



Critical Reasoning Lecture-Seminar 5 Overview – Applications

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Topics recap

- **What we have covered so far:**

week 01: observation and theory

week 02: induction and falsification

week 03: explanation and confirmation

week 04: thought experiments

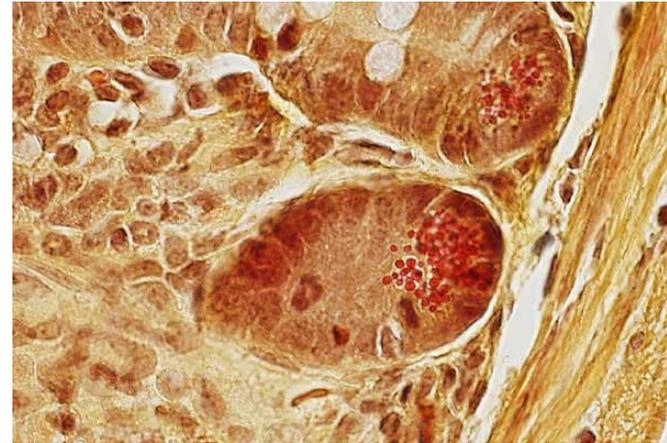


Observation and Theory

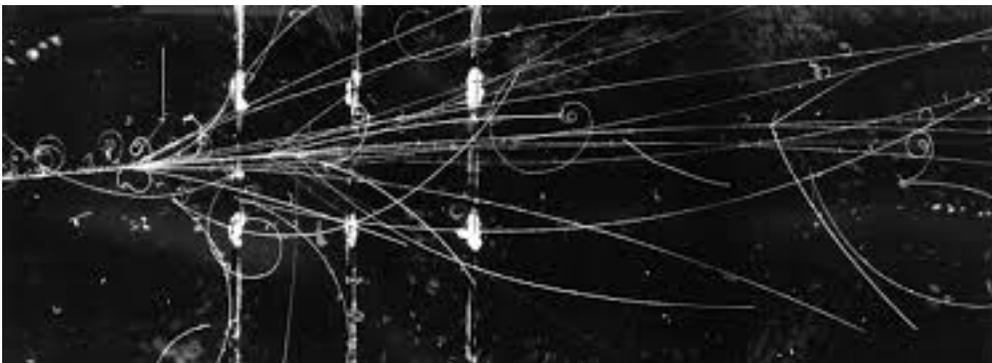
Direct vs. indirect observation

- **Direct:** When our observations track the object we are targeting.

Example: Observing the intestine of a mouse in an optical microscope.



- **Indirect:** When we observe something else that allows us to *infer* the existence and properties of the target object.



Example: Particle tracks in a bubble chamber.

Latent vs. manifest variables

- “The idea that observable phenomena are influenced by underlying and unobserved causes is at least as old as religion, where unseen forces affect real world events. In the more secular sphere of everyday living, latent variables find wide application. From the response to ‘how are you feeling today?’ to the description of a worker as “efficient” or a student as ‘bright,’ such abstract concepts **elude direct measurement... treats latent variables as impossible to measure, as unobservable or unmeasurable.** Jöreskog & Sörbom (1979, p. 105) state that ‘latent variables... cannot be directly measured.’ Similarly the Penguin Dictionary of Economics (Bannock et al. 1998) defines a latent variable as ‘a variable in regression analysis which is, in principle, unmeasurable.’...” (pp. 607-8).” (Bollen 2002: 606-8).

Application: Economics

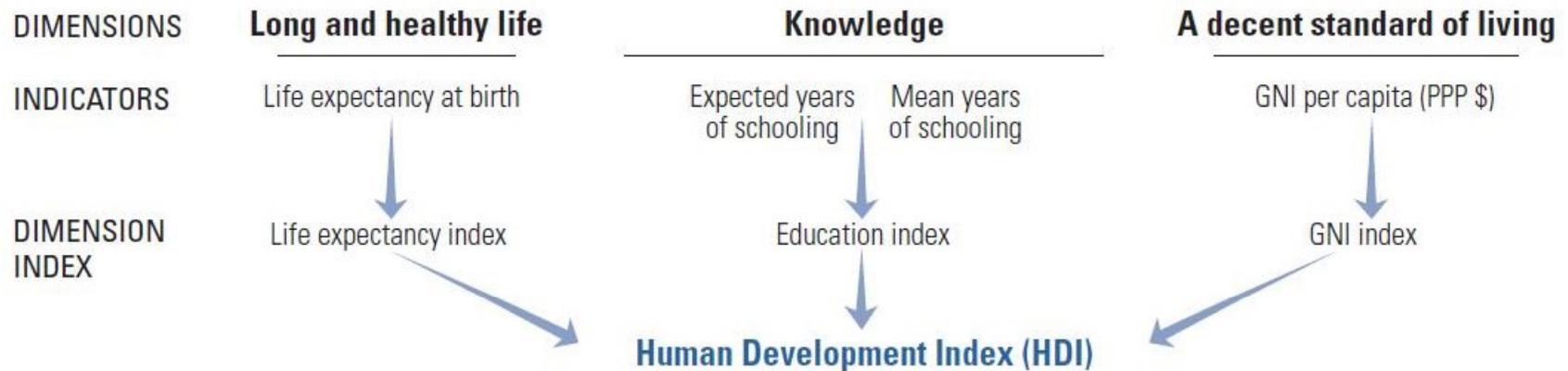
- Economists, among other social scientists, seek to determine **quality of life** in various parts of the world.
- Clearly, this is not something we can observe directly. If it can be observed/measured at all, it is done so indirectly.
- A measure most often associated with quality of life or well-being is:

