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Philosophy of the Social Sciences: Lectures
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Lecture 3: <u>**EXPLANATION I**</u>

<u>The Challenge</u>

Many philosophers, including J S Mill and Karl Popper, have argued that scientific explanations must be deductive.   Formally, that means that scientific explanations must make reference to universal statements or 'laws'. Ontologically and epistemologically it means that the objects of scientific knowledge must be law governed. But <u>that</u> surely means that the idea of 'social scientific explanation' is dubious.

<u>Key Concepts</u>

Explanation

In these lectures we shall meet a number of rival *analyses of the concept* of explanation – tied to different *theories* of explanation. At a minimum though we can note at this point three things about the concept.

1. for some physical event like my car not starting there are a number of 'levels' of explanation
    o   the phenomenological level that is familiar to competent but non-technical drivers – spark plugs, fuel injection systems, engine temperatures etc;
    o   the more technical explanation that a physicist or chemist would understand but ordinary drivers would not;
    o   the explanation sketches that one would offer to a small child or to the completely uninitiated – 'the car's gone wrong and it won't go'; or 'John broke it';
2.   whatever level one works at, the elements of an explanation are ordered in such a way that conditions (explananda) lead up to the event, phenomenon or state of affairs to be explained (explanandum).
3.   but also an important element of explanation is the *interpretation* of the explanandum in such a way as to bring it into an explanatory relation with the explananda (*this theme to be continued....*)

Deductive

Deductive logic is the study of what it is for propositions to follow from premises. Formal logic systematises rules for this, for example:

<u>modus ponens</u>, the principle licensing inference from a conditional plus its antecedent to its consequent: [A, if A then B] |= [B].
<u>modus tollens,</u> the 'denying principle':   [if A then B, [¬B] |= [¬A]

<u>a valid argument schema:</u> Every X is a Y and a Z;
                                 No Y is a W;
                                 Therefore no X is a W.

<u>a logically valid statement</u> (purely by virtue of its form):   If p and q then p

Law governedness

Some smokers die of lung cancer; some do not. But underlying the contingency and uncertainty there does seem to be order and regularity – the world runs according to laws and rules. It seems to be 'nomic'. A problem that immediately arises with the concept of law is whether it is *prescriptive* or just *descriptive*. If we ask why drivers in this country drive on the left hand side of the road (even in the absence of explicit signs telling them to do so, or barriers etc forcing them to do so) we will answer that it is because the laws of the state include the law that we drive on the left. Our actions are prescribed by those laws. Even the actions of law breakers are governed by those laws – if you drive on the right you are a lawbreaker, and you are liable to sanction. Is this also the case for phyical laws? Do we want to say that the apple falls from the tree *because* the laws of nature make it do so? Or that if the leaf does not fall straight to the ground but floats, that is because it is not constrained only by gravity although the laws of gravity are certainly operating but rather is subject to the cross cutting pressures of the the wind (ie laws of thermodynamics and the laws of gravity)? These ways of putting it seem to imply that 'laws' are 'mechanisms'. Or do we simply want to say that the 'laws' of gravity and thermodynamics describe the behaviour of physical objects?

Social Science

What do we mean by 'social'? This is an oddly elusive term, given that so many generations have devoted themselves to social reform, social science and so on.

- o   On the one hand, the concept signals the totality of the domain of relationships between persons – all of these together are social.
- o   On the other, it can signal a subset of those relationships – we divide them into economic, political, familial etc, and social refers to a rather vaguely defined residual category.
- o   The connotations of the term carry the idea that we ARE social, in the sense of sociable, creatures whose existence is saturated with social relationships (unlike, say, slugs who interact mainly/only for sexual purposes and to eat each other when one of them is squashed).

Who has said what about this?

