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On the Duhem-Quine Thesis

In his seminal 1951 paper “Two Dogmas of Empiricism,” the celebrated American logician-cum-philosopher W. V. Quine argues that “our statements about the external world face the tribunal of sense experience not individually, but only as a corporate body” (Quine 355). As support, he cites the influential argument titled “An Experiment in Physics Can Never Condemn an Isolated Hypothesis but Only a Whole Theoretical Group” from P. Duhem’s classic 1906 book “The Aim and Structure of Physical Theory” (Duhem 183). At first glance, the two arguments don’t seem to be related, although upon closer inspection it is clear the Quine’s claim is closely linked to Duhem’s thesis. This of course begs the following question: *how can Quine use Duhem’s philosophy - which explicitly assumes empirical (synthetic) truths - in a paper that viciously attacks the synthetic/analytic and reductionist dogmas of modern empiricism? And if it is then the case that Quine’s understanding of Duhem’s argument is justified, how can Duhem himself simultaneously believe in empirical truth and the underdetermination of physical theory by scientific experiment?*

In order to address these pressing questions, it is important that we understand exactly what Duhem and Quine’s theses are, and how they arrive at their theses. Duhem defines a scientific experiment as the precise observation of empirical facts accompanied by an interpretation of those facts with the aid of abstract propositions and physical theories presupposed by the observer (147). For example, one might observe a small piece of iron

oscillating in a certain experimental set up, and interpret this empirical fact using a physical theory of electricity to deduce the resistance of the coil (145). The propositions that claim to assert empirical facts can be either true or false, while the propositions introduced by a theory cannot be true or false, only “convenient” or “inconvenient” (333-334). This, of course, counters the popular understanding that scientific conclusions based on empirical facts and expert interpretations are just empirical truths stated in abstract physics jargon (149). Once Duhem claims that scientific conclusions implicitly recognize the accuracy of a whole group of propositions and physical theories, he reaches an important conclusion: a scientist can never test an isolated hypothesis, only a whole group of hypotheses. If a predicted phenomenon is not produced, one can *only* conclude that at least one of the propositions used to predict phenomenon is incorrect (185). The analogy Duhem uses is that of a watchmaker and a doctor: while a watchmaker can fix a watch by separating the watch into separate pieces and finding the broken piece, a doctor has no such luxury, and can only suggest remedies by inspecting the entire body. Thus scientific conclusions are inseparable from the corporate body of propositions and physical theories. Duhem aptly writes and the end of his argument: “physical science is a system that must be taken as a whole” (187-188).

We see that Duhem believes in empirical fact – something which Quine tries to disprove – but he only uses it to distinguish between observed phenomena and abstract propositions. It is not essential in establishing the doctrine of physical science as an interconnected system of propositions and physical theories.

Quine reaches a more generalized conclusion about the system of human knowledge of the external world via a completely different route. The first four sections of his paper show that the different explanations of analyticity are circular. This begins with the attempted definition

that a statement can be analytic if it can be substituted with a synonym. However, this depends on the notion of synonymy. In turn, the concepts of similar truth-values, interchangeability *salva veritate*, and necessity are all shown to be unsuccessful in the quest to define analyticity. Quine then concludes that, in the absence of a satisfactory definition of analyticity and the lack of a clear division between analytic and synthetic statements, the analytic/synthetic divide is a “metaphysical article of faith” (340-352).

He then goes on to show that reductionism is unproven. He first defines reductionism as the belief that the meaning of a statement is the method of empirically confirming or rejecting it (353). However, no philosopher has successfully accomplished "the task of specifying a sense-datum language and showing how to translate the rest of significant discourse, statement by statement, into it." Thus this radical form of reductionism is rejected (354). The subtler form of reductionism is that for each statement there exist unique groups of possible experiential events that increase or decrease the likelihood of truth of the statement. Quine then argues that the two dogmas are intimately connected, and that although statements about the external world depend on language and experience, this duality “is not significantly traceable into the statements of science taken one by one,” rather it must be compared with the whole of science as the unit of empirical significance (356). As an alternative to the two dogmas, Quine proposes that “the totality of our so-called knowledge or beliefs...is a man-made fabric which impinges on experience only along the edges.” Any statement within the fabric can be held true if enough changes are made elsewhere within the system, and no statement is immune to revision. For example, Quine claims that even the law of the excluded middle could be revised if there was some compelling reason to do so (356-7).

We see that Quine arrives at his web of scientific belief by attacking two dogmas of modern empiricism. It is also clear that his “man made fabric” thesis is very similar to Duhem’s “system as a whole” thesis, although Quine’s is more general and has more implications.

So how can Quine use Duhem’s philosophy? Quine generalizes Duhem’s model of a whole, interconnected system of propositions to the entirety of human knowledge. Not only is Duhem’s belief in empirical truth is not key to his model, Quine and Duhem arrive at their conclusions in completely different manners. Thus it is in no way contradictory for Quine to use Duhem as a support.

That said, how can Duhem himself simultaneously believe in empirical truth and the underdetermination of physical theory by scientific experiment? Duhem is dealing with abstract physical theories and propositions. His thesis doesn’t need to apply to the extent of human knowledge, or even the whole of science, or even the conformation of observable phenomena; nor is it within the interest of his book. According to Duhem, empirical facts and underdetermined propositions and physical theories are in completely different categories – it is only under Quine’s generalized thesis that Duhem’s empirical facts become part of the “web of belief.”

What we see is a beautiful example of the development of a philosophical model, its use in various arguments, and its relevance in publications separated by half a century. The authors had different fundamental beliefs, but were able to shape similar ideas of interconnectedness to their philosophies. And the foundations they established are still relevant today!

Works Cited

Duhem, Pierre Maurice Marie. *The Aim and Structure of Physical Theory*. Princeton: Princeton University Press, 1954.

Quine, W.V. "Two Dogmas of Empiricism." *Philosophy of Science: Contemporary Readings*. Ed. Balashov, Yuri, and Alexander Rosenberg. London: Routledge, 2002. 340-361. Print