

Lecture X

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Digression: inference

Kenning

A widespread device in Northern European poetry was *kenning*. That was an expression which could replace a single word. Their instance include:

Evil-doer = dragon

Dwelling-place = residence

Mail-shirt = armour

Folk-right = possession

Stone-cliff = wall

and so forth. We can *derive* new kennings from a given kenning by replacing one or more words in it by their kennings. This fixes our rule of inference.

Kenning derivation

Example

Here is a derivation of a complex kenning:

Warrior

Sword-hurler

Battle-fire-hurler

Spear-storm-fire-hurler

Shield-sorceress-storm-fire-hurler

Ship-moon-sorceress-storm-fire-hurler

Shipyards-horse-moon-sorceress-storm-fire-hurler

- Laws are well-confirmed statements in the universal conditional form.
- For example: All men are mortal.
- But where is the conditional?
- We translate the universal statement as follows: For every person x , if x is a man, then x is mortal.

Laws and explanation

- ① Laws: L_1, \dots, L_n
 - ② Conditions: C_1, \dots, C_m
 - ③ Explanandum: E
- Explanations are arguments.
 - The laws and the initial conditions, both understood as statements, logically entails the explanandum.
 - Informally, conditions are causes, but the causal talk is intelligible only in the presence of general laws (compare Hanson).

Explanation: example

Example

Suppose we have a container of gas (say, a syringe). We increase the volume of the container by one-third. The observed phenomenon is the decrease in the gas pressure by 25%. To explain the phenomenon we use Boyle's Law: $PV = T$, assuming the temperature remains constant:

Laws: $PV = T$.

Conditions: The volume of the container increases by one-third, the temperature is constant.

Explanandum: The decrease in the gas pressure by 25%.

Prediction

- The structure of prediction is exactly the same as the structure of explanation.
- Therefore, a good explanation must also be able to function as a prediction.

History

- There is no difference between natural science and history.
- Historical explanation must have the same form as physical explanation.

History and science

- The laws of the historians include reference to individual psychology.
- They also have to account for the very rich data.
- Therefore, they are rather useless in explanation.

- Perhaps historical laws involve probabilities.
- But even then they must have universal form.
- Question: are there probabilistic **laws**?
- Problem: the possibility of empirical test.

Hempel's verdict

- Historical science currently offers nothing more than explanatory sketches.
- An example of error: singling out initial conditions as determiners of historical events.
- The talk of determination is justified once we possess general laws (this follows from linking causation to laws).
- History is one of the fields of empirical science.

What is a law?

Laws are *true lawlike sentences*. So, what is **lawlike**?

Syntactic form?

- ① Universal form: must have the form 'Every x is F .' But: 'Every student in this class likes Obama' is not a law.
- ② Universal form and infinite scope: must not refer to a limited number of objects. But: Kepler's laws refer only to the planets in the Solar system.
- ③ OK, we now distinguish between fundamental laws and derivative laws.

Fundamental laws

- Universal form, infinite scope, and no reference to specific objects: simple generality.
- But: 'Everything that is either the 43th US President, or the best tennis player in 2010 is male' is not a law.
- Now, define '*x* is *preten*' as '*x* is either the 43th US President, or the best tennis player in 2010'.
- Then you have 'Everything that is *preten* is male.' But this does not seem to be a law, though has simple generality.

Breaking with positivism

- Laws are characterised by supporting counterfactual statements.
- 'If x were a planet of the Solar system, it would have had an elliptic orbit'—true.
- But 'If x were a preten, then x would have been male'—false.
- That is, laws express some form of necessity.
- So, laws cannot be characterised by a purely syntactic procedure.
- This is a double affront to positivism. Necessity is a suspect notion, plus there is no linguistic decision procedure to define lawhood.