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Refining process-tracing:
A mechanism-based epistemic strategy for dealing with causal complexity in the social sciences

Social scientists are well aware of the difficulties with causal complexity that their field faces. Multiple interacting variables obfuscate social science scenarios by leading to such issues as spurious correlation and Simpson's paradox, to the extent that simple additive statistical procedures are now deemed insufficient evidence for causal claims (Braumoeller 2003). It is commonly argued that one must find the *causal mechanisms* that generated observed correlations to deal with these causal complexity issues (Bennett and Checkel forthcoming, Brady and Collier 2004, George and Bennett 2005, Little 1991). In this paper, I will investigate this move towards causal mechanisms in the social sciences in detail by focusing on the technique *process-tracing*, which its proponents claim is an adequate mechanism-based epistemic strategy for dealing with causal complexity.

Process-tracing has become increasingly popular in the last decade (cf. Hall 2012), but there has been relatively little communication between process-tracers and philosophers of science. After outlining a philosophy of science account of process-tracing, I will argue that unless process-tracers adopt a clearer notion of causation they cannot find evidence for causal claims. I show that adopting James Woodward's manipulability theory of causation is especially suitable for process-tracing, and argue that this notion entails that a process-tracer must take into account both the observable implications of the mechanisms, and possible interventions on those mechanisms. If it does this, process-tracing has the potential be an adequate epistemic strategy to get around the puzzles of causal complexity.

In the paper, I argue that the essence of mechanistic social science methods such as process-tracing is the contrasting of rival hypotheses on the causal connection between an independent variable and a dependent variable , that is, hypotheses which suggest rival causal mechanisms which have contradictory observable implications. Let us call the researcher's own hypothesis . This hypothesis will then hold there exists a causal mechanism

connecting and , i.e. a set of variables such that (where means that causes). Besides hypothesis , the social scientist will investigate alternative hypotheses , , etc. that are postulated in the literature, that is, they also investigate the observable implications of chains or of intermediate variables or etc.

I will show what process-tracers' reasoning would look like if they were to commit to Woodward's manipulability theory of causation (Woodward 2003). Arguably, a counterfactual notion of causation is more suitable to studying causal mechanisms in the social sciences than other basic notions of causation. Notions of causation focused on energy-transfer, for instance, are more suited to mechanisms in natural sciences like biology than they are to social mechanisms. Moreover, using a counterfactual notion of causation respects process-tracers' claims that causal mechanisms are not reducible to mere probabilistic claims about intervening variables.

Woodward's manipulability theory of causation tells us that any successful explanation of an effect must refer to causal factors that could, at least for some individuals, be manipulated to change the phenomenon under study. One of the requirements in Woodward's theory for a variable to be a cause of another variable is that there exists some *intervention variable* Whereas a cause variable is part of the situation one is trying to analyse, the intervention variable is the means by which one undertakes this analysis. In brief, is an intervention variable for with respect to if we can use to change , which will then in turn change without any interference of other variables linked to . In other words, using we will be able to ascertain that it was that made the change in happen.

In summary, if a process-tracing researcher were to adopt the manipulability notion of causation in Woodward's framework, she would not only have to find observable implications of the alternative mechanisms under study, but also information regarding an *intervention variable* for each link of the causal chain. To illustrate this consequence of adopting Woodward's notion of causation for the social scientist, consider a simple example. A social scientist has the type-level causal hypothesis that "the economic recession, , is a contributing cause for the drop in non-domestic violent crime, , via the intervening variable of a drop in participation in the night time economy, " (i.e. spending money at bars, pubs, nightclubs and fast-food outlets). Now, to find an intervention variable to check the link in this chain, the

social scientist needs to ask herself: is there a way in which we could lower participation in the night-time economy, a way which is in no way connected to the level of non-domestic violent crime through a different route? And would this level of crime drop if we lowered participation in this way?

The conclusions of Woodward's theory for process-tracers are relevant beyond the social sciences alone; the way a Woodwardian process-tracer gets around the puzzles of causal complexity can be relevant to other scientists. Philosophy of medicine and philosophy of biology, for instance, both have to deal with problems of causal complexity and may benefit from the application of a Woodwardian framework by focusing not just on mechanisms, but also on interventions on those mechanisms. Furthermore, this paper will take a step towards a more multidisciplinary approach to philosophy of causation, seeing as Woodward's theory itself has so far not been widely applied to the social sciences.

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