What is Hempel's DN Model of explanation? Consider one objection to Hempel's DN model of explanation, using an example from science. Do you think this objection gives us a decisive reason to reject Hempel's account?

A Defence of the DN Model

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In this essay I will outline Hempel's DN model and explain it using a scientific example. I will then use this example to analyse Michael Scriven's objection to the DN model and arrive at the conclusion that his objection is insufficient for rejection of the DN model.

Hempel's Deductive-Nomological or DN model refers to a set of rules, logical and empirical, that one must follow in constructing an explanation. The logical rules tell us that an explanation must consist of explanans which contain general laws and allow deduction of the explanandum. Here, *explanans* refer to sentences which clarify the *explanandum*, the phenomenon or conclusion in need of explanation. In addition, the explanans must be testable and capable of being observed. The empirical rule tells us that the explanans must be true if the explanation is to be considered sound (Hempel & Oppenheim, 1948).

Imagine one asks why vanadium in its 2+ oxidation state appears violet. A DN model explanation may look like the following. (a) When energy in the form of a particular wavelength of visible light is absorbed by a substance, it will appear as the colour opposite that wavelength on a colour wheel. (b) Since V(II) absorbs yellow light, this gives rise to its violet appearance. (c) Therefore, vanadium in its 2+ oxidation state appears violet as it absorbs yellow light. In this explanation, the explanandum, (c), is vanadium 2+ appearing violet, which is deductively explained by the explanans (a, b) in which (a) is a general law and (b) is a more specific law. Thus, this example fulfils the requirement for laws. It also fulfils the requirement of being testable and observable as using simple spectrophotometry will allow us to confirm the absorbance of yellow light.

Most would consider the above example to be a clear explanation. It gives us a detailed picture of why events happen, not simply the order in which they occur. Let us contrast this with an objection raised by Michael Scriven in his story of the ink bottle. In the story, a man spills an ink bottle and it creates a stain. When asked about the stain, he needs only to state that his elbow bumped the open ink bottle, causing it to fall and create the stain (Scriven, 1962). Scriven argues that rather than explicitly referencing laws, as is required in the DN model, one may give a historical account of the moments leading up to the event. In order to analyse this argument, I offer up my own understanding for what a 'law' is. Laws are truths concerning our reality. Laws are constant as they rely on forces that vary only in magnitude and not in nature. Thus, we may apply our gathered knowledge of these laws for the investigation of scenarios which involve the same principle, such as gravity, at different levels, such as a car rolling down a hill or planetary orbit. It is important to note that the knowledge I mentioned will change as discoveries are made, however, the laws themselves are independent of our knowledge of them. To give a historical account absent of reference to laws is to completely disregard the complexity of the mechanics involved. For Scriven's

sort of explanation to work, those on the receiving end must be content that, although they have some idea of *what* happened, they will never understand the mechanics of *why*. One will qualitatively know what happened before the ink bottle was spilled but will receive little information in terms of the acceleration of the ink bottle towards the ground or how the ink spread. Clearly, the preferred method of explanation depends on the interests and goals of who is asking the question - a physicist or concerned family member. Generally, scientific explanation builds on prior theory such as laws and must therefore reference such laws. The example of the ink bottle is simple to imagine for anyone, regardless of occupation or study, but one would find great difficulty in explaining my earlier example of vanadium without reference to laws.

Now that we have analysed Scriven's objection, it is clear that it is insufficient for rejection of the DN model. Scriven's explanation serves as more of a summary for people with past experiences similar to that of the event in need of explanation. The DN model gives us an essential framework from which we can build further knowledge. This is possible due to its inclusion of detail in the form of laws, which Scriven believes is not required.

Bibliography

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