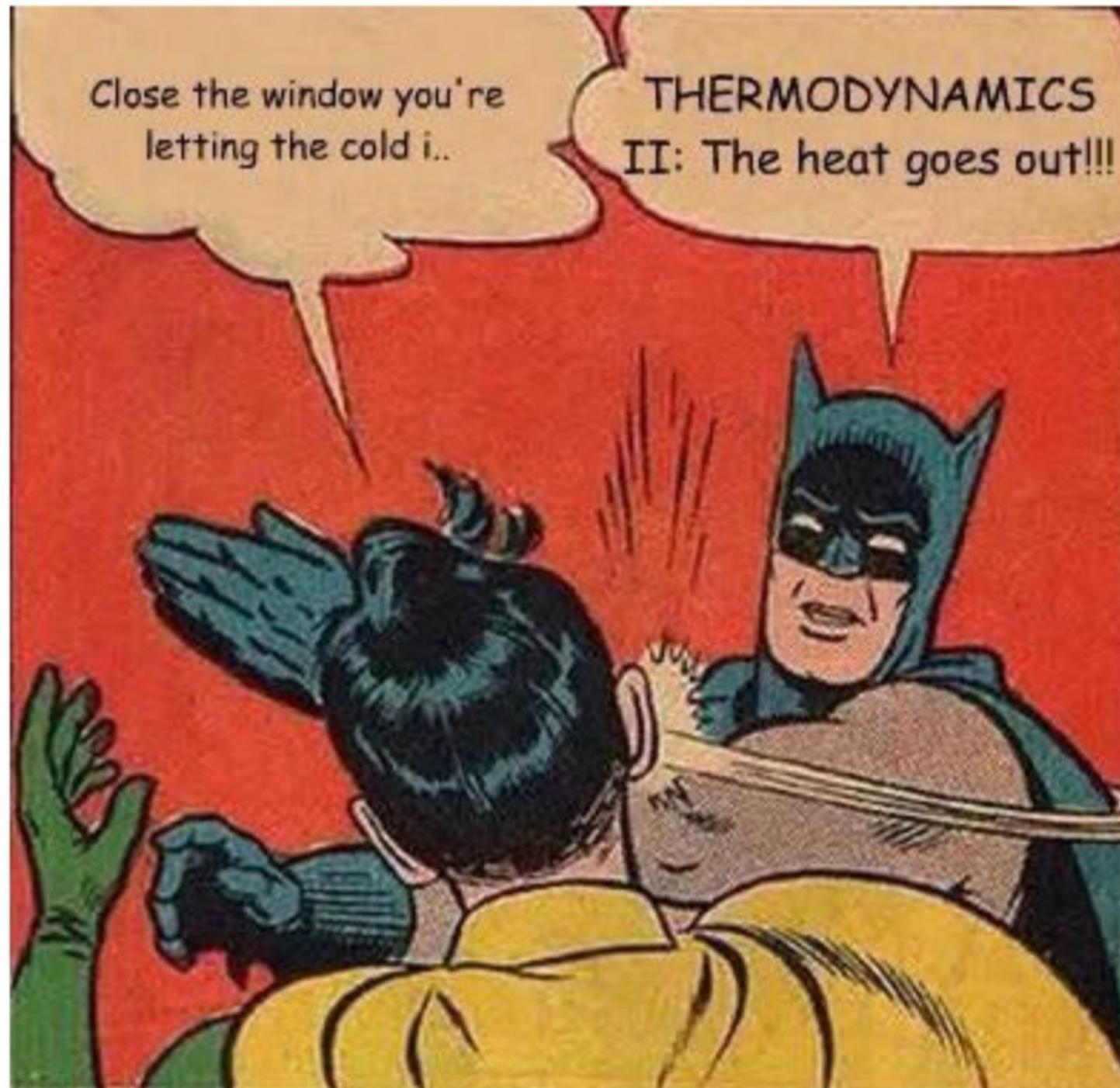
Mysticism

Obscurity

Neither true nor false

Both A and B

General disapproval - Scientist are arrogant  
and cold at hart



# Methods for convincing someone

Let us assume that you want to convince someone of the truth of a statement. Basically, there are three ways of doing it:

- Use scientific arguments.
- Use authority.
- Use sympathy.

In science we supposedly should rely on sound arguments. But this might not always be true.

# Science is authority

- Some people think that science has a too dominant position in society.
- Scientific truth is the only truth!?
- What about artistic truth?
- The idea that science should be more modest and know its place is called *scientism*.
- It seems as if science sometimes fail to get sympathy.

- Science could be an enemy of ethics and morality.
- It seems difficult to reconcile science and religion.
- Perhaps it is also difficult to reconcile science with a meaningful view of life (?)
- Do humans have a place in a scientific universe?

# Sociobiology

An example is the idea that human behavior can be explained evolutionary.

For everything people do, there is a reason. An evolutionary reason. Even for stealing, liking music, murdering, making jokes and so on ...

It is similar to, but not the same thing as Social Darwinism.

It may seem as if sociobiology defends different types of "negative" behavior and "negative" attitudes. If they are adaptively motivated they in some sense apologized.

True or not, science gives us a more specialized perspective than we first might think.

# Religion

Religion gives many people a purpose in life.

Science seems to deprive them of that meaning.

Is that so?

Can science give something in compensation?

# Common arguments for religion

Cosmological Argument - How did it all start?

Design Argument - The world must be constructed.

Consciousness Argument - How can the mind and the soul explained?

Many seem to think that the design argument is the most important.

