MUNI
ECON

FILOSOFIE VĚDY

HLAVNÍ OTÁZKA

Co je věda?

- Jak vymezit vědu?
- Zajišťuje nám věda lepší zpsůoby poznání?
- Jaké je postup vědeckého poznání?
- ...

ÚVOD

The Needs for Demarcation

cf. Pigliucci and Boudry (2013), . . .

- practical
  - policy
    ex.: funding of institutions, procedures,. . .
  - education
    ex.: creationism / intelligent design & evolution theory
  - health care
    ex.: stem cells
  - justice (expert testimonies)
    ex.: pyramid razor sharpener
  - . . .
- theoretical
  - material starting points
  - epistemological warrant
  - . . .

preliminary questions

What do we want to demarcate?

- science
- branches of science
- good science
- bad science
- pseudo-science
- unscience
- parascience
- various types of systems of beliefs
- non-science
- …

What do we want to achieve?

- description
- prescription

What should we take under consideration?

- theories
- systems of propositions
- people
- practices
- …

Is demarcation universal?

- time/history
- domains/fields/branches
- universal

Is demarcation fixed?

- once a science/non-science, always a sciences/non-science
- a science/non-science can turn out to be a non-science/science
- a science can turn out to be a non-science
- a non-science can turn out to be a science

How can this be done?

- examination of theories
- empirical examination
- ...

KARL RAIMUND POPPER

introduction

domains of interest

Popper (2014: 34)

- Marx's theory of history
- Freud's psychoanalysis
- Adler's individual psychology
- Einstein's theory of relativity

"It began to dawn on me that this apparent strength was in fact their weakness."

problems of induction

two problems of induction

Popper (2005)

- psychological
  - Why do We Believe …
- logical
  - logical form
  - justification of induction

forms of theories

forms of statements

Popper (2005)

- singular statements
  - individual concept
- universal statements
  - numerically universal statements
  - strictly universal statements

forms of statements

Popper (2005)

- exitential statements
- non-existence statements

forms of theories

Popper (2005)

rigorous axiomatized system

- consistency
  - epistemological usefulness
- prohibiton
  - possibility of falsification

Fries's Trilemma

Popper (2005)

- psychologism
- infinite regress
- dogmatism

- version of dogmatism
  - no firm base
- observability

falsifiability

components

- theory
- initial conditions
- basic statements

problems & critique

problems & critique

- immunizations
- determination of theories
- missing empirical base
- not corresponding to scientiffic practise
  - Thick Skin Problem

Thick Skin of Scientists

Lakatos (1978: 5–4)

"Scientists have thick skins. They do not abandon a theory merely because facts contradict it. They normally either invent some rescue hypothesis to explain what they then call a mere anomaly or, if they cannot explain the anomaly, they ignore it, and direct their attention to other problems. Note that scientists talk about anomalies, recalcitrant instances, not refutations."

THOMAS SAMUEL KUHN

revolutions 1st edition

The Structure of Scientific Revolutions (1st edition)

Kuhn (1962)

- pre-paradigm period
- period of normal science
  - cumulative proces
  - dogmas
- period of non-normal science
  - period of extraordinary science
  - period of scientific revolution

critique of a paradigm

The Nature of a paradigm

Masterman (1970)

- metaparadigms
- sociological paradigms
- artefact/construct paradigms

The Structure of Scientific Revolutions

Shapere (1964)

- “paradigms cannot, in general, be formulated adequately”
- “cannot be described adequately in words“

revolutions 2nd edition

The Structure of Scientific Revolutions (other editions)

Kuhn (2012)

- symbolic generalizations
- models
- values
- exemplars
- ...

critique of a disciplinary matrix

Critique of the Paradigm Concept

Shapere (1971)

- We are unusre what is content of disciplinary matrix.

IMRE LAKATOS

types of falsification

- Naïve
  - dogmatic
    - firm empirical base
  - metodological
    - conventional empirical base
    - passivists vs. activist
- Sophisticated
  - rules of falsification or elimination
  - rules of acceptance

research programmes

Structure of Research Programmes

Sophisticated Falsification

Lakatos (1978: 116)

„For the sophisticated falsificationist a scientific theory T is falsified if and only if another theory T' has been proposed with the following characteristics: (I) T' has excess empirical content over T: that is, it predicts novel facts, that is, facts improbable in the light of, or even forbidden, by T;3 (2) T' explains the previous success of T, that is, all the unrefuted content of T is included (within the limits of observational error) in the content of T'; and (3) some of the excess content of T' is corroborated."

