Why metaphysicians do not explain[1]

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We explain in science. We explain in everyday life. But do we explain in metaphysics? This paper argues that we shouldn't help ourselves to an affirmative answer — at least, not without a good deal of hesitation. However, as we shall make clear later on, denying that we explain in metaphysics does not imply that there are no metaphysical explanations.

1. What is an explanation?

Most of the time we generate potential explanations rather swiftly. The window broke because I kicked the ball in the wrong direction. I went to the shop because I believed it was open and I intended to buy food there. 'Why is he walking about?', Aristotle asked, then answering 'To be healthy'. At other times potential explanations are harder to generate because we know too little about what could possibly explain, even potentially, a certain explanandum. Perceived paradoxes illustrate this. It was difficult to come up with a potential explanation of the fact that, despite striking nutrient deficiency, a number of species of plankton are known to coexist in the summer. In these cases it is the content rather than the concept of explanation we find ourselves in trouble with.

But sometimes we face conceptual problems as well. Are the three potential explanations mentioned above explanatory in the same sense? If not, does each require its own peculiar model of explanation? Many think of the three as exemplifying different varieties of explanation. The first is arguably a causal; the second is intentional; and the third is functional, of the teleological kind. Are these varieties fundamentally different? The full passage from Aristotle suggests they are not:

> 'Why is he walking about?' we say. 'To be healthy', and, having said that, we think we have assigned the cause. Aristotle (Physics, II.3.194B31)

This is somewhat ambiguous, since it is not clear whether Aristotle believes we have rightly or erroneously assigned the relevant cause. However, we shall assume he means the former — that the assignment is accurate. In incorporating final causes Aristotle's account of causation differs from most causal theorising today. The example nevertheless indicates the interconnectedness of the three varieties.

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Our claim is not that causal, intentional, and functional explanations are always acceptable to science or in everyday life. We do not wish to claim this even when the explanations are 'actual' in Carl Hempel's (1965) sense. Many examples from various disciplines would disprove such a claim. In psychology, intentional explanations are sometimes rejected because the kinds of belief and desire referred to in the explanans of this variety are not considered natural kinds. This argument is but one of the problems discussed. Even the notions of belief and desire themselves face that kind of critique.

Teleological or design function is sometimes used in developmental psychology to account for behaviour in terms of its intended goal, i.e. the effect the subject seeks to achieve by performing the behaviour successfully. It is very difficult, not to say impossible, to establish conclusively whether a given teleological interpretation of behaviour is correct. This is why, generally, interpretations referring to observable use or operative function are preferable to those couched in terms of desired effect. For example, contemporary explanations of nonverbal pointing in human infants in terms of what the act is meant to achieve, establish the existence of several distinct types of pointing behaviour. Yet, that these types seem to depend on similar skills and capacities suggests that they constitute variations of a single behaviour. It is reasonable to claim that pointing has one function only — the operative one of directing the observer's attention to an object or event (Brinck, 2003). Knowing the operative function allows agents to use pointing for different purposes in different contexts.

Explanations in terms of teleological function have now been banished from physics and biology. Today nobody could get away with the suggestion that rocks fall in order to assume their natural place, or that plants have leaves for the sake of shading their fruit (Physics II, 8). (This is not to say that similar modes of thinking have entirely lost their importance in scientific practice: here they may well have heuristic value). Of the three varieties, causal explanation is considered the most unproblematic; and generally speaking functional and intentional explanations become more acceptable the more closely related to causal explanation they are. Where causal explanation is not found useful this is typically because causation is not acknowledged as an ontological building block of the science in question. For instance, Bertrand Russell doubted that causal explanation was of use in physics (see Ladyman and Ross, 2007, for a recent continuation of that line of thought).

Building on the widespread view that causal truths of the form 'a caused b' entail associated laws of nature, causal explanation has been conceived of as a special case of the most well-known model of explanation — the deductive-nomological model. In this model an explanandum is potentially explained when it is derived from a set of premises including at least one law of nature.

