

Natural vs. Human Science

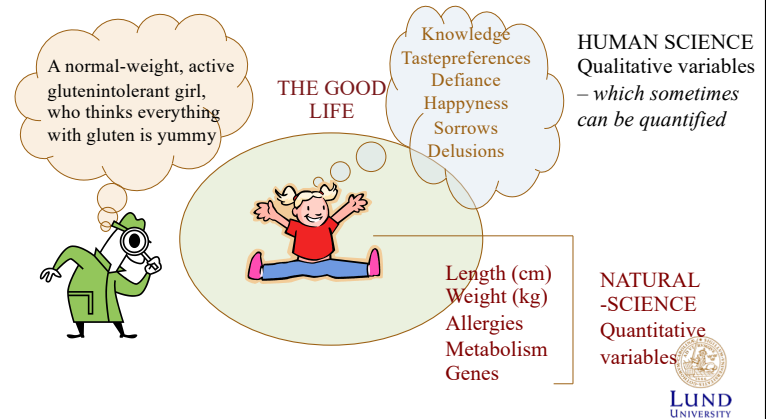
- Natural science studies non-conscious nature; it abides by laws of nature and therefore is fully predictable

The study of a single grain of salt can be generalised to all salt in the universe

- Human science studies conscious nature; it does not obviously abide by laws of nature and therefore isn't predictable

Study of a single human cannot be generalised to all humans

Medical Science



Choosing a Method

- Objectively measurable variables
 - Variables which the subject cannot report (lactate levels)
 - Variables which the subject can report (weight, number of visits)
- Subjectively experienced variables
 - Sensory impressions (pain)
 - Complicated cognitive wholes (sense of stigmatisation)

Technical equipment

Questionnaires

Interviews

Methods

Human Science vs. Natural Science

Qualitative

- Participant observation
- Interviews
- Text analysis
- Discourse analysis

Quantitative

- Field-observations
- Surveys

Physiological Measurements

- Oxygen uptake
- Temperature
- Weighing

Measuring qualitative variables
(which are represented numerically in quantitative studies)

You can ask about physiological variables – but only if you know the subject has made a physiological measurement

Hypothetico–Deductive Method

Semmelweis and the Puerpural fever epidemic in Vienna 1844

Ward 1:
Mortality 10%

Why the
difference? \Rightarrow

Ward 2:
Mortality 2%

1. cosmic telluric disturbances in the atmosphere?
2. Ward 1 overcrowded?
3. Bad food?
4. Bad care?
5. Rough examinations?
6. Priest scares patients to death?
7. Wrong labour position?
8. Corpse-stuff?



Elementary, dear Watson

Premise 1: logical inference

If mortality is due to
poisonous air \longrightarrow Everyone should
suffer equally that
breathe same air

Premise 2: observation

We observe that everyone does not
suffer equally

Conclusion

Mortality is not due to poisonous air



The Logical form of the Argument

If P is true then Q

Q is not the case

Therefore P is false



Hypothetico-deductive method

If mortality due to
corpse-stuff \longrightarrow Then mortality should
decrease if stuff is removed

Test: wash hands with
chloride of lime

Mortality decreases

Mortality is caused by corpse-stuff



Falsification vs. Verification

If P then Q
Not Q

Not P

Logically valid: Cannot deny conclusion without at the same time denying some premise too

If P then Q
Q

P

Logically invalid. Can deny conclusion without denying any premise
Q can be caused by something else than P



Validity in Logic

1. All humans are mortal
2. Sokrates is human
3. Sokrates is mortal

Valid: cannot deny conclusion without denying some premise

1. When a window is hit by a brick, it breaks
2. The window is broken
3. The window has been hit by a brick

Invalid: can deny conclusion without denying any premise



Importance of Controls

If everyone doing therapy gets well → Then the therapy is the cure

Test: evaluate the effects of therapy

60% get well

Therapy is the cure???

Not if 60% of those who didn't get therapy get well anyway!!