THE DEMISE

The Demise of the Demarcation Problem

Laudan (1983)

"[…] we ought to drop terms like 'pseudo-science' and 'unscientific' from our vocabulary; they are just hollow phrases which do only emotive work for us."

"[…] The 'scientific' status of those claims is altogether irrelevant."

GOOD SCIENCE

Merton

Institutional Imperatives

Merton (1973)

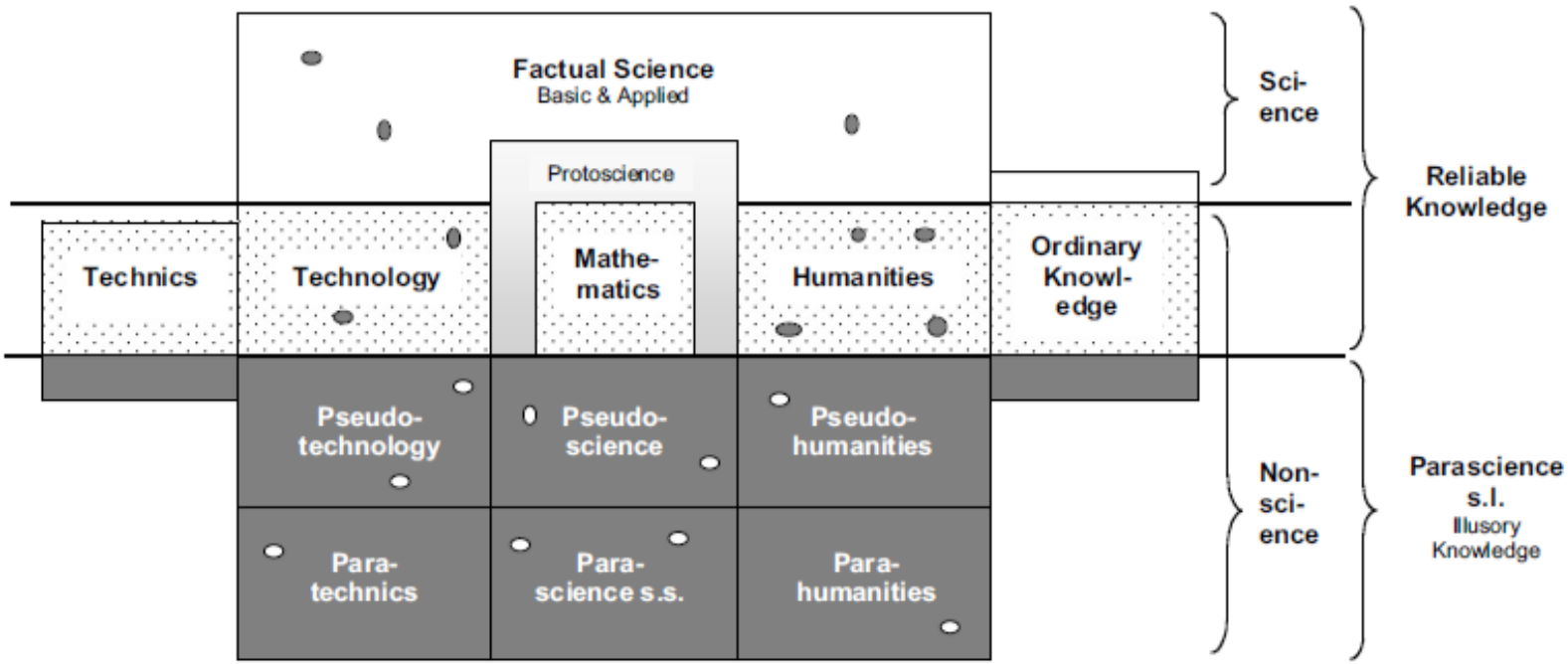
- Universalism
- “Communism”
- Disinterestedness
- Organized skepticism

EPISTEMIC FIELDS

Bunge & Mahner

Structure of Epistemic Fields

Mahner (2007: 549)



Structure of Epistemic Fields

Mahner (2007)

1. Community C: the group or community C of knowers or knowledge seekers
2. Society S: the society S hosting the activities of C
3. Domain D: the domain or universe of discourse D of the members of C, i.e., the collection of factual or fictional objects the members of C refer to in their discourse
4. Philosophical background or general outlook G:
   (a) Ontological assumptions
   (b) Epistemological assumptions
   (c) Methodological principles
   (d) Semantic assumptions
   (e) Axiological and moral assumptions
      - Logical values
      - Semantical values
      - Methodological values
      - Attitudinal- and moral values
5. The formal background F: a collection of logical or mathematical assumptions or theories taken for granted in the process of inquiry

