Explanation and Understanding

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Aalto University, 27.2.2024

Overview

1. Description and explanation
2. The nature of explanation
3. DN-model and causal explanation
4. Mechanistic explanation
5. Understanding vrs. Causal explanation

What is the aim of research?

- Descriptions
  - Of things and happenings
- Predictions
  - How they will evolve
- Explanation
  - Answers why and how
- Manipulation for control
  - Francis Bacon: "knowledge is power"
- Classification
  - To see how things are connected and how they differ
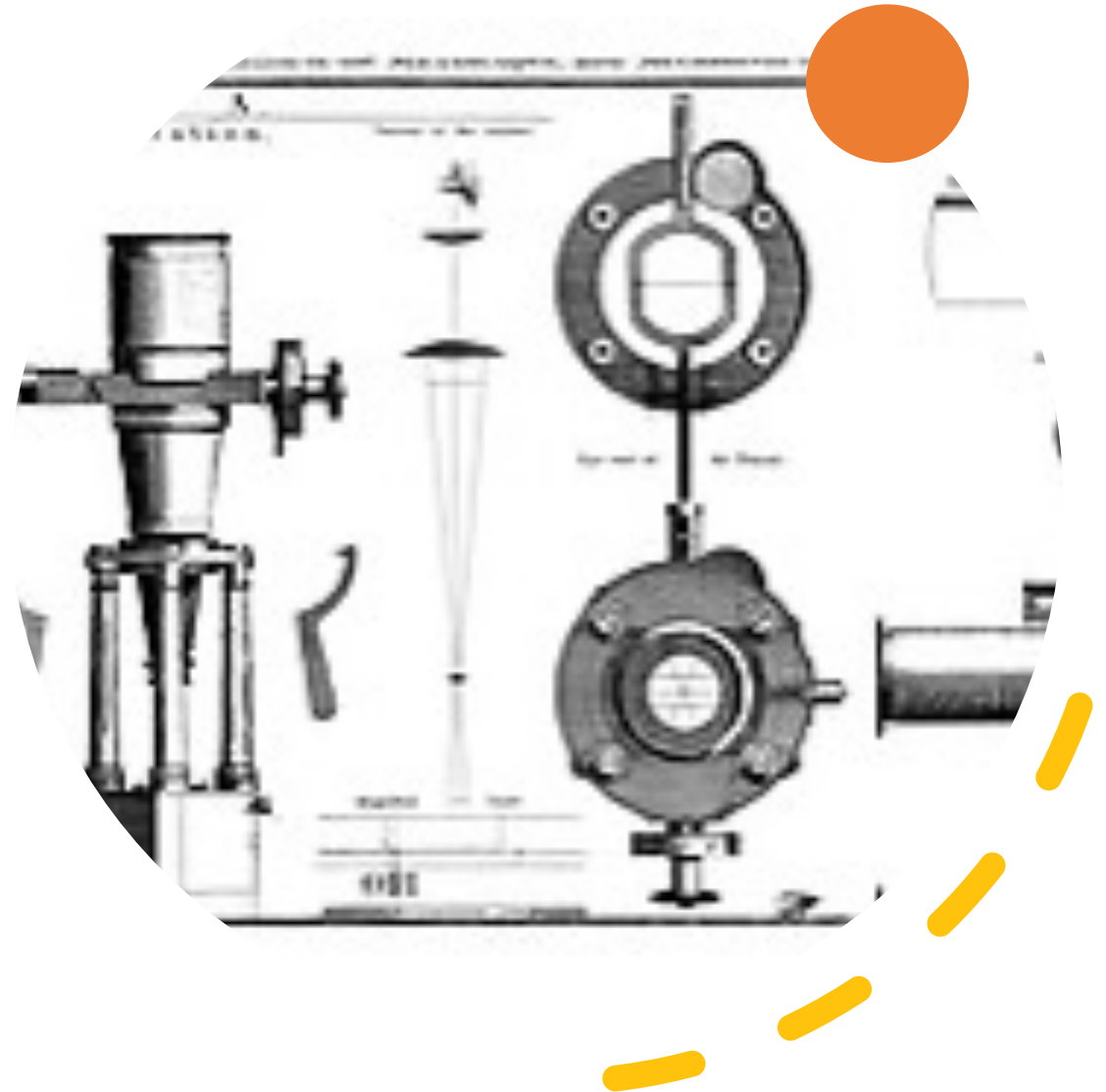
Description vs. Explanation

- Scientific research provides answers to different kinds of questions about the world

- **Descriptions** tell that something happens or is the case. They answer *what-, where-, when-, how much* –questions
    - What is the boiling point of water?
    - What was the voting percentage in the presidential election in Finland?
    - What are the symptoms of major depression?

