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Structural Continuity and its Limits

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Place : Room 1.07 A, Buys Ballot Lab., Princetonplein 5, De Uithof (Utrecht)

Abstract. More than a decade and a half ago John Worrall revived (epistemic) *structural realism*, the view that our best scientific theories can only tell us about the structure of the world. Following Poincaré, Worrall took the structural similarities between Fresnel's theory of light and Maxwell's electromagnetic theory as historical evidence for structural realism. A question that naturally arises is whether structural continuity is a widespread phenomenon in the history of science. Worrall grants that the Fresnel-Maxwell case is unrepresentative in that Fresnel's equations can be straightforwardly derived from Maxwell's theory. Indeed, he points out, like many others before him, that it is more often the case that equations of an older theory reappear only as limiting cases of equations in a newer theory. Following Worrall, I suggest that structural realism can accommodate this fact when appeal is made to the *correspondence principle*. To this effect, I discuss a modified version of Heinz Post's correspondence principle that subsumes some well-known cases from the history of modern physics. I argue that it is not a trivial matter to satisfy this version of the correspondence principle, and that therefore structural continuity of this sort should not be taken lightly. Having said this, I also point out that belief in structural realism should not indiscriminately commit one to the belief that all structures will be preserved. Some structures never make it past scientific revolutions. Under these qualifications, the strongest claim the structural realist can make is that not all structures may survive, but those *predictively successful* elements that do survive, either intact or suitably modified (for, example, according to the some version of the correspondence principle), are structural.

It is worth noting that structural realism is not only motivated by historical considerations. I briefly discuss these as well as their strength over historical considerations. I argue that any preservation that is worth anything to the realist is parasitic on predictive achievement. Indeed, the most telling, though admittedly not conclusive, test for which components have latched onto the world is whether they have predictive success. The test for this can be done independently of any historical considerations. Realists, structural or other, should thus focus more on elaborating such prediction-based criteria. ■