Structure of Epistemic Fields

Mahner (2007)

6. The specific background knowledge B:
   a collection of knowledge items (statements, procedures, methods, etc.) borrowed from other epistemic fields
7. The problematics P:
   the collection of problems concerning the nature, value or use of the members of D, as well as problems concerning other components listed here, such as G or F
8. The fund of knowledge K: the collection of knowledge items (propositions, theories, procedures, etc.) obtained by the previous and current members of C in the course of their cognitive activities
9. The aims A:
   the cognitive, practical or moral goals of the members of C in the pursuit of their specific activities
10. The methodics M:
    the collection of general and specific methods (or techniques) used by the members of C in their inquiry of the members of D

Structure of Epistemic Fields

Mahner (2007)

11. The systemicity condition:
    There is at least one other field of research S' such that S and S' share some items in G, F, B, K, A and M; and either the domain D of one of the two fields S and S' is included in that of the other, or each member of the domain of one of the fields is a component of a system in the domain of the other.
12. The changeability or progressiveness condition:
    The membership of the conditions 5–10 changes, however slowly and meanderingly at times, as a result of research in the same field or as a result of research in neighboring disciplines.

BAD AND PSEUDO-SCIENCE

Derksen

Pseudo-Scientists

Derksen (1993, 2001)

“profile of the pseudo-sciences can be gained
from the scientific pretensions of the pseudo-scientist”

a epistemic-social-psychological profile

The Seven Sins

Derksen (1993, 2001)

- Dearth of Decent Evidence
  - pretence to producing reliable knowledge, obtained via trustworthy methods
- Unfounded Immunizations
  - accepting only particular interpretations of the data
- Ur-Tenptations
  - uncritically assigning a deeper significance to prima facie spectacular coincidences
- Magic Methods
- Insights of Innatates
  - Only the initiate has the right perspective on the truth.
- All-Explaining Theories
- Uncritical and Excessive Pretensions

immunizations

Immunizing Strategies and Epistemic Defense Mechanisms

Boudry and Braeckman (2011: 146)

"We define an 'immunizing strategy' as an argument brought forward in support of a belief system, though independent from that belief system, which makes it more or less invulnerable to rational argumentation and/or empirical evidence. By contrast, an epistemic 'defense mechanism' is defined as an internal structural feature of a belief system, which has the same effect of deflecting rational arguments and empirical refutations."

Immunizing Strategies and Epistemic Defense Mechanisms

Boudry and Braeckman (2011: 146)

- Conceptual Equivocations & Moving Targets
  - Multiple Endpoints
  - Deflationary Revisions
- Postdiction and Feedback Loops
- Conspiracy Thinking
  - Turning the Evidence on its Head
  - Explaining the Motives for Disbelief
- Changing the Rules of Play
- Invisible Escape Clauses
  - Tailoring Around the Phenomena