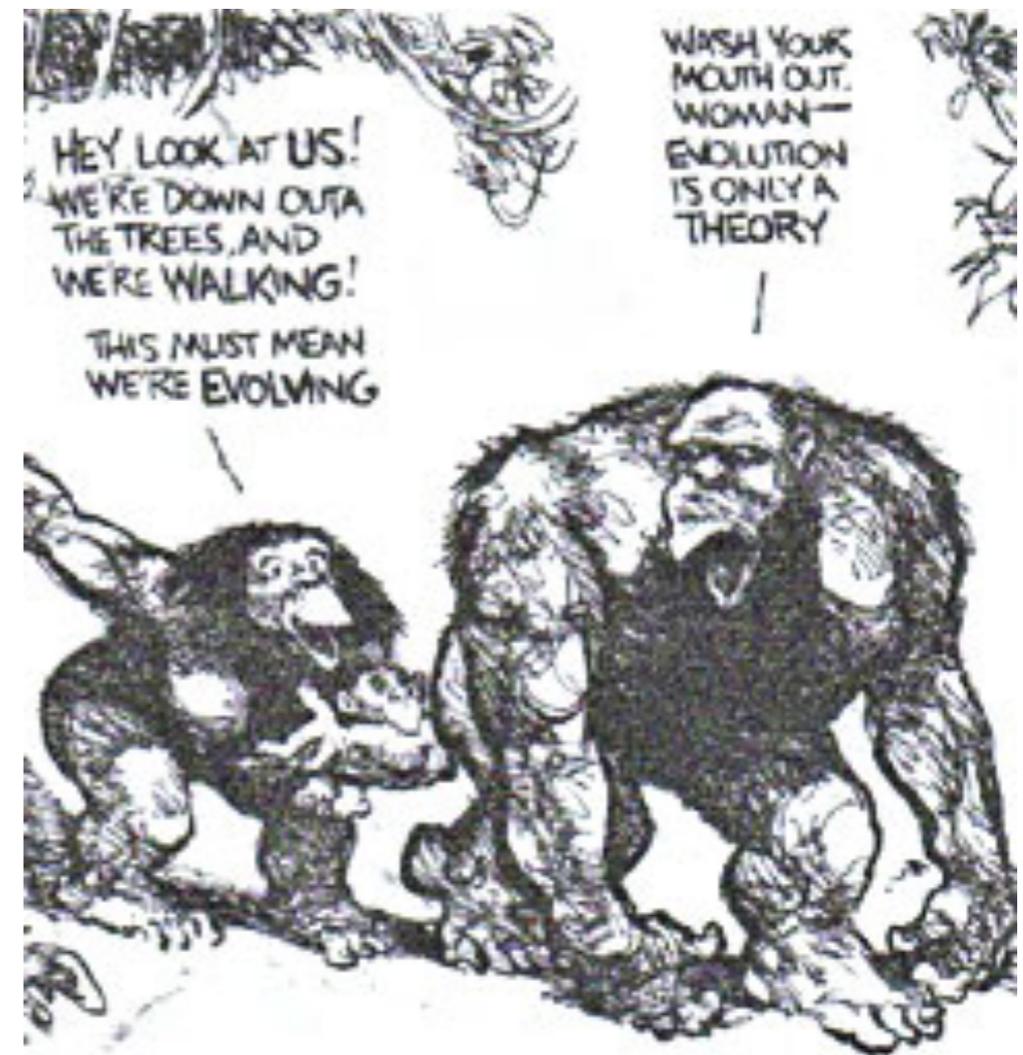
# Creationism and Intelligent Design

Creationism is the belief that the world and all living things in whole or in part is the result of divine intervention or supernatural means. Creationism is consistent with classical Christianity but may also allow other interpretations of the semi-religious character.

Intelligent design is the notion that life on Earth is too complex to have arisen and developed exclusively by random variation and natural selection as biology's theory of evolution says. It is customary to give examples of organs that are irreducibly complex.

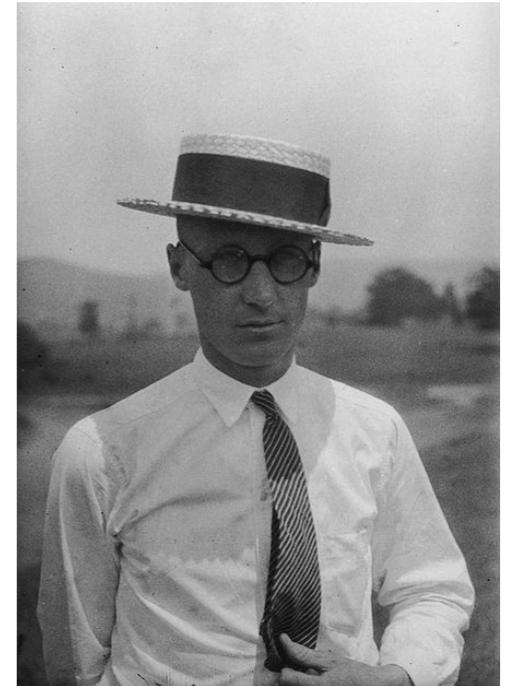
This would indicate an element of deliberate, intelligent design at various times during the evolution of life.

They forward the thesis that there are certain phenomena in the universe and among living things that can best be explained with reference to an intelligent cause, not with reference to undirected natural processes such as natural selection.



# A cut out of American history

- In the 1920s, a schoolteacher in Tennessee was sentenced for teaching evolution.
- The trial became famous and known as "The Monkey Trial".
- The law that prohibited the teaching of evolution was lifted only in 1967.
- Meanwhile, it is also forbidden to teach religion in the United States.



- 1981 enacts the state of Arkansas a law requiring schools to devote equal time to the teaching of creation-science as of evolution.
- 1982 condemned the law as unconstitutional in a famous trial. Creation-science is deemed unscientific in a famous ruling by Judge Overton.

# How to define a scientific theory

To be more specific, he used these five points to describe the difference between a scientific theory and a *pseudo-scientific* theory. A scientific theory must fulfill this:

- It is guided by natural law.
- It has to be explained by reference to natural law.
- It is testable against the empirical world.
- Its conclusions are tentative, i.e., are not necessarily the final word.
- It is falsifiable.

# Reflections

- Is the requirement that science should refer to natural laws reasonable? Could we not, by that criterion, have to reject several well-established theories?
- Is it really true that creation-science cannot be falsified?
- A natural objection to creation-science is that it is not constructive. It just attacks the theory of evolution.

