

Philosophy of Science // Fall 2015

Handout 15

Explanation: van Fraassen

ASYMMETRY: METAPHYSICAL SOLUTION. The problem of asymmetry, according to van Fraassen, is perhaps the most important problem plaguing theories of explanation. So we begin by looking at two possible solutions to it.

In the problem of asymmetry, we must be able to distinguish propositions that are correlated perfectly in alternative circumstances, but whose explanatory roles are very different. The kinetic theory example we saw earlier, and another one (discussed by van Fraassen) is the case where barometer rises invariably when the storm is coming. A metaphysical solution would distinguish facts from sentences. Sentences having matching truth values across possible worlds can be made true by different facts. Thus while the state of the barometer and the storm are perfectly correlated, each is made true by different facts. This is a nice solution, but the talk of facts is spurious.

ASYMMETRY: ARISTOTELIAN SOLUTION. Aristotle makes a distinction between ‘demonstrations’ and ‘explanations’. A demonstration can be any valid argument. An explanation is an argument whose premisses necessarily contain a *cause* of the fact stated in the conclusion. But we have to enlarge the notion of a cause to make this proposal adequate.

For consider: the atomic structure of an element may explain the chemical behaviour of that element, yet it would not be a ‘cause’, in our modern view, of that behaviour.

Aristotle, however, provides a theory of causes that allows to regard even the atomic structure as a cause. A lantern, for instance, has wood as its material cause. Or: lantern has wood as its ‘essence’. So: the premisses of an adequate explanation must state the essence of the phenomenon we are to explain.

OBJECTION TO THE ARISTOTELIAN SOLUTION. What property is essential cannot be context-dependent. But what property is explanatory *is* context-dependent. Essence and explanation, therefore, come apart.

Example 1. Consider the flagpole story narrated by van Fraassen. We normally come with a fixed function $f(x, t)$ yielding the length of the shadow, where we plug in the length x of the pole and the time t of the day. The length x seems to be the essential cause of the shadow. But on some occasions it is the length of the pole that can be explained by the length of the shadow (where, that is, we tweak the pole’s length to get the shadow exactly that long). There the function $g(y, t, z)$ will yield the length of the pole depending on the length y of the shadow, the time t , and some other factor z (a giant sundial in van Fraassen’s example). Here the essence gets to be explained by an accident.

Remark 2. We ignore entirely Section 2.4 in van Fraassen’s selection.

TRANSITION TO PRAGMATICS: HEMPEL’S FALSE IDEALS. One false ideal: in Hempel’s hands explanation has become a relation between a theory (laws) and the phenomenon. But we may just as well say that a phenomenon is explained when *we* explain with the help of a theory. The second false ideal: explanatory power of the theory is identical to its acceptability. But there are false theories that explain. Generally, explanatory power should only be part of the reason for accepting the theory. The third false ideal: the explaining power of a theory is its primary virtue. Well, not always: we may also accept the theory, for other reasons, before using it for explanation.

So the alternative proposal is that explanations are nothing but answers to certain questions, even though these answers are at the same time also propositions. We can interpret the D-N and P-S models as saying that conditions (or ‘factors’) explain the explanandum relative to a theory T (that contains the ‘laws’). So the condition C explains E relative to T just in case: T entails a certain proposition $\phi(C, E)$ expressible in the calculus of logic or probability theory.

OUTLINE OF THE PRAGMATIC MODEL. Explanations are answers to some aspects, perhaps contextually interpreted, of why-questions. To answer a question ‘Why p ’, I must first fix a contrastive class X of propositions, and then interpret the original question as ‘Why p , rather than x ’, where $x \in X$.

Example 3. If my question is, ‘Why did *the mayor* get paresis?’, I am in effect asking, ‘Why did the mayor, and not anyone else in town, get paresis?’ Propositions of the contrastive class contain reference to the townsfolk. The original question may be answered by citing his syphilis. If, however, I am asking ‘Why did the mayor, and not anyone else in the syphilis ward, get paresis?’, the question has no answer (within the medical theory).

INNER WORKINGS OF THE PRAGMATIC MODEL. The new approach utilises the context of the utterance of a particular question: that context identifies the intentions of the utterers (see the reference to Stalnaker in page 64). Every token-question (i.e. a particular dated utterance) is assigned a presupposition. So ‘Why p ?’ must be interpreted as ‘Why p , in contrast to X ?’, where the original question is supplemented with a contrastive class X .

The token-question, on a given occasion, presupposes that $p \in X$, and that p is true, while most members of X are false. The problem of asymmetry will be solved by sorting answers into relevant and irrelevant, depending on the presupposition of the question token.

Question 4. Give an example illustrating van Fraassen’s solution.

TRIVIALISATION? Van Fraassen’s solution interprets a why-question as a triple $\langle P_k, X, R \rangle$, where R is a relevance relation. The point of R is to differentiate between appropriate and inappropriate answers to the why-question. In the situation where the propositions A and A' are true in the same possible worlds, the answer ‘Because A ’ is logically equivalent to the answer ‘Because A' ’. However, only one of them may be an appropriate explanation of the phenomenon. The relation R is supposed to distinguish between these two logically equivalent, but explanatorily non-equivalent, answers.

Example 5. The question ‘Why was there infrastructure damage in Bodrum over the weekend?’ is answered by saying, ‘Because there was a storm.’ The answer-proposition is equivalent to ‘Because every barometer in Bodrum, if it were installed there, would have fallen.’ However, the latter is ruled out as an explanation by being irrelevant.

But the lack of restrictions on the relevance relation makes it possible for any true proposition A to explain any other true proposition P_k . So let the question be ‘Why P_k ?’ Let $X = \{P_k, \sim P_k\}$. We stipulate that A is a relevant answer to P_k , given the contrastive class X : $R = \{\langle A, \langle P_k, X \rangle \rangle\}$. That is, there is a why-question $\langle P_k, X, R \rangle$, and A is the only answer to it.

Example 6. Suppose that the question is ‘Why is the roof in my apartment **leaking**?’ The topic P_k is the proposition ‘The roof in my apartment is leaking.’ Let $X = \{\text{‘The roof in my apartment is leaking’}, \text{‘The roof in my apartment is not leaking’}\}$. Let K be a body of knowledge containing a yoga theory. And let the relevance relation R be a relation of emotional influence, so that R contains pairs of my emotional attitudes to the apartment and various disturbances in it. Then the answer A may contain a true statement of my negative attitude to the apartment and the leakage in it.

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