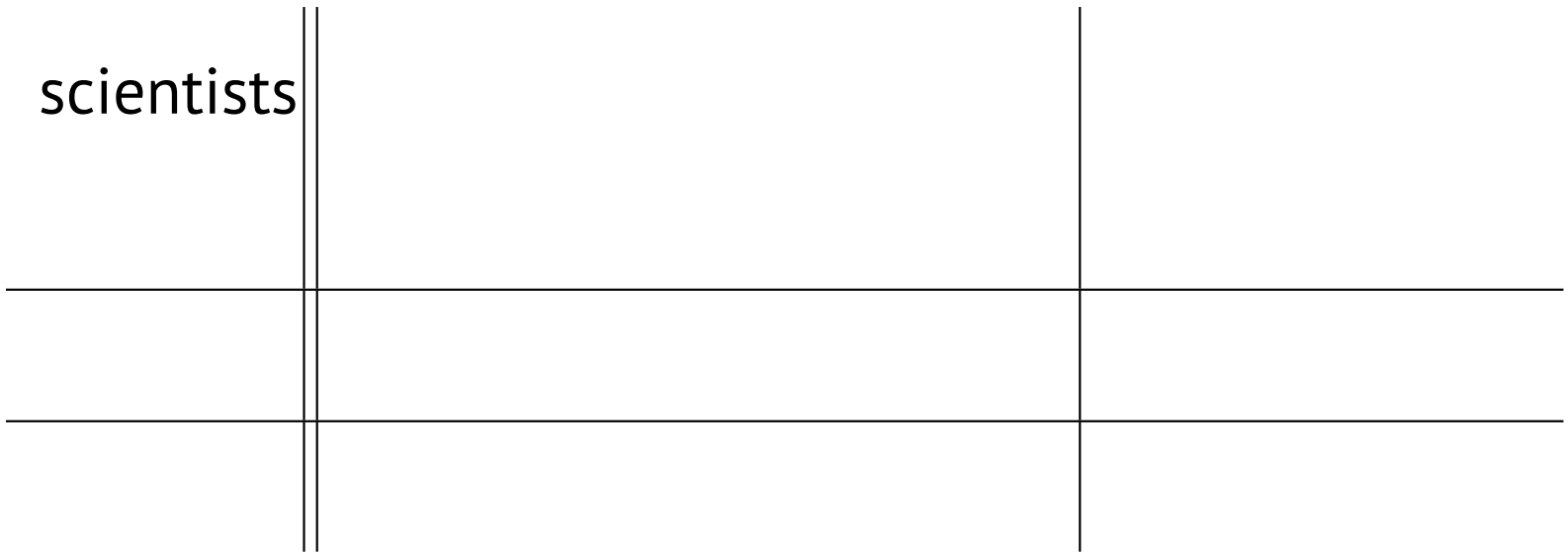
SCIENTIFIC MISCONDUCTS

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)



How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	

How Many Scientists Fabricate and Falsify Research?

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scientists	fabrication, falsification or modification of data or results	
admitted		

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	
admitted	1.97%	

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	other questionable research practices
admitted	1.97%	

How Many Scientists Fabricate and Falsify Research?

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scientists	fabrication, falsification or modification of data or results	other questionable research practices
admitted	1.97%	33.7%

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	other questionable research practices
admitted	1.97%	33.7%
know of		

How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	other questionable research practices
admitted	1.97%	33.7%
know of	14.12%	

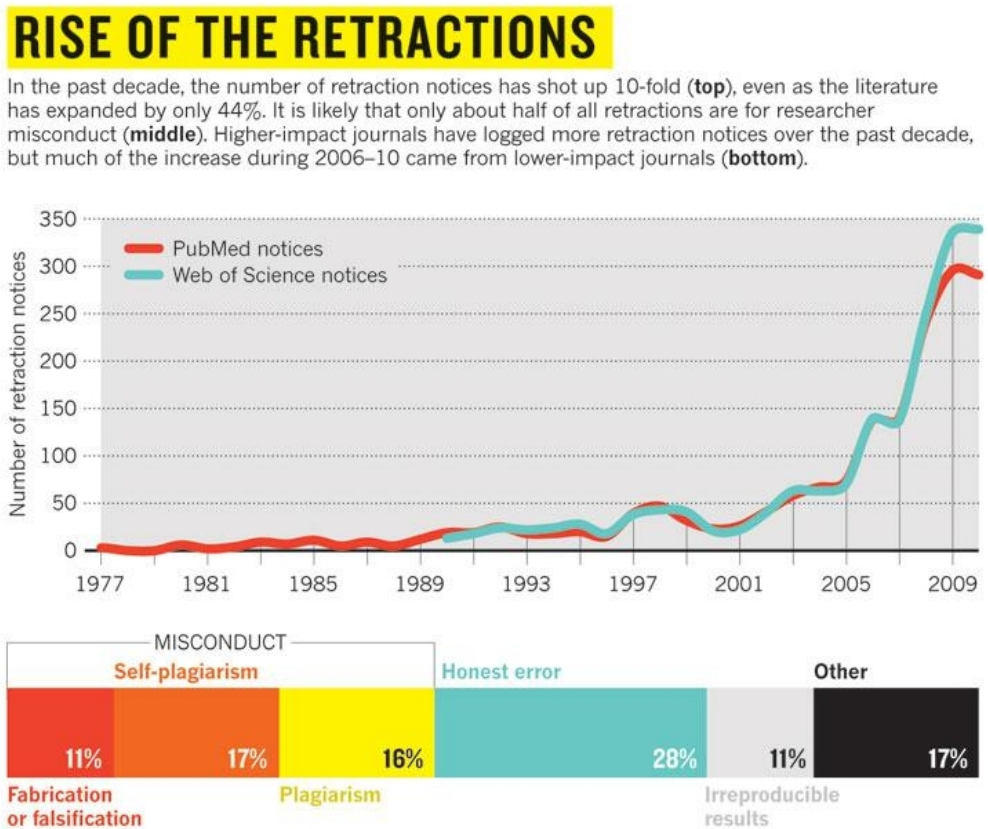
How Many Scientists Fabricate and Falsify Research?