Mill

All phenomena of society are phenomena of human nature, generated by the action of outward circumstances upon masses of human beings; and if, therefore, the phenomena of human thought, feeling and action are subject to fixed laws, the phenomena of society cannot but conform to fixed laws, the consequence of the preceding. There is indeed no hope that these laws, though our knowledge of them were as certain and as complete as it is in astronomy, would enable us to predict the history of society, like that of the celestial appearances, for thousands of years to come; but the difference of certainty is not in the laws themselves, it is in the data to which these laws are to be applied. (Logic of Moral Sciences ch6 p63)

The actions and feelings of human beings in the social state are, no doubt, entirely governed by psychological and ethological laws; whatever influence any cause exercises upon the social phenomena, it exercises through those laws. Supposing, therefore, the laws of human actions and feelings to be sufficiently known, there is no extraordinary difficulty in determining from those laws the nature of the social effects which any given case tends to produce. (p84)

Popper
on scientific explanation:

To give a causal explanation of an event means to deduce a statement which describes it, using as premises of the deduction one or more universal laws together with certain singular statements, the initial conditions. For example, we can say that we have given a causal explanation of the breaking of a certain piece of thread if we have found that the thread has a tensile strength of 1lb and a weight of 2lbs was put on it. If we analyse this causal explanation we shall find several constituent parts. On the one hand there is the hypothesis: 'Whenever a thread is loaded with a weight exceeding that which characterises the tensile strength of the thread, then it will break'; a statement which has the character of a universal law of nature. On the other hand we have singular statements (in this case two) which apply

> *only to the specific event in question: 'The weight characteristic for this thread is 1lb', and 'The weight put on this thread was 2lbs'.*

In the footnote added to a later edition he offers an alternative account of the example:

> *" A clearer analysis of this example – and one which distinguishes two laws as well as two initial conditions – would be the following: 'For every thread of a given structure S (determined by its material, thickness, etc) there is a characteristic weight w, such that the thread will break if any weight exceeding w is suspended from it.' - 'For every thread of the structure S1 the characteristic weight w1 equals 1lb.' These are the two universal laws. The two initial conditions are: 'This is a thread of structure S1' and 'The weight to be put on this thread is equal to 2lbs.'"*

on universality

Popper distinguishes strict universality from numerical universality:

- o Strict universality:

"Of all harmonic oscillators it is true their energy never falls below hv/2". This statement is true for any place and any time; it is not replaceable by a finite number of singular statements.

- o Numerical universality:

"Of all human beings now living on earth it is true their height never exceeds 4 metres" This statement is true (or perhaps false) for a specified place and time; it is replaceable by a finite number of singular statements. Popper argues it is best treated as a species of singular statement.

- o The point is that *strictly universal statements must be hypothetical*. Numerically universal statements *can be* hypothetical – I don't actually know whether statement 2 is true, although it's a reasonable working hypothesis.
- o A parallel distinction can be drawn between kinds of concepts:

> dictator, H2O, social class, are *universal concepts;*
> Hitler, the Atlantic, the C19 working classes, are *singular concepts*

Carl Hempel (b.1905)

Hempel formulated the most precise version of the **'covering law model'** of scientific explanation. He calls his model of explanation the '**deductive-nomological' model:**

$$1. \; C_1, C_2 \ldots. C_n \; (\text{conditions})$$
$$2. \; L_1, L_2 \ldots. L_n \quad (\text{laws})$$

_____

$$3. \; (\text{entails}) \; \models \quad \text{Event to be explained}$$

1 + 2 = Explanandum
3 = Explanandum

Secondly, he offers an **'inductive-probabilistic'** or a '**probabilistic-statistical'** form:

$$1. \; F_i \quad (\text{in instance i (the case) factors F were realised})$$
$$2. \; (P) \quad \text{prob}(O, F) \text{ is very high}$$

_____

$$3. \; (\text{implies}) \; \vdash \quad O_i$$

Probabilistic explanation, just like explanation in the [previous manner] is nomological in that it presupposes general laws; but because these laws are of statistical rather than of strictly universal form, the resulting explanatory arguments are inductive rather than deductive in character. (Hempel, in Ruben (ed) Explanation p23)

Hempel argued that both these models are applicable in history and the social sciences.
Rational choice theory is deductive/inductive:-

$$1. \; A \text{ was in a situation of type C (initial condition 1)}$$
$$2. \; A \text{ was disposed to act rationally (condition 2)}$$
3. Any person who is disposed to act rationally will, when in a situation of type C, invariably (with high probability) do X. (covering law)

_____

$$4. \; (\text{implies}) \qquad \vdash A \text{ did X}$$

<u>Standard objections to Hempel's model</u>

1) **The flagpole**.
   o Given the height of the flagpole, the time of day (elevation of sun in sky), rectilinear propogation of light, we can predict the length of the shadow.
   o Equally, given the length of the shadow, time of day, rectilinear propogation of light, we can predict the height of the flagpole.
   o However, although we may accept that the height of the flagpole and elevation of sun explain length of the shadow, we do not accept that the length of the shadow and the elevation of the sun explain the height of the flagpole.

