

Master's program in
Statistics and Data
Mining

*Linköpings
Universitet*

Philosophy of Science

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The Structure of the Course

- 4 x lectures
- 1 x Obligatory discussion seminar analysing a research paper
 » *Make up for missed seminar by submitting written answers to discussion questions*
- Examination: Home examination
 - 6 essay style questions requiring answers of approximately 1-1,5 pages each.



Content

- What is philosophy of science?
- **Core concepts:** truth, knowledge, realism vs. anti-realism, empiricism vs. Rationalism, justification, induction, deduction, abduction, objective reality, the subjectivity of experience, preunderstanding, theory dependence of observation...
- **Methods of thought:** hypothetical-deductive method, analytic method,
- **Philosophical views about science:** positivism, falsificationism, theory of paradigms (hermeneutic)
- Differences between the natural and human sciences



What is Philosophy of Science?

- | | |
|--|--|
| <p>□ Medicine studies the body to know how it works</p> <ul style="list-style-type: none"> ▫ Does not study logical fallacies, how observations are dependent on theory/prejudice, or what knowledge is ▫ It takes such things for granted | <p>□ Philosophers of science study science</p> <ul style="list-style-type: none"> ▫ Fallacies in argument ▫ Sources of bias ▫ What is knowledge, objectivity, truth, validity, reliability? |
| <p>▫ They want to know how to stay healthy or to heal the sick</p> | <p>▫ They want to know the best way to conduct science</p> |



Two Different Approaches

Naturalism/A Posteriori

- Look for common denominators among the things we identify as “science”
- Take into account the practical obstacles that the sciences face
- Take into account metaphysical views about the constitution of reality
- Investigation into the nature of science understood as a this-worldly-and-largely-human-enterprise

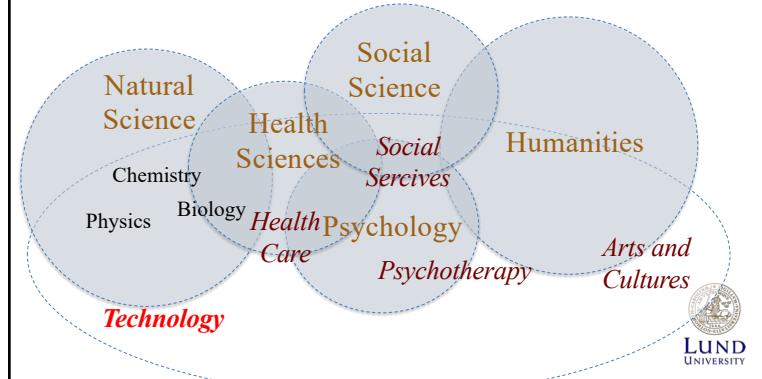
A Priori approach

- What is the concept of ‘science’ / ‘knowledge’ / ‘truth’
 - Induction and deduction ?
 - Mathematics ?
- Investigation into the content of concepts that exist independently of any human activity
 - Science will have to adapt



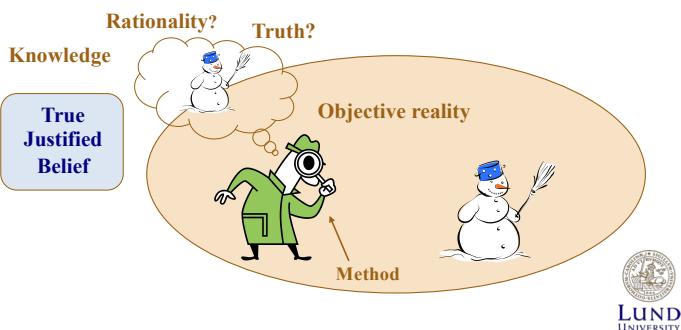
A Comment on “Science”

The Sciences | Vetenskap | Wissenschaft



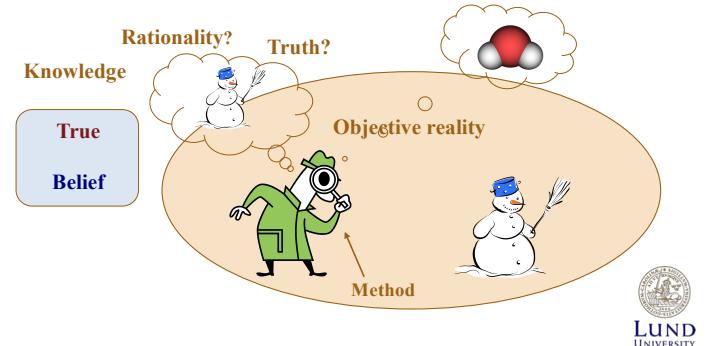
What is Science?

To find out what the world is really like, in a systematic and self-critical manner



Truth?

Correspondence between the content of belief and whatever feature of the world that the belief is about



Rival Theories of Truth

Consensus theory:
"Truth is what we have
agreed is true!"