- **Explanations** are answers to *why-* or *how-* questions
    - Why does water boil at 100C?
    - Why did the voting percentage go up from 2018 to 2024 election?
    - What causes and realizes the symptoms of major depression?

- "All major depression have these symptoms in common" does not answer why or how they have the symptoms in common

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Explanation

- Explanations are not mere descriptions of what is or what has happened, but rather why it is the way it is or what were the reasons for why it happened

- Explanation answer: *why x?*
    - An explanation would make *x understandable* if true

- Core questions:
    - What produces understanding in explanation?
    - How can we evaluate explanations?

Constructive structure of explanation

- When Willie Sutton was in prison, a priest who was trying to reform him asked him why he robbed banks. "Well," Sutton replied, "that's where the money is" (Garfinkel, 1981: 21).
- Why **Willie** robbs banks?
- Why did Willie **robb** banks?
- Why did Willie robb **banks?**

- Making the underlying contrastive explanations explanation explitic, the research question becames clearer and easier to answer
  - Why X rather than Y?
- Why **Willie rather than John** robbed banks?
- Why Willie robbed **banks rather than bookstores**?
- Why Willie **robbed banks rather than worked** at them?
- Why Willier **robbed banks rather than nothing**?

Discussion

- Could you make your research more precise with contrastive questions?

Logical empirists

- An exaplanation shows how a phenomenon (e.g. particular event) can be subsumed (is covered) under a general law or regulation

- Hempel and Oppenheim's (1948) deductive-nomological model

- "*Why* does the phenomenon occur?" is understood as "according to what *general laws*, and by virtue of what *antecedent conditions* does the phenomenon occur?"

Structure of scientific explanations

- To show that the explanandum (this that is being explained) it is to be expected and not surprising
- Premises must contain laws(s) of nature and initial conditions
- Initial conditions and the law logically (necessarily) entail the event

- C1,C2,…,Ck Particular circumstances
- L1,L2,…,Lγ   Laws of nature
- E   Phenonmenon to be explained

Explanans
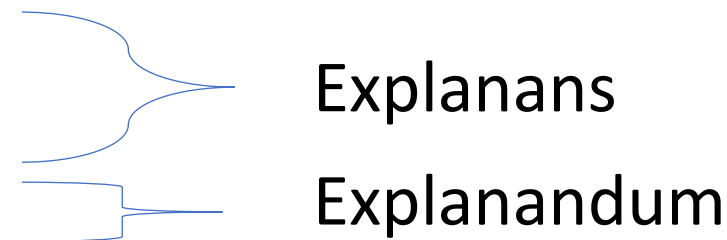
Explanandum

- "Why did the solar eclipse occur at time t?"

- C's: The mass, force, position, and velocity of Sun, Moon, and Earth etc. at time t
- L's: Newtonian mechanicst (or Einstein's)
- E: Solar eclipse

SUN

MOON

EARTH

Umbra

Penumbra

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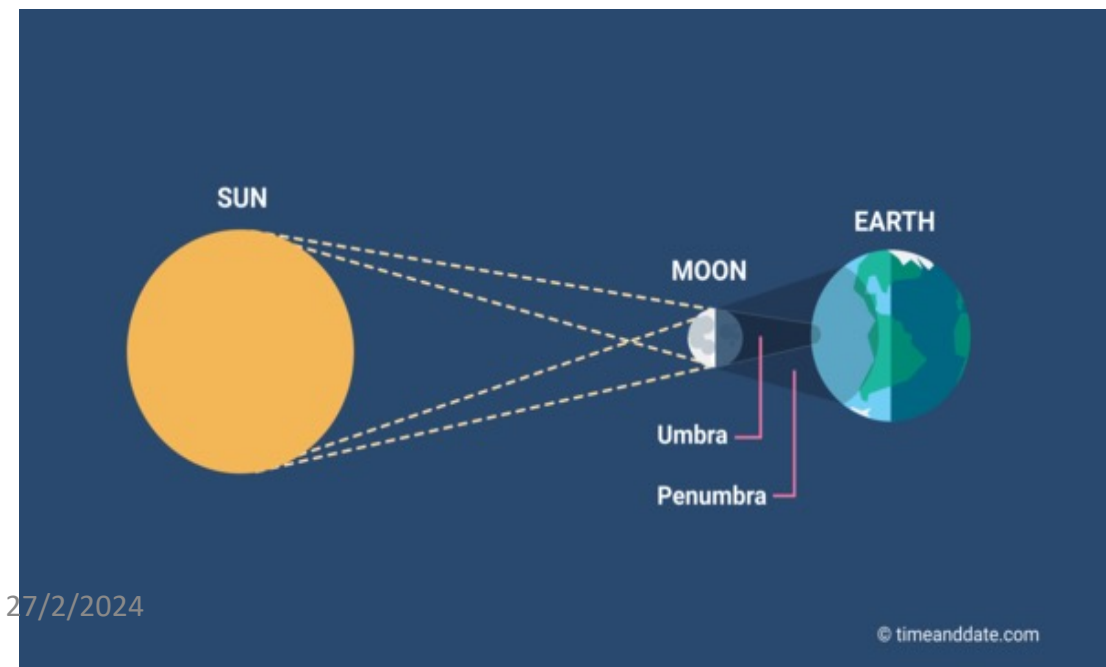
Explanatory Asymmetry