Another widely indulged set of assumptions links causal explanations to mechanisms. This is especially clear in cases where we seek to explain regularities. For instance, causal explanations are often implicitly mechanistic when we provide explanatory accounts of established effects in psychology. An example is the white male effect in risk perception research. Risks tend to be assessed as lower by men than they are by women, and similarly as lower by white people than they are by people of colour. A study conducted in the United States showed that the overall effect here is generated by 30% of the white male population, who judge risks to be extremely low. This has led researchers to suggest that sociopolitical, rather than biological, factors explain the effect (Finucane et al., 2000). Another example, from a totally different field, concerns smoking. Half a century ago Austin Bradford Hill (1965) examined the cogency of argumentation in which a move is made from an association between smoking and lung cancer to a causal relation between them. In his list of 'criteria' legitimising such a shift he focused on the biological plausibility of this causal relation. In other words, he asked whether or not a suitable biological mechanism for the effect had been identified.

2. Explanatory relata

Prepositions are at the root of a great deal philosophical muddle. 'What is the meaning of life?' has bewildered an army of thinkers; the question 'what is of meaning in life?', on the other hand, can be answered by a child — ice cream, visits to the seaside, viewings of The Lion King. Also when it comes to explanations we must mind our prepositions. For example, explanations in mathematics are one thing; explanations with mathematics, something else.

Many explanations in physics make use of mathematics (Rivadulla, 2005). We can, for example, use mathematics to explain hydrogen's spectral lines distribution, to explain, in turn, differences in time delays between electrons emitted from the $3s^2$ and from the $3p^6$ shell at different excitation energies (Klünder et al., 2011).

In like manner we use mathematics (together with scientific principles) in explanations in biology, economics, medicine, and psychology. Non-linear differential equations are used to explain the interaction between predator and prey (the Lotka-Volterra equation); Euler's formula is used to explain savings strategies (Ramsey, 1928); in medicine we use mathematics to explain the exchange of water and small and large solutes across the peritoneal membrane in peritoneal dialysis (Rippe and Levin, 2000); and we use the theory of conjoint measurement to explain human idiosyncratic decision making (Kahneman and Tversky, 1979).

But what is a mathematical explanation in mathematics? Scientists give causal explanations, and mathematics is a useful tool. But do mathematicians explain? In a recent paper, Arianna Betti (2010, 4) says:

> …mathematical explanations are non-causal. Surely mathematics is worth its name as a science as much as physics is? If so, explanation in mathematics is a legitimate form of scientific explanation as much as explanation in physics is.

This seems to presuppose that physics and mathematics are both sciences, and that, since physics explains, mathematics also explains. This way of thinking is based on the assumption that the only thing that distinguishes science from non-science is that science explains.

Mathematicians prove propositions, theorems and lemmas. Their proofs are demonstrations, not explanations. Proofs are a combination of axioms and definitions, of theorems and lemmas. There are, of course, many types of proof — for example, proofs by induction, by example and by contradiction, and nonconstructive proofs. All, however, are demonstrations of necessary truths. Mathematicians do not give, as Betti correctly observes, causal explanations; nor do they give functional or intentional explanations, simply because they do not explain anything, i.e. they do not introduce new (qualitative) information. And, we want to add, you do not have to be in the business of explaining to be a scientist.

Certainly, mathematicians can use examples from everyday life to help us understand. But that is explanation at a different level — the examples are pedagogical.

Do conceptual reformulations and innovations count as explanations? A new conceptual framework means new proofs, that we understand things in a completely new way (Mancosu, 2008). However, Betti rather sides with Charles Sanders Peirce, who describes conceptual explanation in mathematics as a form of analytic truth (1957a) that does not reveal any new empirical facts. Peirce held that mathematical demonstration is a form of deduction consisting in the application of a general rule to a particular fact: what is already known (the rule) is used to explain the consequences of the fact.