# Examples of pseudoscience

Classic examples of areas that are usually regarded as pseudoscience is:

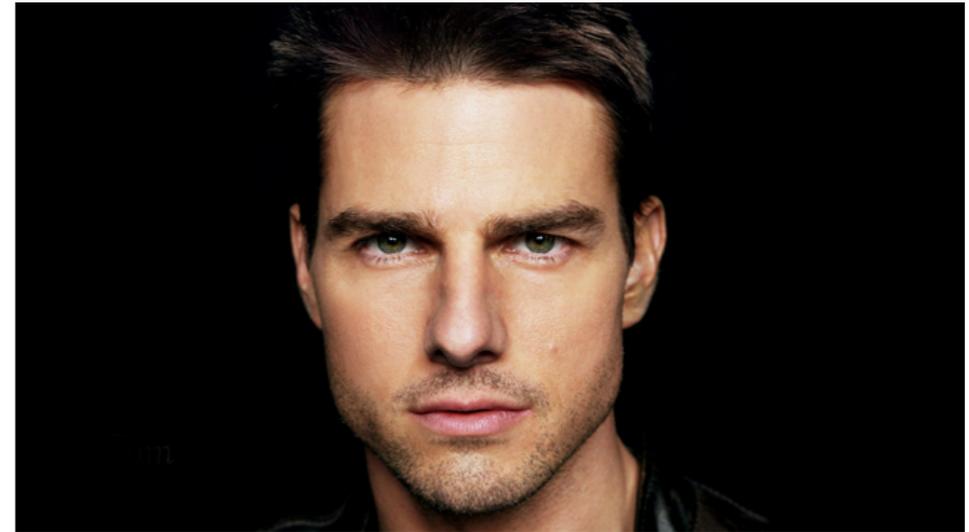
- Astrology
- Freudian psychology
- Marxist theory
- We shall see more examples

# Classification of pseudosciences



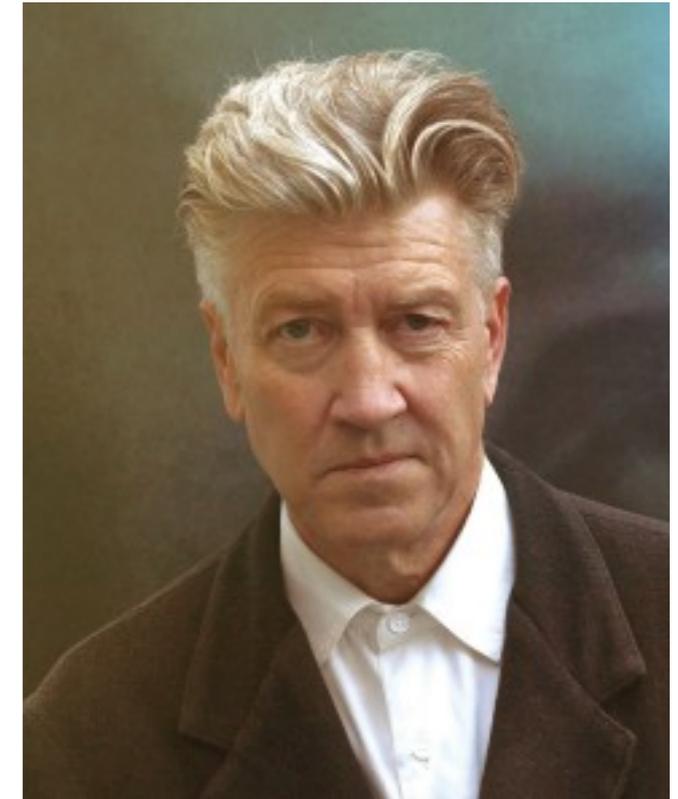
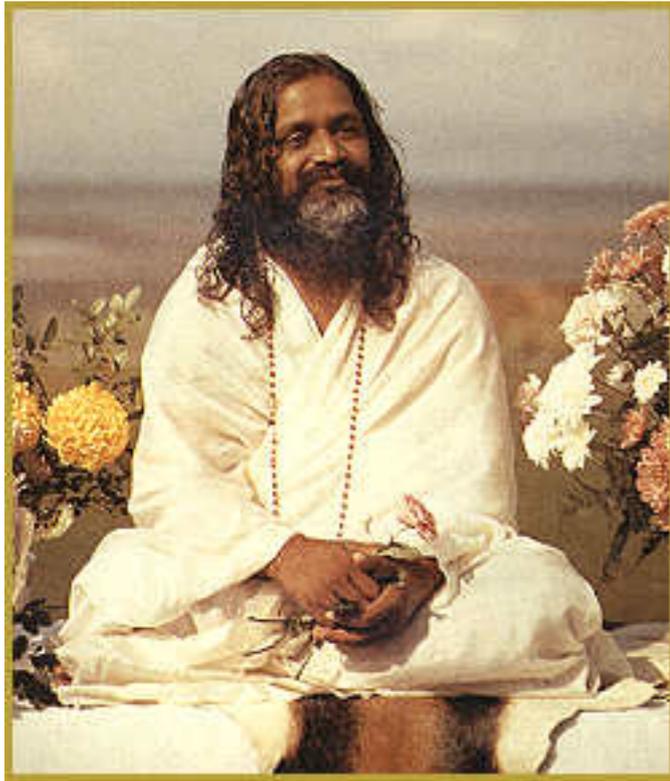
Sven Ove Hansson. Professor at KTH. In his book *Vetenskap och ovetenskap*, he has conducted a review of various forms of pseudoscience

# Scientology



Scientology is described by his supporters as a selection of principles and methods used to manage the problems of life and achieve happiness. These methods are taught through by a very large number of courses and treatments that the Church of Scientology provides. The scientologists argue that man is an immortal spiritual being, whose experiences encapsulate all her lifetimes. Furthermore, man is a spiritual being, with (theoretically) unlimited abilities over time, and matter. Man is basically good and can, if she wants, achieve spiritual liberation, provided that she uses Scientology methods and teachings.