2). **The barometer.**
   o With a drop in the barometer reading we can predict the coming storm.
   o But we don't think the barometric reading explains the storm;
   o rather a drop in atmospheric pressure explains both.

3) **The contraceptive pill**
   o The man who regularly takes his female partner's birth control pills does not have a good grip on the explanation why he does not get pregnant despite sexual intercourse

4) **Syphilis and paresis**
   o Of individuals with latent untreated syphilis, about 25% will contract paresis.
   o We can explain the contraction of paresis by the fact of latent untreated syphilis.
   o However, in 75% of cases latent untreated syphilis does not cause paresis.
   o ie, we have explanations of events that are relatively improbable

Bas van Fraassen (b.1941)

   o *Realists criticise Hempel* because
   1. the truth of premisses is neither here nor there in his logical model of explanation.
   2. there need not (in the model) be any relevance of the explanans to the explanandum, yet a genuine explanation seems to involve mechanisms and causes.
   o *Van Fraassen criticises realists* because he thinks that truth is neither here nor there in scientific theories and explanations generally.
   o To say that a theory explains some fact or other, is to assert a relationship between this theory and that fact, which is independent of the question whether the real world, as a whole, fits that theory.
   o The word 'explain' can have its basic role in expressions of the form 'fact E explains fact F relative to theory T'.
   o **an explanation is an answer to a why question.**

Why did Adam eat the apple? Why questions implicitly invoke:
   o the topic (Adam eating the apple)
   o background theory [what's the appropriate theory here? old testament Judaeo Xian theology?, New Testament Xian theology? science of human action? contemporary philosophy of the human condition?]
   o a contrast class as in
      o why did Adam eat the apple (as opposed to Eve eating the apple)
      o why did Adam eat the apple (as opposed to using it for target practice)
      o why did Adam eat the apple (as opposed to the plums)
   o relevance relation: closely connected with theoretical context; 'because Yahweh is a just God' is (perhaps) not relevant to the question why Adam ate the apple.

Summary

1.   Popper's deductive *covering law model* of explanation:
<div align="center">
universal law **L**
initial conditions **C1, C2...Cn**
event **E** occurs
</div>

2.   For Popper an explanation is a *set of statements;* the relationship between **explanans** and **explanandum** is the logical relation of **entailment** arrived at by **deduction**. The *deduction is also a prediction.*

3.   For Popper the laws scientists deal with are **strictly universal** as opposed to **numerically universal.**

4.   Are the laws that *social* scientists deal with stricly universal??

5.   Hempel's *deductive nomological model of explanation*
<div align="center">
initial conditions C1... Cn
law(s) L1...Ln
together entail
explanandum
</div>

6.   Hempel's *inductive probabilistic model of explanation*
<div align="center">
F1.... Fn (i) (in instance i factors 1...n applied)
P (F1...Fn, O) Hi (the probability of O given factors F1...Fn is high
together imply
likelihood of explanandum
</div>

8.   Both these models ARE applicable in social science; rational choice theory is deductive or inductive;
<div align="center">
1. A was in a situation of type C
2. A was disposed to act rationally
3. Any person who is disposed to act rationally will, when in a situation of type C, invariably (or with high probability) do X
</div>

9.   Objections to Hempel's model of explanation
      9.1   the flagpole
      9.2   the barometer
      9.3   the contraceptive pill
      9.4   syphilis and paresis

10.   *Could there be laws operating in history and society?* [this question will be adressed in Lecture 5]
      Are here laws operating in history and society?

11.   Laws of 'rationality'

12.   Rational action models are frequently *static;* remember JSMill's objection to the '*geometric method*' in social science

13.   Game theoretic models can be dynamic. *But game theoretic* **explanations** *are not ipso facto* **predictions**.

14.   Belief in rational action as 'law' is *conjectural* (ie, Popperian)

15.   But there is a problem with *falsification:* what test would falsify rational action theory?

16.   So are the 'laws' of rational action theory really 'axioms'?