Betti says:

> Mathematical explanations are conceptual explanations, namely connections among propositions resting on the properties of some concepts. This means that explanation in mathematics and conceptual explanation in metaphysics do not just cross paths: they are one of a kind. (p. 5)

She seems to argue that mathematical and metaphysical explanations provide only conceptual knowledge that demonstrates what is already (in principle) known.

Betti discusses three types of explanation: causal, metaphysical and conceptual. Her examples are: (Causal) Socrates is pale because he's scared to death; (Metaphysical) 'Socrates is pale' is true because there exists a trope of paleness in Socrates; (Conceptual) Socrates is pale because he's a white guy with skin-type I.

As Betti points out, in all three cases we have a two-place relation, but in each case there is distinctive pair of relata. In the first case two objects are related; in the second, an object and a truth; and in the third, two truths. The idea, to take just one example, is that the causal explanation is true if and only if there is a causal relation between the relevant objects.

In Hume's opinion an object " is as perfect an instance of cause and effect as any which we know, either by sensation or reflection" (1739-40, Abstract, p. 649). This reminds us of what Betti says. But are objects the only relata of causation, the only thing we need to explain? Socrates falls because he is tired. Is this a causal report with one object — Socrates? His tiredness is not a thing, it is an event (or conceivably a process). Causation, understood as a link between objects, seems to require events.

Against this, D. H. Mellor (1995), making use of one of Frank Ramsey's arguments (Ramsey, 1990), claims that events cannot function as the relata of causation. Mellor's example runs as follows: Don manages to hang on when his rope breaks, and so does not die, because he does not fall. This looks as causal as when (a week later) Don dies because he falls. The problem for the event-causation view, according to Mellor, is that while 'Don does not die because he does not fall' reports an instance of causation, it also seems to assert that the non-existence of one event is produced by the non-existence of another. Since non-existent objects are as problematic as non-existent events this argument is effective against object causation, too.

The specification of relata is central in the construction of a theory of causation, and hence in any theory of (scientific) explanation. What then can the relata of causation be? Again, following Mellor, the fact that Don survives is caused by the fact that he manages to hang on. And the fact that he does not survive is caused by the fact that he does not manage to hang on when the rope breaks. Facts seem to solve the problem with 'negative' reports. But if 'negative' facts are but conceptual tools, they cannot function as reinforcing bars in the world. In this respect facts are as badly suited as events to be the fundamental relata of a causal relation.

The problem is that causation needs to relate more than one type of entity. Moreover, causation may not be a relation at all. It may be thought of as a structure, or a mechanism, or as the manifestation of nomic facts or laws in space-time (Persson and Sahlin, 1999).

All this is important, because the difficulties outlined above — concerning the relata of causation and the dubious status of the causal relation itself — show that scientific explanations are imbued with metaphysical ideas and ontological assumptions. Scientific explanations are, at least partly, metaphysical. This means that we need to ask if the relata of metaphysical explanations are the same as their scientific counterparts. It also means that we need to consider whether the metaphysical ‘because’ is the same as the causal (scientific) ‘because’.

Betti provides answers to these questions, but gets them wrong — or not quite right. Her third category of ‘because’, the conceptual case, is not an explanation but a proof or argument. She argues:

> (Conceptual) is true iff true proposition *q* follows from true proposition *p* on the basis of at least a third proposition ruling in an appropriate manner the connection of concepts involved in *p* and *q*. For example, ‘Socrates is pale’ (a truth) follows from ‘Socrates is a white guy with skin type I’ (another truth) because the concept of paleness and that of skin type I are appropriately related in a third truth, say ‘human skin type I according to Fitzpatrick’s scale is mostly pale in colour’.

The first part of this argument looks very much like a description of a logical or mathematical proof: *q* follows from *p* and a handful of further assumptions. The second part looks more like a definition. If Mellor’s Don is a bachelor, this is because he is single and man. True, one could say that definitions explain the meaning of a term, but there is not much explanation going on here. The definition adds no new information; it merely spells out what is already known. On the other hand, Don’s being a single man and the proposition that ”a single man in possession of a good fortune, must be in want of a wife” explains a great deal. Maybe even why Don finally lets the rope slip out of his hand.

