

Understanding defective theories: An inferentialist approach to scientific understanding

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Abstract

Here I address two questions from the epistemology of science, namely: *can scientists achieve legitimate understanding of defective theories?* and if so, *how is this possible?* On the one hand, understanding has been traditionally considered to “consist of knowledge about relations of dependence. When one understands something, one can make all kinds of correct inferences about it” (Ylikoski 2013: 100). In addition, understanding is often regarded as *factive*, this is, the content of understanding can only include true propositions that are known to be so. This considered, it is impossible to understand a knowingly defective (conflicting, inconsistent, false and even impossible) set of information. On the other hand, much scientific practice makes use of defective theories (Bueno 2006, Martínez-Ordaz 2020), and, despite the fact that some of these theories are knowingly defective, scientists have found different ways of scrutinizing and working with them to the point that they report having ‘understood’ both the theories as well as the phenomena that they describe. Regarding this issue, it is important to notice that the mechanisms that these scientists use to, allegedly, gain such an understanding, are such that by going against some of the basic principles of classical logic, allow scientists to identify relevant segments of the structure of the defective theory (Reck and Price 2000, Martínez-Ordaz 2020). The combination of these facts poses the following dilemma: either understanding defective theories is possible or scientists that report having understood any defective theory are mistaken. Hence the importance of addressing both issues together.

Here, I aim at explaining under which circumstances when scientists report having understood a defective theory, their claim might be legitimate. In particular, I argue that scientists understand a defective theory if they can recognize the theory’s underlying inference pattern(s) and if they can reconstruct and explain what is going on in specific cases of defective theories as well as consider what the theory would do if not-defective –even before finding ways of fixing

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it. To do so, I focus on cases in which the defective character of either entities or theoretical chunks might be both useful and an essential feature of what is being understood; and I contend that, when falsehoods or any other defective elements are included in the content of understanding, they must be joined by the (non-classical) inference patterns that allow them to remain 'well behaved'.

In order to do the above, I proceed in three steps.

- First, I characterize very broadly scientific understanding and its, alleged, incompatibility with defective information.
- Second, I characterize defective theories and I explain in which way they are more than just *felicitous falsehoods* (Elgin 2007, Lawler 2019). I argue that understanding of defective theories is not only possible but has been constantly achieved in the sciences.
- Third, I sketch some inferentialist approaches to understanding (Hazlett 2017, Le Bihan 2017, Martínez-Ordaz forthcoming) and explain why any of them, to be satisfactory, must incorporate non-classical features. I submit that, when defective elements are included in the content of understanding, they are joined by the inference patterns that allow them to remain well behaved.

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