- The length of the shadow cast by a flagpole can be derived from the height h of the pole and the angle θ of the sun above the horizon and laws about the rectilinear propagation of light.

- BUT one can also derive the height *h* of a flagpole from the length *s* of its shadow and the angle θ of the sun above the horizon.
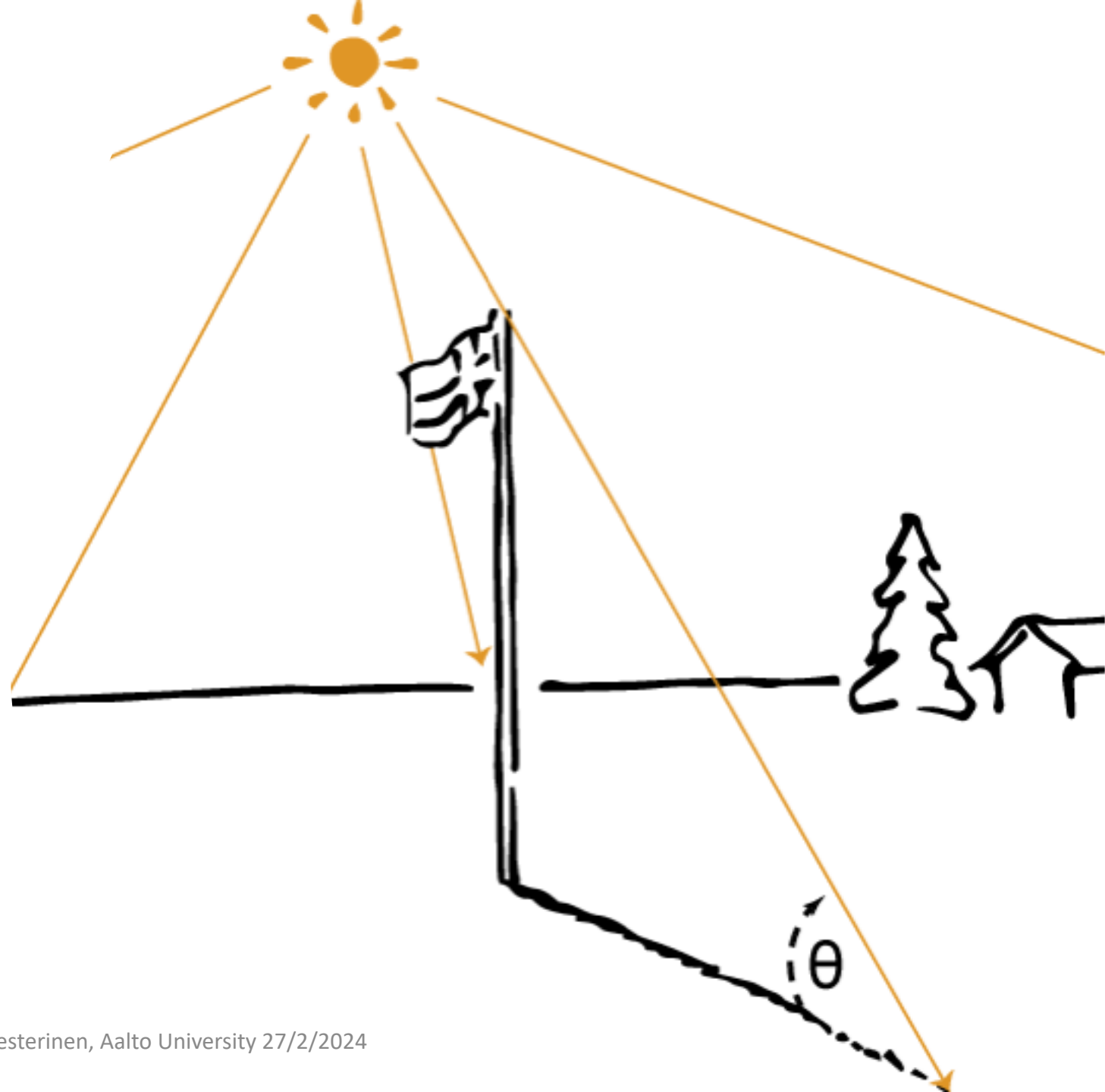
Criticism of the DN model