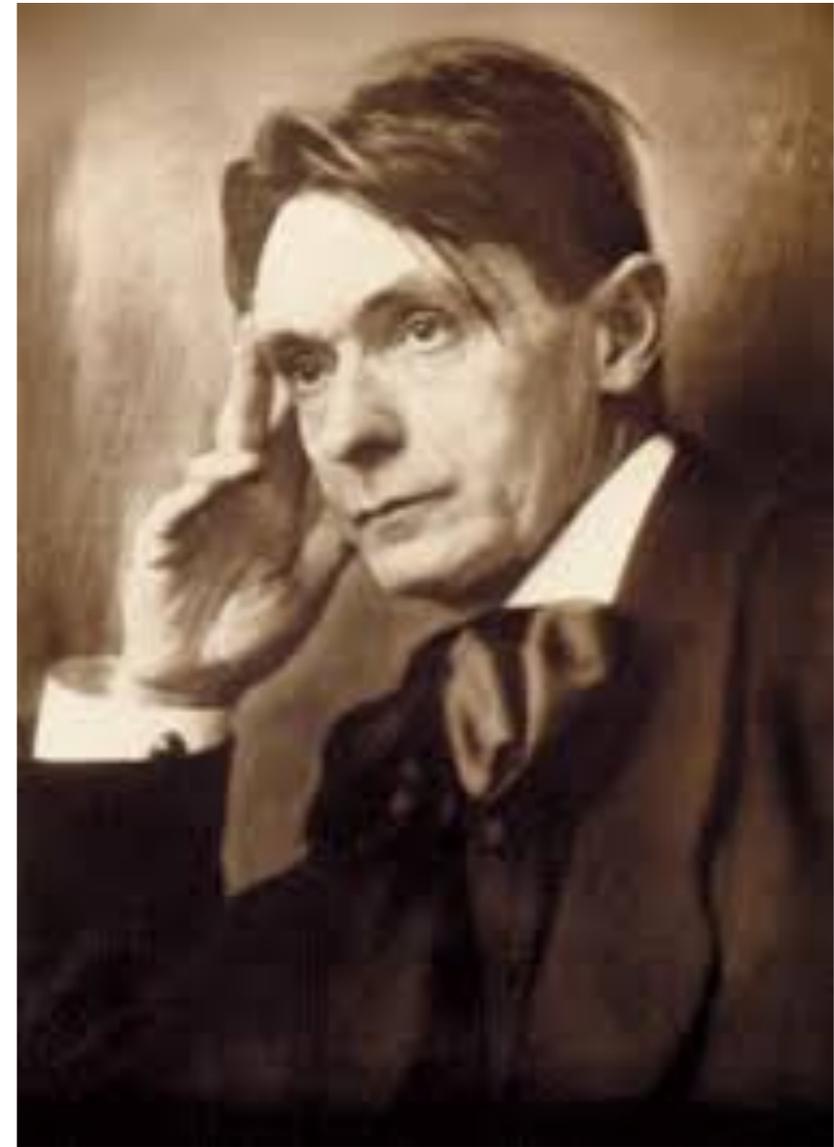
# Transcendental Meditation



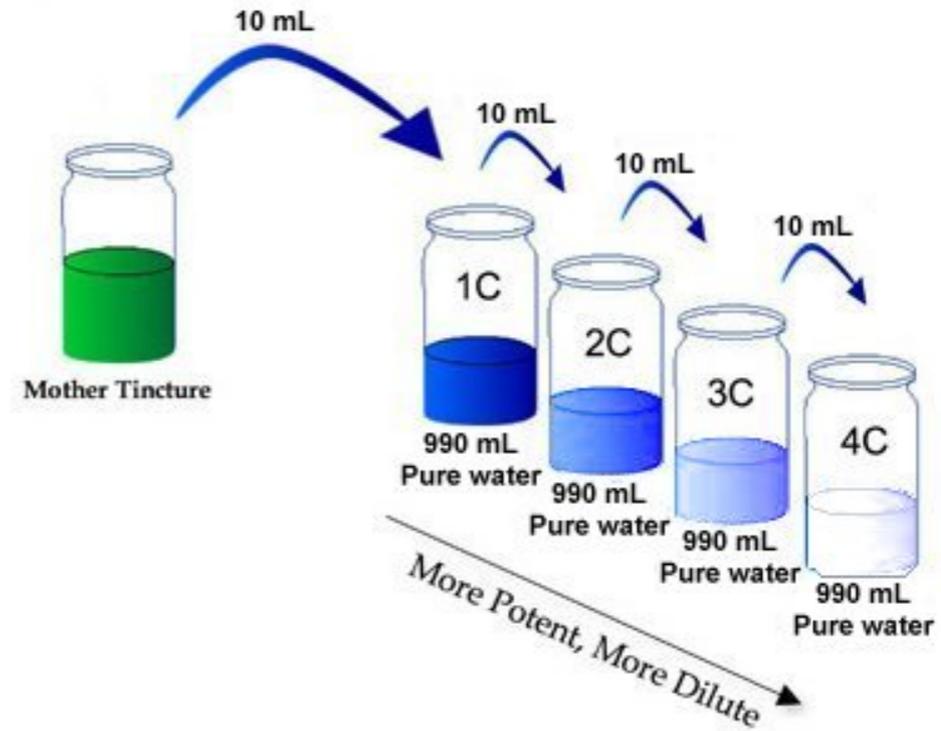
Characteristic of TM include the use of so-called mantras. Within the TM organization one advocate the so-called Ayur-Vedic medicine, a form of alternative medicine. The TM organization, which is non-profit, justifies the relatively high price for a course of this meditation with that TM has unique effects that are considered scientifically well documented .

# Anthroposophy

Anthroposophy is a spiritual philosophy founded in the early 1900s by Rudolf Steiner. It postulates the existence of an objective, intellectually comprehensible spiritual world accessible to direct experience through inner development, through conscious cultivation of a form of thinking independent of sensory input