Human development index (HDI)

NB: There are several others, including the Genuine Progress Indicator (GPI).

The human development index

- Human development index (HDI) as illustrated in the 2019 UN Human Development Report.



- Other dimensions that are employed in 'quality of life' measures include:

- * mental health
- * crime
- * pollution

Why care?

- It is clear that, whenever possible, we ought to test hypotheses against observations.
- But hypotheses often go beyond the directly observable. The further they go, the **riskier** our judgments about them.
- Designing tests means thinking carefully about the long-chain of relations between more and less observable quantities.



- We must also think carefully about the *length* of such chains.

In the social sciences, direct vs. indirect observation manifests itself as the distinction between

instrument and
non-instrument observation

measurable and manifest
variables

manifest and latent
variables

latent and occult
magnitudes



Share an example of a latent variable in your field of study.



Scientific Explanation

The deductive-nomological account

- Good explanations are arguments that possess:
 - (a) Deductive validity
 - (b) True and non-redundantly used premises
 - (c) Empirical content
 - (d) At least 1 deterministic law of nature (a generalisation)

$$\begin{array}{l} 1. C_1, C_2, \dots, C_n \\ 2. L_1, L_2, \dots, L_m \\ \hline \therefore E_1 \end{array} \left. \vphantom{\begin{array}{l} 1. C_1, C_2, \dots, C_n \\ 2. L_1, L_2, \dots, L_m \\ \hline \therefore E_1 \end{array}} \right\} \begin{array}{l} \textit{Explanans / Explicans} \\ \\ \textit{Explanandum / Explicandum} \end{array}$$

$C_1 - C_n$ descriptions of particular facts, $L_1 - L_m$ descriptions of laws and E_1 is a description of the thing to be explained.

Application: Political theory

- **Duverger's law:** The plurality (a.k.a. simple majority) approach to elections favours two-party systems.
- Glynos and Howarth (2007) employ it in a D-N explanation.

Table 2 The deductive-nomological model: a social science illustration

Explanans	Law	The simple majority electoral system favours the two-party system
	Initial conditions	Legalization of party organizations; secret ballot; inclusion of party affiliation on ballots; diffusion of ethnic/class membership across electoral districts; etc.
Explanandum	Event/process	Therefore x party system is two-party

Problems: Incompleteness and violations

- Glynos and Howarth's schema is, of course, incomplete, e.g. assumptions about non-interference are missing.
- More crucially, the law seems to be violated:

Dunleavy (2012) argues: "Duverger's Law is a dead parrot... perfect two-party systems like this are now found almost nowhere outside the USA, except for a few small Caribbean nations... all the major Westminster system countries have shown strong trends towards multi-partism".

- In short, the law is not deterministic and hence the D-N model is inapplicable here. But I-S model is applicable.

Why care?

- Explanations appear, by their very nature, to require some degree of generality.

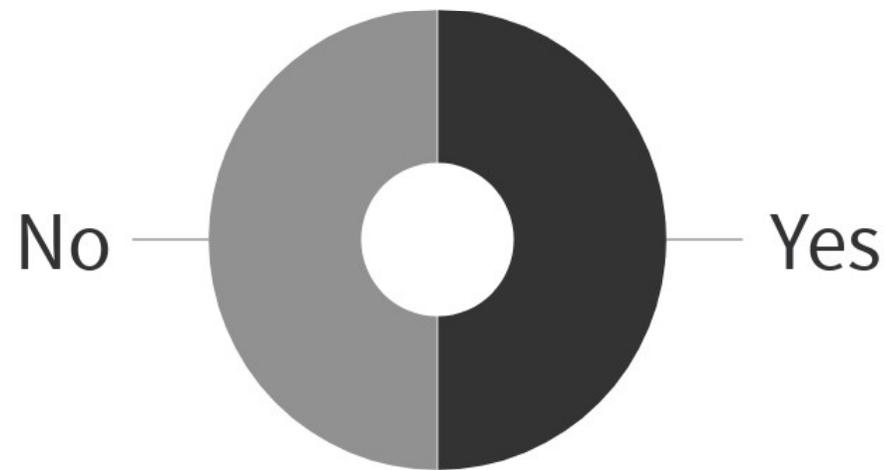
Example:

If we try to explain why LHO killed JFK by saying that he was just in a unique state of mind, we don't get anywhere.