Explanatory asymmetry?

The length of the flagpole can be explained by its shadow

Explanatory relevance?

The consumption of contraceptive pills by a man can explain why he does not become pregnant.

Explanations in sciences where there are no laws of nature?

Explanation in the social sciences?

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Unificationist and Causal Explanations

- **Unificationist account of explanation** (Kitcher 1989)
  - Scientific explanation is a matter of providing a unified account of a range of different phenomena
  - Explanation is a matter of deriving descriptions of many phenomena by using as few argument patterns as possible
  - E.g. Gravitation theory is unificatory because it can explain tides and the movement celestial bodies.

- **Causal mechanical model** (Salmon 1984)
  - An explanation of an event E will trace the causal processes and interactions leading up to E – the explanation shows how E fits into a "causal nexus"

- **Pluralism about explanation?**

Causal explanation

- ## Woodward's (2003) interventionist theory

  - Explanations are answers to **what-if-things-had-been-different** questions

  - Explanatory relationships are relationships that in principle can be used for manipulation and control in the sense that they tell us how certain variables would change if other variables were changed

  - To explain causally a phenomenon is to provide information about the factors on which it depends and to exhibit how it depends on those factors

  - Contrast to DN-model: Explaining as **revealing dependencies** between things in the world, not as subsuming under laws

Opening black boxes: Mechanistic explanations

- In many life sciences, it has become common to require that explanations of phenomena describe mechanisms (cf. Machamer & Darden & Craver 2000)
  - E.g. how information gets transmitted in a synapse
- Mechanism
  - A collection of (1) components, which (2) organized in a certain way, sustain a (3) stable phenomenon
  - Can often be described as a causal process that transforms inputs into outputs
- Mechanistic explanation are causal explanations

- Syphilis was one of the most devastating diseases encountered in mental hospitals until the discovery of penicillin at the beginning of the 20th century.

- Syphilis was called the "great imitator" because of its variable clinical course and diversity of manifestations (Carneiro et al. 2013).

- It was only when the bacterium, and the causal mechanism by which it produces the symptoms, were discovered, that the various courses and manifestations of the disease were lumped together under the same treatable kind heading.
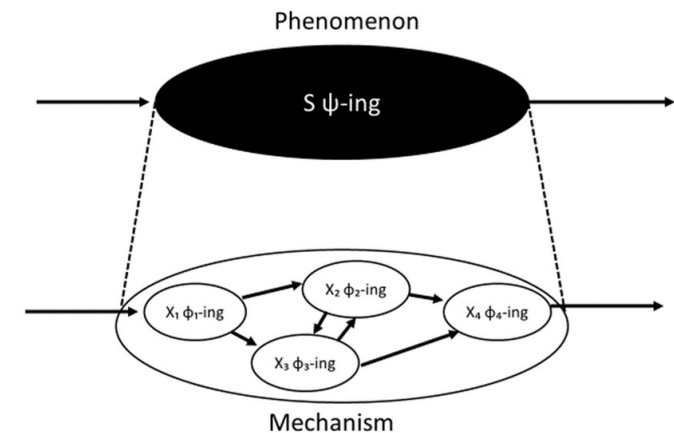

Figure 2. (Craver 2007)