# Homeopathy

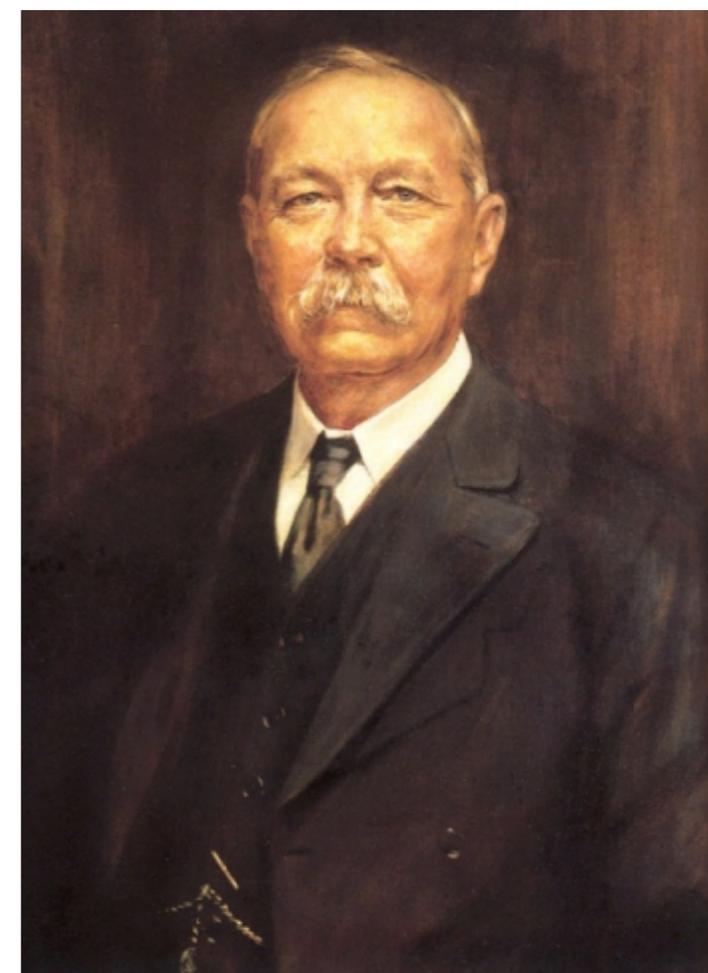


# Strange genetic theories



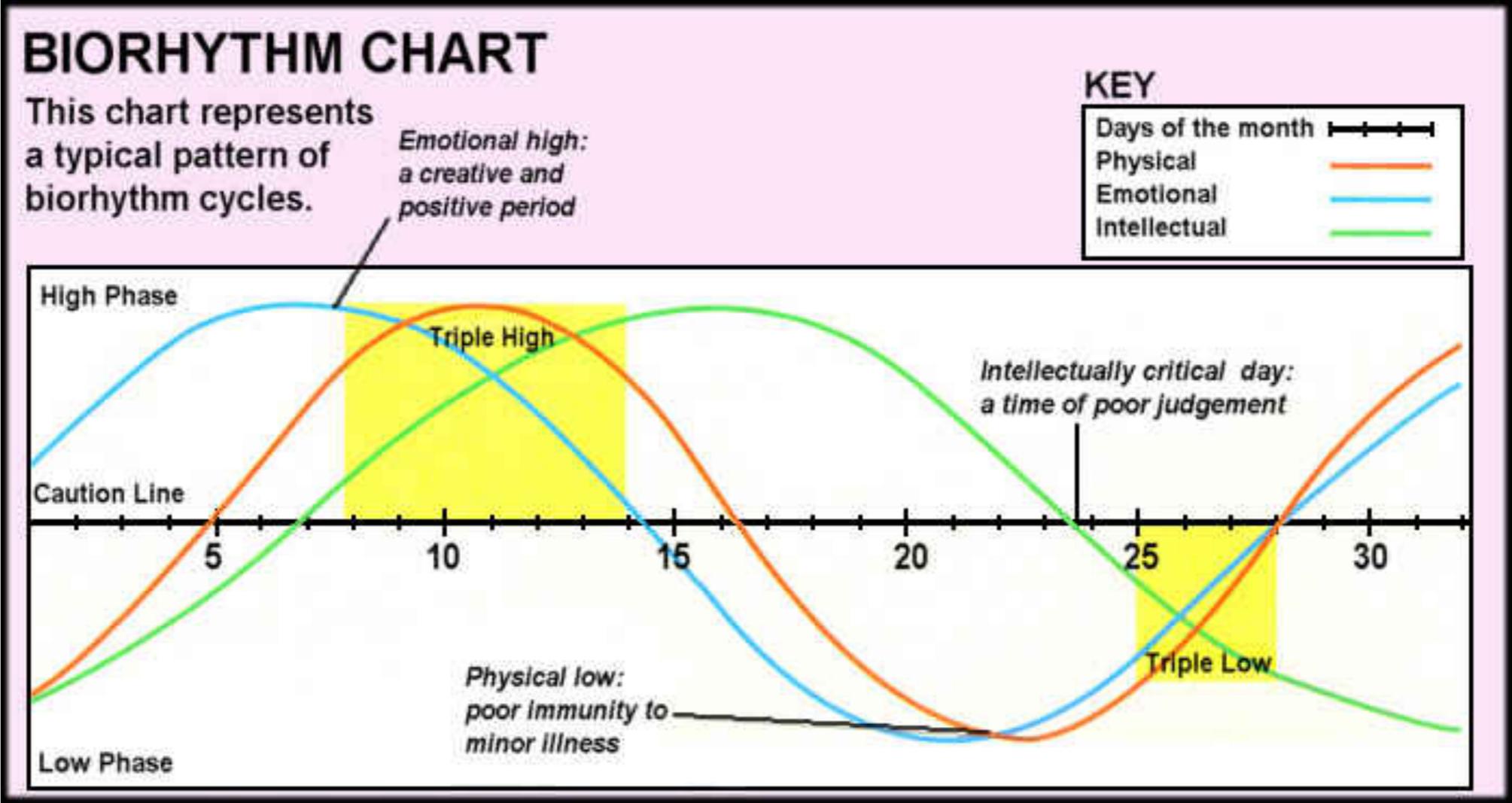
Theories that say that acquired characteristics can be inherited. One of the most famous is the theory of is Stalin's biologist Lysenko.