- A more plausible (and testable) explanation involves positing features about that mind-set.
- For example, psychological evaluations, prior behaviour and motives, that *correlate* with extreme actions.
- Implicit in such explanations are law-like regularities.

Is D-N the only account that requires generalisations for a good explanation?

Yes **A** No **B**





**Share an example of a generalisation in your
field of study.**



Confirmation

Hypothetico-deductivism

- Recall the ‘hypothetico-deductive’ (H-D) account of confirmation.
 1. Central hypothesis
 2. Auxiliary assumptions (e.g. initial & boundary conditions)

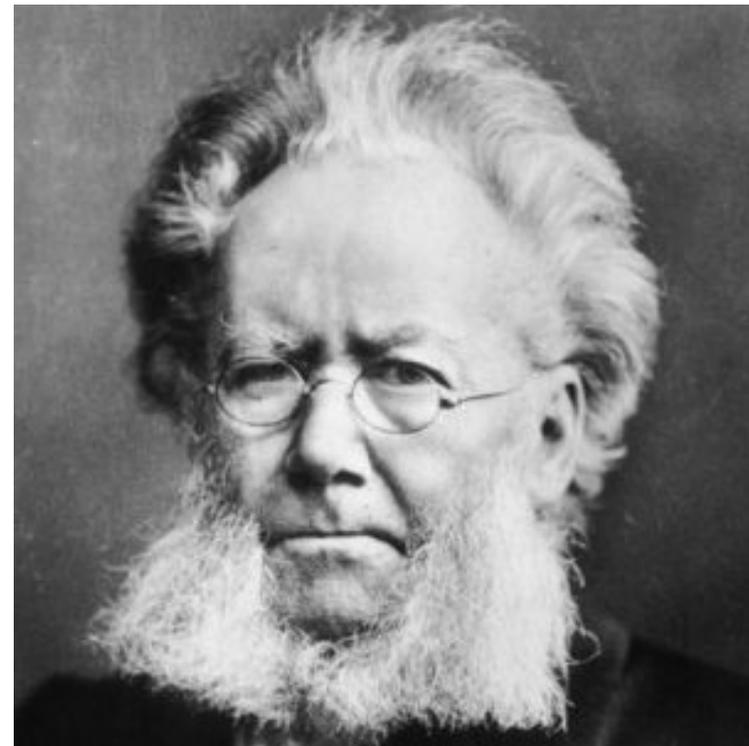
∴ Observational consequence
- If the observational consequences turn out true, then we say that the hypothesis (+ any auxiliaries) are *confirmed*.
- If they turn out false, we say that they are *disconfirmed*.

The Stranger in Ibsen's Peer Gynt

- Dagfinn Føllesdal (1979) considers various interpretations of the Stranger in Henrik Ibsen's Peer Gynt.

The stranger represents:

- (1) anxiety
- (2) death
- (3) Ibsen himself
- (4) the Devil
- (5) the ghost of Lord Byron



- Are any plausible? If so, is there a most plausible one?

Reconstructing an interpretation

- Take the third interpretation as an illustration.

Central Hypothesis: The Stranger is Henrik Ibsen (HI).

Auxiliary 1: If the Stranger is HI, then all the attributes possessed by the Stranger must be possessed by Ibsen.

Auxiliary 2: The Stranger is 'white as a sheet'.

Auxiliary 3: The Stranger stays indoor during the day.

Auxiliary 4: The Stranger has an interest in anatomy.

Auxiliary 5: The Stranger is a free thinker.

...

Therefore:

HI is 'white as a sheet', stays indoor during the day....

Revising auxiliaries

- Suppose there are some attributes that the Stranger and HI don't share. Is that the death of the central hypothesis?
- Not necessarily. We can save the central hypothesis at the expense of the first auxiliary. Here are two alternatives:

Auxiliary **1a**: If the Stranger is HI, then *nearly all* the features possessed by the Stranger must be possessed by HI.

or

Auxiliary **1b**: If the Stranger is HI, then the features possessed by the Stranger must *either be possessed by or be wished to be possessed by* HI.

Why care?

- By reconstructing interpretations, we can see that:
 - central hypotheses are insufficient on their own to derive testable conclusions & must be supplemented w/ auxiliaries.
 - these auxiliaries must be made explicit for the testable conclusions to follow from them (+ the central hypothesis).
 - there are different ways to react to a refutation, e.g. we can revise the central hypothesis and/or one or more auxiliaries.
- More general point: Are all interpretations amenable to such a reconstruction? Perhaps not! But should they be?



**Is there a reason why we wouldn't want to
apply the hypothetico-deductive method in
interpreting literary works?**



The End