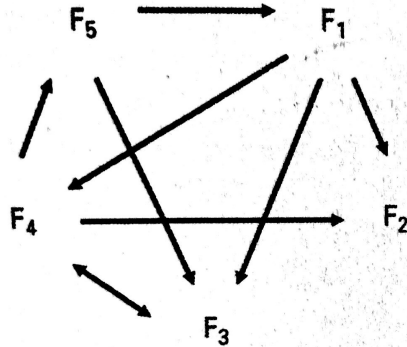# Different Mechanisms (Kendler, Zachar, Craver 2011)

Fig. 2. One possibility for a property cluster kind in which individual clinical features (labeled F_1 to F_5) are causally inter-related to one another. There is no underlying essence that is responsible for the clustering of the symptoms. For example, if the disorder is major depression, suicidal ideation (F_2) might be caused by both depression mood (F_1) and feelings of guilt (F_4).
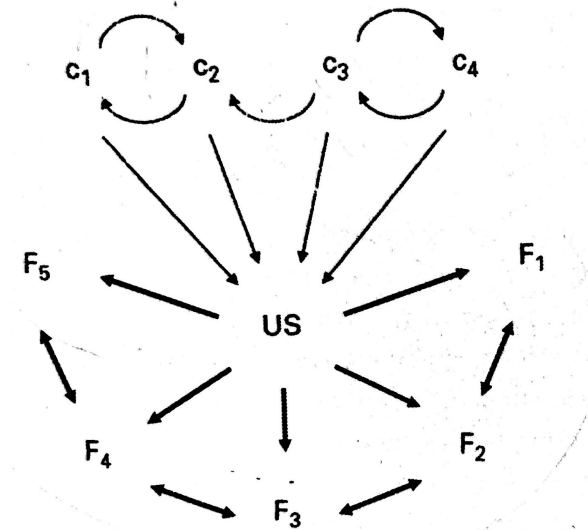
Fig. 3. Another possibility for a property cluster kind in which we have a series of causes (C_1 to C_4) that interact with each other to produce an underlying state (US) that in turn leads to the individual clinical features (F_1 to F_5). These causal processes could be psychological or biological. These clinical features in turn could causally interact with each other.

Interpretation and Understanding

- There does not seem to be laws in the social sciences.

- The objects of social science are subjects: they have their own ideas, concepts, and perspectives.

- And researchers are part of the same context as the people and forces they are investigating.

- Human behavior is hard to measure, predict and explain.

- Where do scientific concepts get their meaning?

- Do violent video games cause aggressive behavior?

- How to explain *aggressive personality*

CLIFFORD GEERTZ

BASIC

THE INTERPRETATION
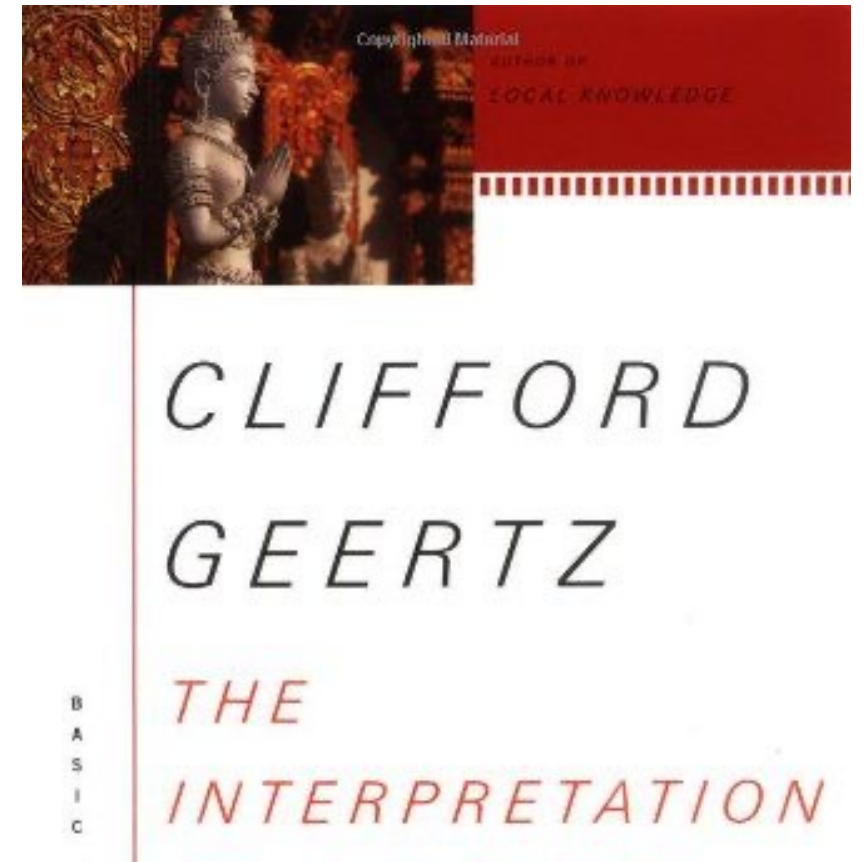
Verstehen

- Max Weber: "Ideal types". Concepts of the social sciences need to capture the meanings and motivations that are significant for the subjects to be studied.