**Mind reading, clairvoyance, and the like**

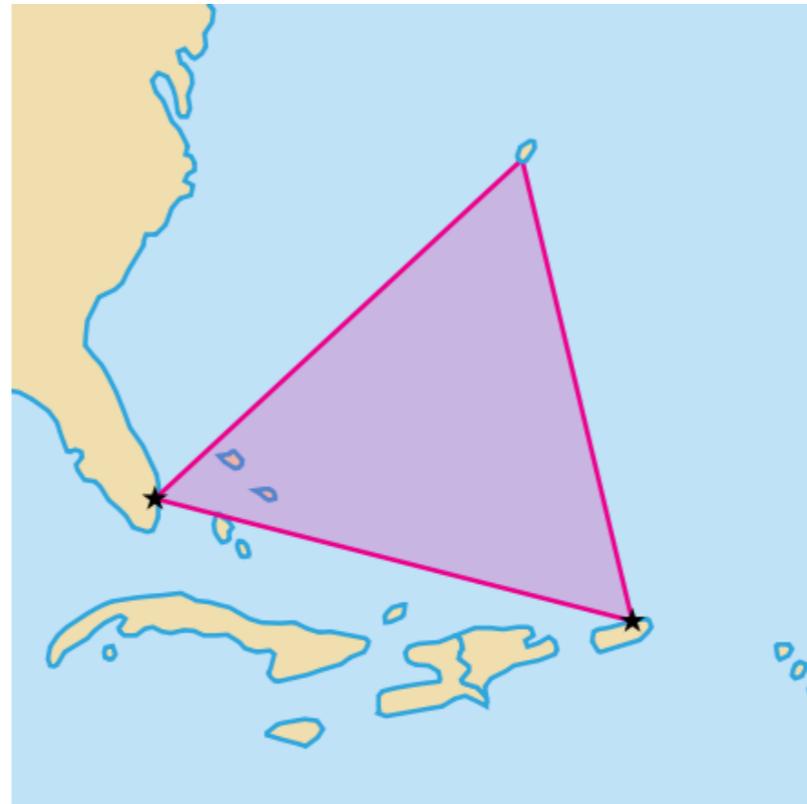


Girl with fairies

# Biorythms

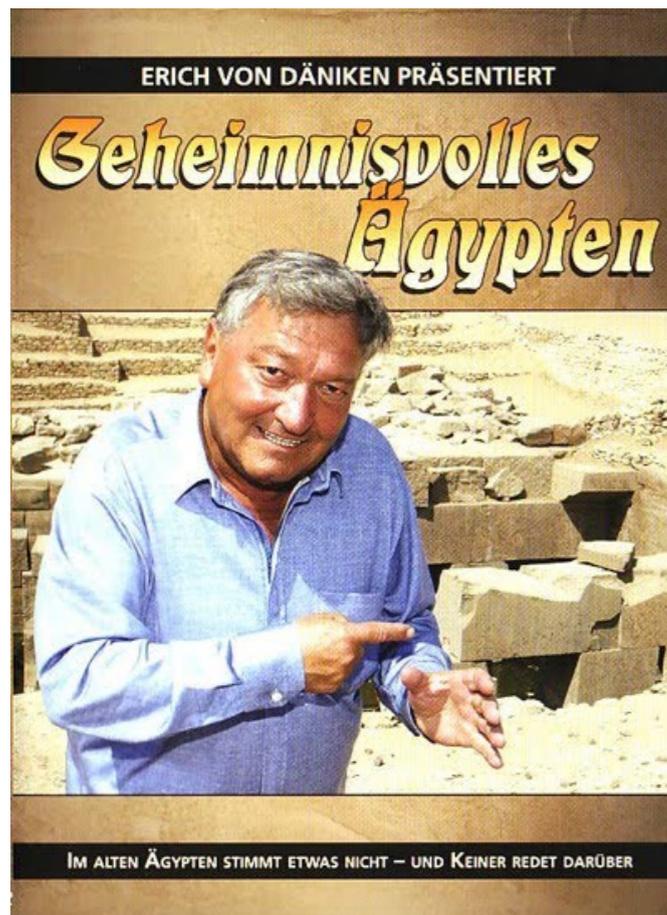


# The Bermuda Triangle



The Bermuda Triangle, aka The Devil's Triangle, The Triangle of Death, The limbo of the lost, is an approximately 1 million km<sup>2</sup> marine area in the shape of a triangle with Bermuda, Puerto Rico and Miami, including the Sargasso Sea, located within the triangle boundaries.

# Erich von Däniken



# Erich von Däniken and UFOs

Erich von Däniken is a popular science writer who has written 26 books. He runs the thesis that aliens often have visited Earth. This can be seen in the archaeological remains and ancient stories of various kinds. In 1968 he published his first book, *Erinnerungen an die Zukunft (Olösta gåtor ur mänsklighetens förflutna)*. It is also his best selling.



# Characteristics of pseudoscience

Sven Ove Hansson proposes seven characteristics.

**Authoritarianism:** Some people are accorded such great ability to decide what is true and false, that others just have to abide by their judgments.

**Experiments that can not be repeated:**  
Pseudoscience relies on experiments performed once and not always possible to repeat.

- Hand-picked examples: One uses hand-picked examples, when a random sample would be possible.
- Reluctance to real testing: One does not really try test the theory against reality, although this would be possible.
- Indifference to contradictory facts: Even-though there are evidence telling against the theory, these are ignored.

- **Subterfuges:** One demands that the theory shall be tested under such conditions that it can only be confirmed, never contradicted.
- **Explanations are abandoned without being replaced:** One abandons sustainable explanations without putting something in place so that the new theory leaves more unexplained than the old one.

# Another type of characterization

An alternative way to recognize pseudoscience:

- It does not do any real problem solving.
- It has for a long developed to a much lesser degree than other "similar" theories.

SIGN OF PSEUDOSCIENCE	EXAMPLE
Exaggerated claims	Three simple steps will change your love life forever!
Overreliance on anecdotes	This woman practiced yoga daily for three weeks and hasn't had a day of depression since.
Absence of connectivity to other research	Amazing new innovations in research have shown that eye massage results in reading speeds 10 times faster than average!
Lack of review by other scholars (called <i>peer review</i> ) or replication by independent labs	Fifty studies conducted by the company all show overwhelming success!
Lack of self-correction when contrary evidence is published	Although some scientists say that we use almost all our brains, we've found a way to harness additional brain power previously undiscovered.
Meaningless "psychobabble" that uses fancy scientific-sounding terms that don't make sense	Sine-wave filtered auditory stimulation is carefully designed to encourage maximal orbitofrontal dendritic development.
Talk of "proof" instead of "evidence"	Our new program is proven to reduce social anxiety by at least 50 percent!

# Problem med sociobiologin

- Det kan tyckas som att sociobiologin försvarar olika typer av negativt beteende och negativa inställningar. Om dessa är adaptivt motiverade är de i någon mening ursäktade.
- Sociobiologin verkar ha kopplingar till politisk hållning. Anhängare är ofta "högertänkare", motståndare ofta "vänstertänkare".

# Försvar för vetenskap

Försvar för vetenskap kan ske enligt åtminstone två huvudlinjer

- Vetenskap når fram till äkta sanningar
- Vetenskaplighet är ett framgångsrikt förhållningssätt.

# Philosophical critique of science

We can see two kinds of criticisms:

- Science is limited. There are many questions it can not answer. These issues must be left to philosophy.
- Science has misunderstood everything. There is no objective truth!

# Kuhn's thoughts (again)

- A paradigm consists of concepts, methods, standards and beliefs. It defines the way we see the world (or part of it).
- Normal Science is science conducted within the paradigm.
- In the revolutionary science we discard the old paradigm and replace it with a new one.

- In normal science you never question the paradigm. Problems are handled within the paradigm.
- Within the paradigm we work of working with "puzzle-solving". The distinguishing feature of true sciences is the existence of a program for such problem solving.
- When a crisis occurs, it can lead to a paradigm change.
- The change is often done for irrational reasons.
- Two paradigms are incommensurable with each other.

# Problems with Kuhn's philosophy

- Does it give a recommendation for how science should be conducted? Maybe.
- It emphasizes stability in normal science. We like to think that a new paradigm is better than the old one.
- How can we tell if this is the case?
- Kuhn is not entirely clear on this point.