Now, consider Betti’s second case of ‘because’, the metaphysical one. Suppose there is a truth-making relation between an object in the world and a true proposition. Does this fact explain much? Does it answer any serious why-question we might have? Metaphysics is important, do not misunderstand our intentions, but talking about metaphysical explanations simply involves too much concept-twisting. Nor do mathematicians explain. If successful, they prove remarkable theorems, and if they fail, they explain their mistakes, but that is another story. But do metaphysicians and mathematicians fail in the same way?

An alternative so far undiscussed is the suggestion that the deductive-nomological model of explanation can be applied in metaphysical explanations as well. We shall have to remove the requirement that the set of premises contains a law of nature. Instead we could require the premises to contain at least one general, fundamental metaphysical principle or assumption (e.g. that there are tropes). Why not call this type of explanation ‘deductive-ontological’ explanation? But a model of this kind just emphasises what we already have claimed — arguments, definitions, and explanations should not be confused. F. H. Bradley’s regress argument, for instance, is an argument, not an explanation.

3. Abductive inferences & metaphysical blankets

In deduction we derive the formal consequence(s) of our premises. A deductive argument aims to show that a conclusion necessarily follows from a general rule and a set of premises (hypotheses). An inductive argument, on the other hand, grows out of individual cases. The premises of an inductive argument present support for the conclusion but do not entail it. Deductive arguments are sound or unsound tout simple. Inductive arguments provide different degrees of evidentiary strength.

Peirce and many others have argued that there is a third kind of inference. In addition to deduction and induction we make use of abduction. Abduction comes first. Induction turns the abductive result into a rule or law; we learn by induction that an abductive hypothesis is valid, whereas we use deduction to clarify its consequences. Peirce sometimes referred to abductive inference as reasoning from effects to cause and sometimes as "the operation of adopting an explanatory hypothesis" (Collected Papers 5.189). There is an intimate relation between abduction and explanation in Peirce's writings. He writes that abduction occurs when we observe some very curious circumstance which would be explained by the supposition that it is a case of a certain general rule, and thereupon adopt that supposition (1957a). For instance, fossils that remind us of fish remains are found in the interior of the country; we suppose this land once was under water.

Ilkka Niiniluoto (1999) cites the following early illustration of abductive reasoning from Peirce's 1865 Harvard Lectures:

> We find that light gives certain peculiar fringes. Required an explanation of the fact. We reflect that ether waves would give the same fringes. We have therefore only to suppose that light is ether waves and the marvel is explained (Writings 1:267).

From Galileo to Semmelweis it is an easy task to locate very similar formulations in reports on scientific breakthroughs.

Peirce writes that abduction is a preference for one hypothesis over others that equally explain the facts, so long as this preference is not based upon any previous knowledge with a bearing upon the truth of the hypotheses, nor on any testing on any of them (1957b). The hypothesis that can be tested first should be preferred. If two hypotheses can be tested immediately, economy decides: the one that costs the least in terms of time, energy, and money is preferable and should be put to the test. Furthermore, the hypothesis should be internally coherent, consistent with what is known generally, reasonable, and prima facie susceptible of verification.

Abduction is a fallible kind of inference. It obviously invites discussion of the circumstances under which it should be regarded acceptable. Gilbert Harman (1965) and Peter Lipton (1991) prefer talking about inference to the best explanation (IBE) instead of abduction, and this opens up the possibility of our deploying criteria other than Peirce's original ones. The question is: what is gained by subsuming abduction under that heading? It may be more useful, insofar as we are trying to understand the many varieties of scientific reasoning, to keep the two notions separate.

IBE relies on the comparison of competing explanations relative to a set of pragmatic principles or norms that determine what counts as a good explanation in scientific practice. Abduction, by contrast, is not in this sense a normative notion. It does not depend on preconceptions about the characteristics of a good hypothesis — except, that is, testability. Peirce simply suggests that we should pursue the hypothesis that can readily be tested. We need not speculate about which virtues of explanation identify the hypothesis that is most likely to be true.