- First describe the actions to be explained in terms of typical motivations. Then form the concept by abstracting characteristics of the action from a variety of observations.

- Ideal types related observable behaviours by identifying the motivations that stand behind them. E.g. "aggression" cannot be defined solely in terms of observable behaviour but needs to identify typical feelings, beliefs, and social meaning.

- BUT does *not capture the subjects point of view*, rather present the scientists theory of their motivations.

Understanding through interpreting

- People's actions are based on meanings: actions and language are interrelated.

- Hence, to understand those actions, we need to interpret their meaning to the people.

- E.g. Why an individual moves a horse in a certain way in chess cannot be explained by physical shape and regularities of the pieces.

- Tyler (1971): the game of chess is a normative rule-constituted activity, not just rule-governed activity.

- *Understanding requires interpreting what actions mean (norms, motivations, desires) for the actors.*

Thick concepts

- Clifford Geertz articulates the idea of social scientific concepts being translations in his essay "Thick description: Toward an interpretive theory of culture".

- Ethnographic description tries to make foreign culture intelligible, in that sense it is a bit like translating novels or poetry.

- "Thick" and "thin" descriptions:
  - *Thin* descriptions have minimal relationships to other descriptions. E.g. to say just that someone "is walking" is a thin description.
  - *A thicker* description is to say that someone "is walking *to class*". Even thicker would be "...is *hurrying* to class".

- Thick descriptions are meaningful due to their specific relationships to other actions, events, motivations, possibilities for response, outcomes, strategies, etc.

Thick concepts

- The conceptual relationships expressed by thick descriptions are embedded in the language, symbolic system, and actions of the subjects.

- In that sense they correspond to Schutz's common sense but Geertz doesn't think they are the subjects "theories" of the society. Instead he subscribes to a Wittgensteinian idea of meaning as use.

- Thick descriptions capture what the members of the community have in common – their culture.

- The goal of interpretive social science is to thickly describe the culture, and thereby express in the interpreter's language the relationships that make the subjects' social world meaningful.

Azande witchcraft

- The Azande blame heritable witchcraft for their accidents (e.g. illnesses and deaths)

- But if there had been enough cases, all Azande would be witches? How to interpret the logical contradiction?

- Evans-Pritchard suggests that witchcraft is invoked as an explanatory principle 'whenever plain reason fails'.

- BUT Winch rejects the idea that there are universal standards available to compare witchcraft beliefs and science.

- Winch argued that they have their own language-games, which cannot be translated into other languages as such

- *Principle of charity*: communication requires that we take same beliefs as granted

BUT intentional (meaningful) explanation is causal?

- The general view in the philosophy of social sciences is that reasons can function as causes in explanations and that interpretation and causal explanation need not be mutually exclusive (Tuomela 1977; Henderson 1993; Kincaid 1996; Ylikoski 2001).

- As an example, when an anthropologist conducts fieldwork by interpreting local customs and behaviours, she relies on the causal efficacy of cultural structures and beliefs.

- This means that a putative intentional explanation is explanatory if it can answer questions concerning how the explanandum action would have been different, had the relevant beliefs and desires been different (see Ylikoski 2001, p. 97).

Cross-cultural cognitive variation?

- These difference, nonetheless, do not prove that there is no cognitive unity rather than undermine the presupposition that WEIRD (Western, Educated, Industrialized, Rich and Democratic) people's similarities in normally considered cognitive processes are representative of human cognition in general

- Joe Henrich et al. (2010), for instance, demonstrate that there is considerable cross-cultural variation in self-concepts, the visual system, and even in visual illusions usually considered to be cognitively impenetrable (e.g. the Müller-Lyer illusion). According to Segall et al. (1966), San foragers of the Kalahari Desert were not affected by the illusion possibly because they were not visually exposed to "carpentered corners" when growing up.

Discussion

- What type of explanation do you employ in your research?

- Could you make it more explicit?