Pragmatism:
Ideas are true if they work
(give correct predictions)

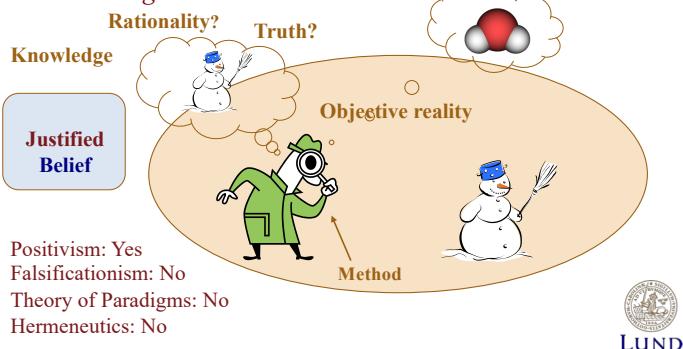
Coherence Theory:
An idea is true if it is consistent
with our established world view

Relativism:
There is no truth



Justified?

*Is there any way we can become sure beyond any doubt
that something is true?*



True vs. Believed to be True

- *True¹* — "corresponds to reality"
 - An ontological status (what kind of phenomenon it is)

- *True²* — "something we know corresponds to reality"
 - Epistemic status (How we know P is true¹)

- Truths¹: Beliefs that correspond to reality

- Truths²: Beliefs known/proven to be True¹
 - Because they give correct predictions (they work)
 - Because they are coherent with our world view

*But this is
knowledge; not
truth*

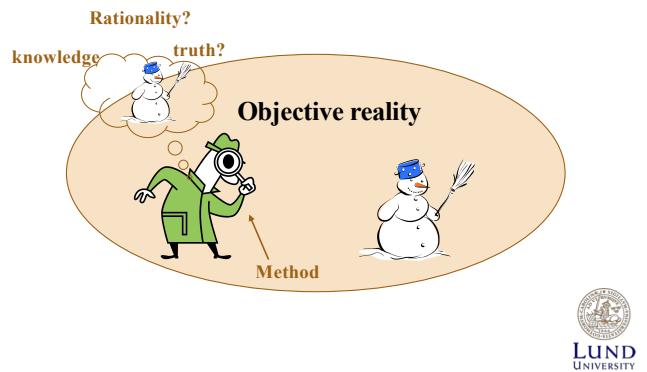


Knowledge

- Techne—craftsmanship, know-how
- Episteme—true justified belief, knowing-that
 - Doxa—popular opinion
- Phronesis—judgement



What We Study: Objective Reality?



The Phenomena We Study

- Physical matter + properties
- Organisms + functions
- Consciousness and their contents
- Social interactions and behaviour
- Language and concepts
- Societies
- Intelligence

Natural Sciences

Human Sciences



But What is Objective Reality?

Basic idea ≈ the world as it is in itself

1. That which exists independently of minds

Only includes the physical objects around us

2. That which exists independently of what we believe exists

Also includes minds and their contents, therefore also social phenomena

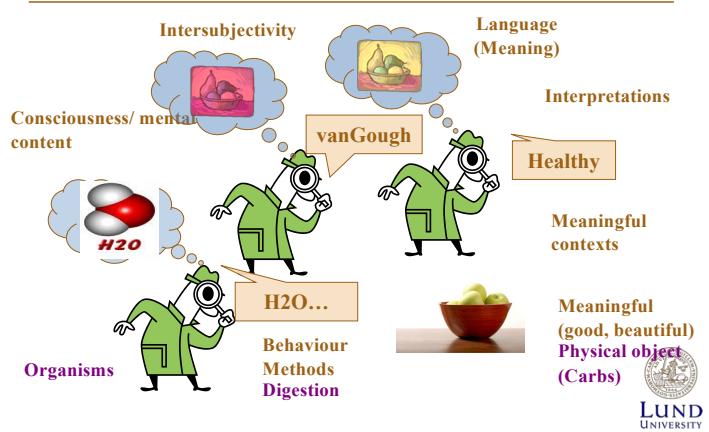


Two Meanings of “Objective”

- Objectively real (real existence)
 - The world as it is in itself independently of our attempts to conceive of it and measure it.
 - » NOT: "the world as we objectively think of it"
 - » NOT: "the world as we measure it"
- Objective knowledge/truth (ideas about reality)
 - See things as they really are
 - Unaffected by prejudice/bias
 - » Only rely on measurements?



The Complicated Reality



Social Constructions: What are They?

- Created by human activity
- Could have remained uncreated
- Could have been made differently
- Something else could have been made

Artefacts: made by humans in a social context

Concepts: made by humans in a social context



Types of Social Constructions

- Generic construction
 - A product of a conscious or subconscious social activity
- Discursive construction
 - Objects who are what they are because of how we talk and think about them
- Pragmatic construction
 - Conceptual categories whose use is determined by social factors

Courts of law,
families

particular
individuals

"feminine"
"Cool"



Weak vs. Strong Constructions

- *Weak social construction* – if the use of the word denoting the construction is partly determined by social factors and yet refers to some non-social fact

The Holocaust, Quarks, Charles, and Diana

- *Strong social construction* – if its use is entirely determined by social factors and does not refer to any non-social fact

"feminine", "manly", "Cool"



Hidden Mechanisms

- Bacteria causing diseases
- Why different materials have different properties depending on their chemical composition
- Biological urges that govern behaviour
- Conscious processes (thinking, feeling)
- Unconscious processes (phobias, compulsions, memory)
- Social processes (conformism, hierarchies of power)



Appearance and Reality

Secondary properties

Produced by the brain,
not quantifiable,
–Colours
–Tastes
–Values(bad/good)
–Attitudes

The world as it appears to us

Primary properties

In the things themselves,
quantifiable
–Mass
–Energy
–lactate levels
–Temperature