# Criticism of Kuhn

- Kuhn's influence has been great. But he has endured much criticism.
- He is accused of saying that science is irrational. (In the sense that it consists of several arbitrary choice.)
- It seems that he rather meant that science is not guided by a well-defined algorithm.
- Kuhn has also stressed that observations never are independent of the theory.

# Some implications of Kuhn's philosophy

- It is sometimes thought that in order to understand a science, we must also understand the society in which it is developed.
- Kuhn's thoughts led on to the so-called strong program in the philosophy of science: It explains choice between theories in sociology, psychology and anthropological terms.
- Kuhn has also indirectly given strong support to so-called cultural relativism.

# Who doesn't want objective truth?

Why criticism of objective truth? Some common thoughts are:

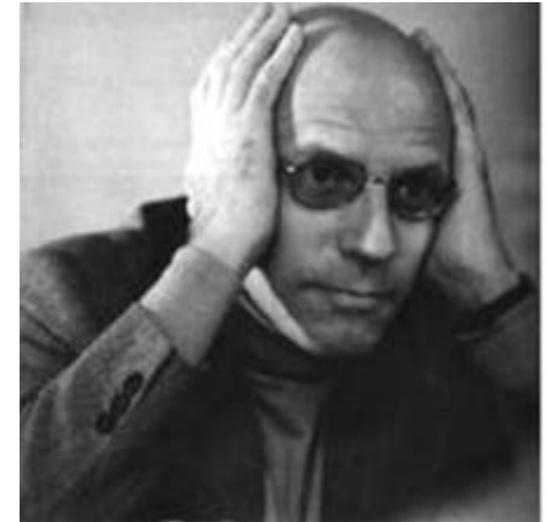
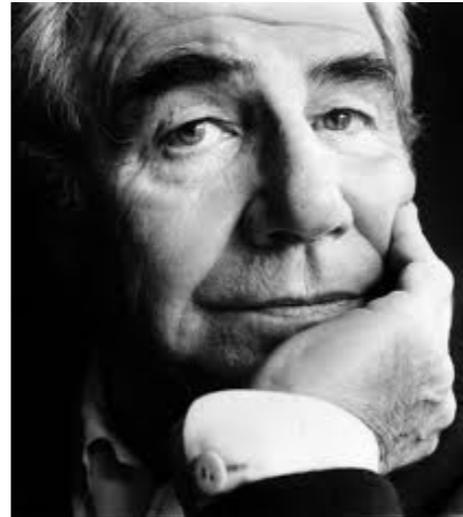
- To refer to truth is in a way a misuse of power.
- It is a form of totalitarianism. The dictatorship of science!
- Truth is a rhetorical trick.
- Fanaticism and intolerance is sometimes based on a belief in objective truth.
- Perhaps it is truth without skepticism that is dangerous?

# Nietzsche



- Regarded as one of the first to deny that objective truth exists.
- Said that all truth is matter of ideologyideologically driven.
- Said that Christianity is a slave moral.

# Postmodernism



Everything's stories  
There is no meta-narrative  
Relativism!



# Postmodernism

Some basics of postmodern thinking:

- By tradition, it is considered important to distinguish between symbols and reality.
- A new brilliant insight: Everything's symbols!
- All language is a kind of game.
- It's all stories or meta stories!

# Deconstruction



Derrida

- Derrida was a critic of the focus on logic in Western culture.
- For instance, he criticized science.
- He created the method called *deconstruction*.

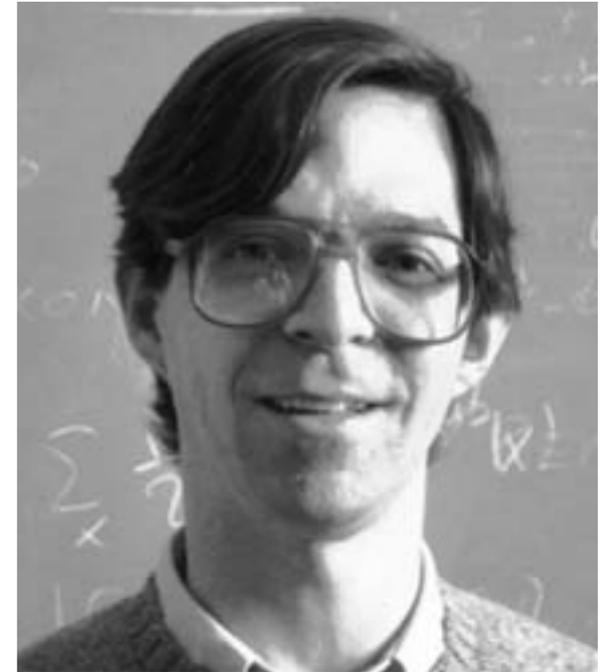
# Some thoughts about this

- It is sometimes said that life consists of problem-solving.
- There are two types of problems: those that come from nature and those from humans.
- We seem to be confronted most with the second type of problem.
- The step seems not far to just take an interest in the human-generated problems.

# The Sokal Affair

**(From Wikipedia)**

The Sokal affair, also known as the Sokal hoax, was a publishing hoax perpetrated by Alan Sokal, a physics professor at New York University. In 1996, Sokal submitted an article to *Social Text*, an academic journal of postmodern cultural studies. The submission was an experiment to test the journal's intellectual rigor and, specifically, to investigate whether "a leading North American journal of cultural studies – whose editorial collective includes such luminaries as Fredric Jameson and Andrew Ross – [would] publish an article liberally salted with nonsense if (a) it sounded good and (b) it flattered



The article, "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity", was published in the Social Text Spring/Summer 1996 "Science Wars" issue. It proposed that quantum gravity is a social and linguistic construct. At that time, the journal did not practice academic peer review and it did not submit the article for outside expert review by a physicist. On its date of publication (May 1996), Sokal revealed in *Lingua Franca* that the article was a hoax, identifying it as "a pastiche of left-wing cant, fawning references, grandiose quotations, and outright nonsense...structured around the silliest quotations [by postmodernist academics] he could find about mathematics and physics".

## MY HOBBY:

SITTING DOWN WITH GRAD STUDENTS AND TIMING HOW LONG IT TAKES THEM TO FIGURE OUT THAT I'M NOT ACTUALLY AN EXPERT IN THEIR FIELD.



