Section 1. General Philosophy and Methodology of Science

MAKING CONTACT WITH OBSERVATIONS

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A stalwart view in the philosophy of science holds that, even when broadly construed so as to include theoretical auxiliaries, theories cannot make direct contact with observations. This view owes much to Bogen and Woodward's (1988) influential distinction between data and phenomena. According to them, data are observable whereas (physical) phenomena are unobservable. Theories only talk about the latter. As they stress, "…data typically cannot be predicted or systematically explained by theory" (pp. 305-306). Following Bogen and Woodward, various philosophers (e.g. Prajit K. Basu (2003), Stathis Psillos (2004) and Mauricio Suarez (2005)) claim that for observations or data to be of use in theory testing, they first need to be transformed into evidence via the introduction of theoretical vocabulary. This prevents any direct observational assessment of theories. In this paper I argue contrary to this view that at least in some cases we can derive observation statements straight from the theory. In so doing I utilise a rather well-known scientific controversy between Antoine Lavoisier and Joseph Priestley.

The Lavoisier-Priestley controversy concerns two conflicting results emanating from what appears to be the same experiment. Both scientists agreed that *observationally* the experiment resulted in the production of a given quantity of a particular kind of black powder. Yet neither of their respective theories of oxygen and of phlogiston spoke of the presence of such a black powder. In both cases, the raw observational data first had to be theoretically treated. For Priestley, when iron was heated in dephlogisticated air it led to the production of iron calx. For Lavoisier, the heating of iron in oxygen led to the production of iron oxide. Yet, the presence of iron calx is only entailed by the phlogiston theory and the presence of iron oxide is only entailed by the oxygen theory. In other words, the same observation (i.e. the presence of the black powder) is theoretically transformed as two different evidential statements, each only confirming its respective theory.

Prima facie this case seems to support the Bogen and Woodward inspired view that theories do not make direct contact with observations. A more sustained examination however reveals that all one needs is a theoretical auxiliary of the form 'observation x implies evidence y' to secure a sufficiently direct link between observation and theory. In the historical case at hand theoretical auxiliaries of this form are already available. This much is admitted by Basu (ibid., p. 361), though he claims that even when we include such auxiliaries in the respective theories, i.e. when we take a broad construal of the theories, the two scientists cannot derive the relevant observation statements. This is so, Basu argues, because the converse auxiliaries are needed, i.e. something of the form 'evidence y implies observation x'. Contra Basu, I show that the original auxiliary is sufficient to establish an auxiliary of the form 'evidence y implies a disjunction one of whose disjuncts is an observation x' and that this auxiliary allows the theory to make direct contact with observations.

References:

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