Fanelli (2009)

scientists	fabrication, falsification or modification of data or results	other questionable research practices
admitted	1.97%	33.7%
know of	14.12%	72%

The trouble with retractions

Van Noorden (2011: 27)



sorts & types

Misbehaviours of Various Kinds

Fanelli (2011: 85)

Table 1

country	year	institution	fabrication and/or falsification and plagiarism	open definition	selective reporting	ghost-guest authorship	misuse of statistics	misrepresenting others' research	sabotaging others' research	biased interpretation of results	mismanaging conflicts of interest	duplicate publication	not following approved protocols	mismanaging/not preserving data	misrepresenting professional credentials	favouring misc./hampering investigations	abusing power as a peer reviewer	withholding information or materials	financial misconduct	personal abuse	bad mentorship	harming human or animal subjects	exploiting students or subordinates	other	source
AU	2007	NHMRC et al.	x	x		x					x		x			x			x			x			[29]
CN	2009	CAS	x	x		x			x			x						x	x					x	[30]
CR	2007	CESHE	x		x	x		x	x	x	x	x												x	[31]
DK	2009	DCSD	x	x	x		x			x														x	[27]
FI	2002	TENK	x	x	x		x	x	x	x		x		x										x	[21]
FR	1999	INSERM	x			x					x			x							x			x	[32]
IN	2006	ICMR	x		x	x		x			x	x					x							x	[33]
NL	2001	KNAW et al.	x	x	x	x	x	x		x			x		x					x				x	[34]
NO	2007	NCISM	x	x																					[35]
SW	2004	EGISRM	x	x	x		x																	x	[36]
CH	2003	SAAS	x	x	x	x	x	x	x	x				x		x	x	x						x	[37]
UK	2009	UKRIO	x	x		x							x												[38]
US	2005	PHS	x		x																				[17]

Sorts and Types of Misconducts

National Science Foundation (2002)

- Ethical Misconducts
  - Violations of ethical code.
- Research Misconducts
  - "*Research misconduct* means fabrication, falsification, or plagiarism in proposing or performing research [...], reviewing research proposals [...], or in reporting research results [...]"

National Science Foundation (2002)

- Plagiarism
  - “means the appropriation of another person’s ideas, processes, results or words without giving appropriate credit”.
- Fabrication
  - “means making up data or results and recording or reporting them”.
- Falsification
  - “means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record”.

practical characterization

National Science Foundation (2002)

A finding of research misconduct requires that—

1. There be a significant departure from accepted practices of the relevant research community; and
2. The research misconduct be committed intentionally, or knowingly, or recklessly; and
3. The allegation be proven by a preponderance of evidence.

(b) Research misconduct does not include honest error or differences
of opinion.

Main Characteristics

- a methodology or a code

- an intentionality
- a knowingness
- a recklessness

- a preponderance of evidence

problems

Problems of Distinction: Questions

- What is the relation between ethical misconducts and scientific misconducts?
  - Is any ethical misconduct a scientific misconduct?
  - Is any scientific misconduct an ethical misconduct?
- How to distinguish sceintific misconducts and honest errors?

Problem of Violatting a Methodology or a Code of Conducting

- The Tuskegee Syphilis Study
- The Monster Study
- Unit 731

- introspection

- Dr. Roger Poisson

Problem of Intention

- Schön scandal

Problem of Knowledge of Consequences

- Little Albert experiment
- Milgram Experiment
- Stanford Prison Experiment

The Myth of Self-Correction in Science

Stroebe, Postmes, and Spears (2012)

Fraud Detectors	Reducing the Risks
peer reviews	rewards
replications	cost
whistleblowing	chance of discovery

conclusion

Problems of Distinction: Answers

- What is the relation between ethical misconducts and scientific misconducts?
  - Is any ethical misconduct a scientific misconduct?
  - Is any scientific misconduct an ethical misconduct?
  - Any scientific misconduct can be seen as an ethical misconduct but not vice versa.
  - Be aware of The Moralistic Fallacy (Davis, 1978).
- How to distinguish sceintific misconducts and honest errors?
  - The only difference between scientific misconduct and honest errors is an intention.