The resultant academic and public quarrels concerned the scholarly merit of humanistic commentary about the physical sciences; the influence of postmodern philosophy on social disciplines in general; academic ethics, including whether Sokal was wrong to deceive the editors and readers of *Social Text*; and whether the journal had exercised appropriate intellectual rigor before publishing the pseudoscientific article.

# Content of the article

"Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity" proposed that quantum gravity has progressive political implications, and that the "morphogenetic field" could be a cutting-edge theory of quantum gravity (a morphogenetic field is a concept proposed by Rupert Sheldrake that Sokal characterized in the affair's aftermath as "a bizarre New Age idea"). Sokal wrote that the concept of "an external world whose properties are independent of any individual human being" was "dogma imposed by the long post-Enlightenment hegemony over the Western intellectual outlook".

# A few quotes

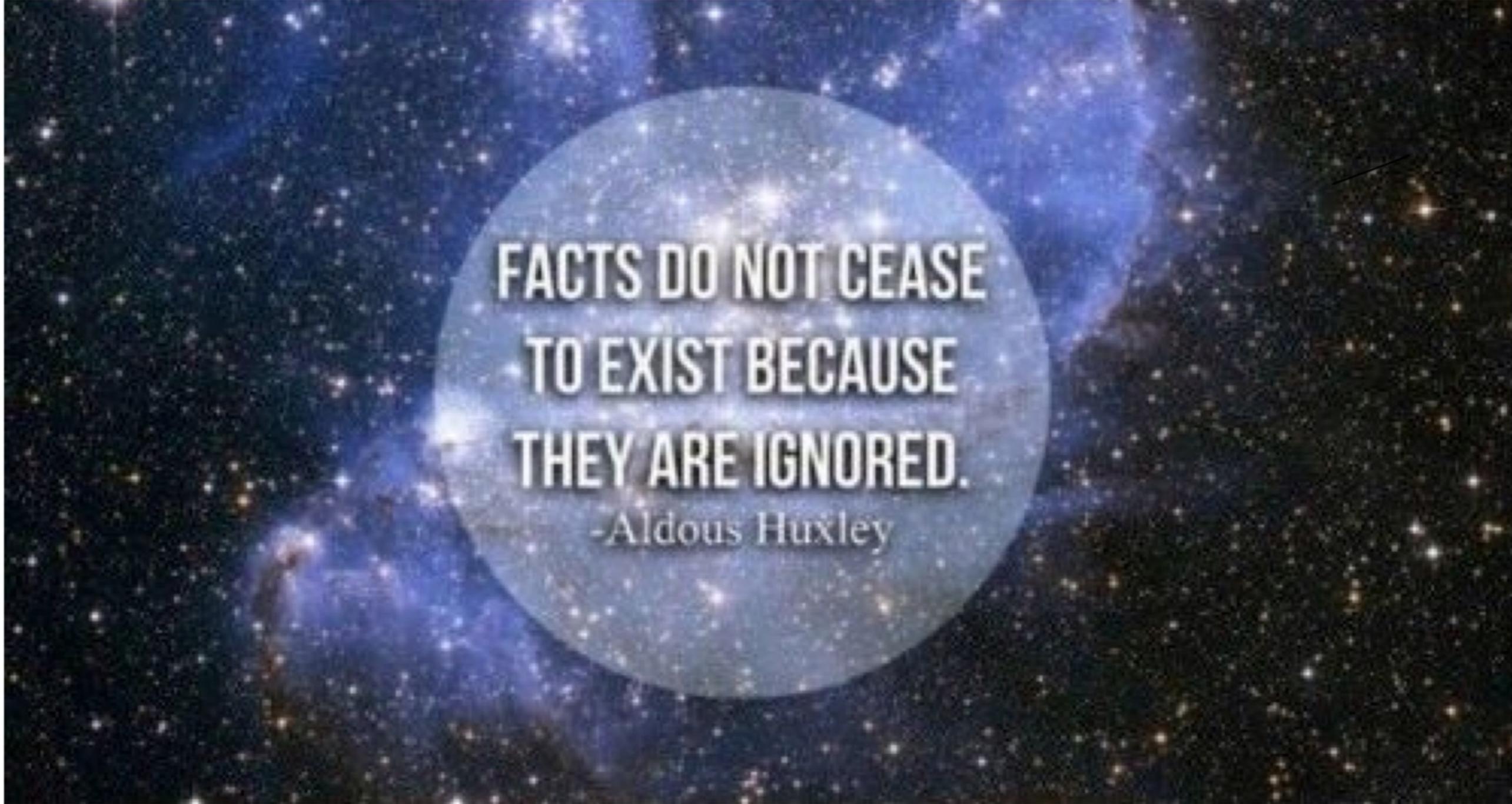
In the article, there were quotes from famous postmodernists regarding science:

- *The Einsteinian constant is not a constant, is not a center. It is the very concept of variability -- it is, finally, the concept of the game. In other words, it is not the concept of something -- of a center starting from which an observer could master the field -- but the very concept of the game ...*

- *This diagram [the Möbius strip] can be considered the basis of a sort of essential inscription at the origin, in the knot which constitutes the subject. This goes much further than you may think at first, because you can search for the sort of surface able to receive such inscriptions. You can perhaps see that the sphere, that old symbol for totality, is unsuitable. A torus, a Klein bottle, a cross-cut surface, are able to receive such a cut. And this diversity is very important as it explains many things about the structure of mental disease. If one can symbolize the subject by this fundamental cut, in the same way one can show that a cut on a torus corresponds to the neurotic subject, and on a cross-cut surface to another sort of mental disease.*

- *... natural objects are also socially constructed. It is not a question of whether these natural objects, or, to be more precise, the objects of natural scientific knowledge, exist independently of the act of knowing. This question is answered by the assumption of "real" time as opposed to the presupposition, common among neo-Kantians, that time always has a referent, that temporality is therefore a relative, not an unconditioned, category. Surely, the earth evolved long before life on earth. The question is whether objects of natural scientific knowledge are constituted outside the social field. If this is possible, we can assume that science or art may develop procedures that effectively neutralize the effects emanating from the means by which we produce knowledge/art. Performance art may be such an attempt.*

# Some Final Words

A quote by Aldous Huxley is centered on a circular, semi-transparent blue overlay. The background is a deep space image featuring a dense field of stars and a prominent blue nebula or galaxy structure. The text is white and bold, with a slight drop shadow for readability.

**FACTS DO NOT CEASE  
TO EXIST BECAUSE  
THEY ARE IGNORED.**  
-Aldous Huxley