IBE puts explanation in the front seat. Whatever version of IBE we assume, and whatever merits it has, it will be such that it can be applied only in situations where: (a) at least one of the hypotheses to be selected from is, potentially, a satisfactory explanation; (b) we are capable of selecting one or a few hypotheses from several possibly satisfactory explanations; (c) the best explanation is good enough. Hence it is clear that not only the content but the very concept of explanation in play is an important guide to the cases in which we are prepared to infer to the best explanation (e.g. see Lipton, 1991; Bird, 1999; Persson, 2007).

As will be discussed below, many of the abductive features that make an explanation a good one are virtues in non-explanatory contexts as well. That an inference is neither inductive nor deductive does not entail that it is an instance of IBE — it may be another non-explanatory kind of abductive inference.

Are there IBEs in metaphysics? Herbert Hochberg's (1970) blanket theory tells us that explanations in metaphysics are not deduced:

> Just as one takes a descriptive singular statement to be deduced from a law and a description of initial conditions, one might think that a metaphysical thesis follows from statements of fact and explicitly stated principles. However, what is deduced, in such a case, is not a description, in an ordinary sense, of the fact to be explained, but something that plays the role of the covering law in the scientific explanation, i.e., a thesis. Thus, the analogy would be more apt if we think in terms of trying to fit a purported law to a set of facts in conformity with certain rules (about simplicity, minimal hypotheses, etc.) and other hypotheses. In short, the pattern is more like an inductive than a deductive one.

Interestingly, Hochberg's delineation of metaphysical explanation is strongly reminiscent of IBE. If he is right, Betti is wrong: metaphysics can generate genuinely new knowledge.

Peirce emphasised that abductive hypotheses are not worth much unless they can be tested and until the explanations they provide are corroborated by further facts. Most philosophers think that metaphysical hypotheses cannot be empirically tested, and we agree. The question is whether, in spite of this, metaphysics can produce the right kind of test — one that would show that metaphysics does provide genuine explanations and not merely a set of hypotheses, interesting yet incapable of verification. What might the criteria of adequacy be for metaphysical explanation considered as inference to the best explanation?

4. Explanation in metaphysics?

The difference between metaphysics and science is often exaggerated. It must be remembered that science is inevitably based on ontological assumptions. There are also striking similarities between the criteria of adequacy in situations when we choose between different metaphysical and different scientific assumptions.

Compare, for example, Carnap's physicalism with a solipsistic theory, or Goodman's nominalism with a Platonistic theory assuming the existence of both properties and relations. Simplicity is obviously a desideratum, albeit one in need of clarification. A radical nominalistic theory is simple in the sense that it only assumes the existence of one sort of entity. But it will very soon lead to complicated constructions when we try to reconstruct classes and so forth. Completeness is, of course, another desirable. Can we, in the metaphysical theory, capture all we want to say and do say in everyday life and science? Fruitfulness is another criterion of adequacy. Can the metaphysical theory we construct yield interesting and illuminating results when applied to other problems or areas? A pragmatic aspect enters the picture. Consistency is an obvious merit of explanations, both in metaphysics and science.

A special problem arises when we have a choice between two competing metaphysical constructions satisfying these criteria in different degrees. Against some criteria the first construction gets an α and the second gets a β; against others the first construction gets an β and the second gets a α. But even more important is perhaps the general conclusion, or realisation, that if a particular scientific explanation and a particular metaphysical theory were both to satisfy these and similar criteria of adequacy, it would still not follow that both are explanations.

Humpty Dumpty sought to foist upon a sceptical Alice the delusion that the fundamental question of meaning is "which is to be the master". And you can, of course, make the word 'explanation' stand for whatever you like. But clarity matters. Concepts are analytical tools. If we want to understand the methodological principles of metaphysics, we should resist Dumpty rhetoric. It is not a good idea to borrow concepts imbued with the empirical view of science and use them to analyse metaphysics. Instead let us take the methodological questions seriously and ask: What do (or should) the metaphysicians do?

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