Danger of confounders

Confounder: an unknown cause that produces the same effect as they hypothetical cause, deceiving us into believing that the hypothesis works

If everyone who eats proteins get larger muscles → Then protein causes muscle growth

Test: monitor what happens to people eating protein

80% get larger muscles

Protein causes growth???

Not if the real cause is the training; training is the confounder



How Should We Conduct Science?

- Positivism
 - Knowledge by observation
- Falsificationism
 - Knowledge by excluding falsity
- Kuhn's Theory of Paradigms
 - Observations and falsifications are only judged to be valid in the context of a paradigm
- Hermeneutics
 - How to interpret meaningful contexts



Positivism

GENERALLY

- Pure reason does not give knowledge about the world
- Observation and controlled experiment can give knowledge about the world

Principle of verification: a claim is meaningless until its truth can be justified empirically



Positivistic Science

Naive positivism

1. Science starts with observation not guided by theory
2. General laws can be inductively inferred from a large base of data

Problem: induction is logically invalid

Sophisticated positivism

- Probabilistic laws can be inferred from a large base of data – they become our hypotheses
- Hypotheses can be further tested using the hypothetico-deductive method



Induction

Observation 1: Raven is black

Observation 2: Raven is black

Observation 3: Raven is black

...Observation 3.980.000: Raven is black

Conclusion: All Ravens are black – *Invalid*

Valid conclusion: All known occurrences of Ravens have been black

But this is not a general law nor does it explain why Ravens are black



Two Types of Inductive Inferences

Inference from the specific to the general.

1. This raven is black
 2. This raven is black
 3. This raven is black
 4. etcetera
-
- All ravens are black

Any inference in which conclusion is plausible but not necessary

- I saw my girlfriend kiss another man
-
- I think she is having an affair”

“allows hypotheses to emerge from patterns found in the data”???



Two Types ?

1. This raven is black
 2. This raven is black
 3. This raven is black
 4. ...
-
- Nature is Uniform
 - When you find a consistent pattern you may have found a uniformity
-
- All ravens are black

- I saw my girlfriend kiss another man
 - In our society it is a general rule that you only kiss those you are involved with
-
- I think she is having an affair”

Looks more like abduction/Inference to the best explanation



Maybe different after all

Attempt to infer what many observations say about population in light of background theory

1. This raven is black
 2. This raven is black
 3. This raven is black
 4. ...
-
- All ravens are black
 - Alt: 98% of the raven population is black

Attempt to explain particular observations in light of background theory

- I saw my girlfriend kiss another man
 - Social rule: it is a betrayal to kiss other than those you are involved with
-
- I think she is having an affair



The Problem with Positivism

1. The principle of verification cannot be empirically verified: *is it meaningless?*
2. Observation without hypothesis is impossible: all observation involves interpretation
3. Neither induction or deduction guarantees truth of conclusions
4. Difficult to find anything but correlations
5. We cannot objectively observe the content of ideas; nor intersubjectively



Observation: knowledge via senses

- Can we trust our senses?
- Are sensations free from interpretation/hypotheses
- Do we see what is there, or only what we expect to see?
- Can you learn to see more than you expect?

Observations are Theory-dependent

They presuppose a preunderstanding of the observed

1. Experiences do not arise like photos in a camera
2. Experiences are like advanced computer generated images where something has been added and something removed (subconsciously).
3. How much is added and/or removed depends on our preunderstanding
4. Without preunderstanding, no meaningful experience

Preunderstanding

- Understanding arises against the backdrop of certain preconditions
 - Preunderstanding–Gadamer
 - Paradigms–Kuhn
 - General backgroundstheories –Feyerabend
 - Horizon of expectations– Popper

Attention test

Watch

???



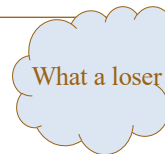
What's up ?



Qu'est ce?



What is going on? IV



That is an
Interesting
question