New Definitions of Scientific Misconduct

Fanelli (2013)

- scientific misconduct as distorted reporting

“any omission or misrepresentation of the information necessary and sufficient to evaluate the validity and significance of research, at the level appropriate to the context in which the research is communicated”.

- no difference between honest errors and scientific misconducts

SCIENCTIFIC PUBLISHING

problems

Some Problems

- decreasing credibility
  - too much science
- predators
  - predatory publishers
  - predatory conference

decreasing credibility

Pop-science

- increasing number of pseudo-scientific claims, papers, shows...
  - Dr. Oz
- misreporting of scientific results, researches...
  - Could sniffing flatulence be GOOD for you?
    Potent gas can help prevent cancer, strokes and heart attacks, claim scientists
    (Mail Online 2014-07-11)
  - Study: Smelling farts may be good for your health
    (The Week 2014-07-11)
  - Silent, not deadly; how farts cure diseases
    (The Guardian 2014-07-11)
  - Farts can fight strokes, heart attacks and dementia, scientists claim
    (The Mirror 2015-11-08)

Biased Researches

- funding
- sustainability
- ...

Poor Orientation & Biased Knowledge

- Rosling (2016): The Ignorance Project
- Project Implicit (2016): Project Implicit
- Moralistic Fallacy
  - Gould (1996):
    The mismeasure of man
  - Rushton and Jensen (2005):
    Wanted: More race realism, less moralistic fallacy
- ...

predators

Beall's list

List of potential, possible, or probable predatory scholarly open-access publishers.

Criteria (Beall, 2015):

- Editor and Staff
- Business management
- Integrity
- Other
- Poor journal standards / practice

Beall (2016)

Publishers	
Year	Number of publishers
2011	18
2012	23
2013	225
2014	477
2015	693
2016	923

Testing

- absurd, meaningless texts
  - Sokal (1996):
    Transgressing the Boundaries:
    Towards a Transformative Hermeneutics of Quantum Gravity
    “The content and methodology of postmodern science thus provide powerful intellectual support for the progressive political project, understood in its broadest sense: the transgressing of boundaries, the breaking down of barriers, the radical democratization of all aspects of social, economic, political and cultural life. Conversely, one part of this project must involve the construction of a new and truly progressive science that can serve the needs of such a democratized society-to-be.”
    (Sokal, 1996: 11)
- automaticly generated texts
  - PDOS research group (2016): An Automatic CS Paper Generator

Pseudo-scientists

(cf. Derksen (1993, 2001))

“profile of the pseudo-sciences can be gained from the scientific pretensions of the pseudo-scientist” Derksen (1993)
a epistemic-social-psychological profile.5

Pseudo-scientists

(cf. Derksen (1993, 2001))

- Dearth of Decent Evidence

SHRNUTÍ A ZÁVĚR

Co si odnést?

Teorie potřebuje praxi.

důležité pojmy a koncepty I

POJMY A KONCEPTY

- dělení vědy
- problém indukce
- povaha tvrzení
  - existenciální, non-existenciální
  - singulární, universální
- empirická báze
- Friesovo trilema
- verifikace
- falsifikace
  - naivní, metodologická
- asymetrie verifikace a falsifikace
- ad-hoc hypotézy

důležité pojmy a koncepty II

- paradigma / disciplinární matice
- vědecká období
  - předparadigmatické období
  - období normální vědy
  - období ne-normální vědy
- výzkumný program
  - degenerativní a progresivní
  - tvrdé jádro, ochranný pás, heuristiky
- demarkace vědy
  - falsifikovatelnost
  - řešení hádanek
  - výzkumné programy

důležité pojmy a koncepty III

PROBLÉMY

- Jak lze rozlišit vědu a ne-vědu?
- Proč potřebujeme vědu?
- K čemu vede asymetrie mezi verifikací a falsifikací?

Frauds in Philosophy?

fauxphilnews (2012)

“Saul Kripke resigned yesterday from his position [...] a team of philosophers from Oxford University [...] were systematically unable to reproduce the results of thought experiments reported by Kripke in his groundbreaking Naming and Necessity. The team, led by Timothy Williamson, first became suspicious of Naming and Necessity after preliminary results raised questions about related work by Hilary Putnam. While the group was initially unable to confirm that water is H2O on Twin Earth, the results turned out to be due to contaminated research materials—one of the researchers’ minds had been contaminated by Chomskyan internalist semantics.”

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