

## Research Statement

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My research explores the relation between science and agency—how our interests and abilities as agents affect our scientific view of the world. In my doctoral dissertation I argue that the causal relations we appeal to in science reflect our concern with making good decisions. In my next project I plan to explore how the epistemic standards we use in scientific enquiry reflect our limitations and needs. My research covers topics in philosophy of science, epistemology and metaphysics—including causation, justification and explanation. And I engage with philosophy of physics, decision theory and philosophy of action, as well as historical approaches including German Idealism and Pragmatism.

In my doctoral dissertation, I develop and defend a deliberative account of causation. I argue that causal relations correspond to the evidential relations we need when we decide on one thing to achieve another. Tamsin's taking her umbrella, for example, is a *cause* of her staying dry if and only if her *deciding* to take her umbrella is grounds for thinking she'll stay dry. Knowing about the causal structure helps Tamsin make decisions that are evidence of outcomes she seeks. Other philosophical accounts leave it mysterious why we should care about causation. I provide an account of causation that shows how it matters. I begin by developing an 'epistemic model' of deliberation. This model characterises deliberation using requirements on beliefs, and has important implications for how we model deliberation in decision theory and even artificial intelligence. I then develop this model into a deliberative account of causation: causal relations correspond to the evidential relations we use to achieve our ends. This deliberative account explains why causal relations matter, and even why causes come *before* their effects—a surprising fact, given that fundamental physical laws don't suitably distinguish between past and future. The account also allows us to understand the explanatory structure underlying statistical-mechanical accounts of causation, and reconciles them with agent-based approaches. And it gives us a new way of relating temporally asymmetric phenomena, including entropy, memory and causation.

The following papers are direct outputs of the dissertation:

- 'Time, Flies, and Why We Can't Control the Past' (in press)
- 'Varieties of Epistemic Freedom' (forthcoming)
- 'Why We Should Care about Causation: A Deliberative Account' (in preparation)

In addition, the following papers are planned:

- 'An Epistemic Model of Practical Deliberation' (presented at seminars)
- 'I Think, therefore I Will: Fichtean Insights into Freedom and Belief' (presented at seminars and conferences)

In further research, I plan to continue exploring the relations between deliberation, prediction and evidence. In the paper 'Freedom, Self-Prediction and the Psychology of Time Travel', I will use time travel cases to argue for my epistemic model of deliberation. Say Tom time-travels to meet his eight-year-old self. If older-Tom remembers this encounter, he'll know what he'll do before he does it. I argue that older-Tom can't rationally deliberate on what he's going to do. He may still feel that what he says is up to him. But this feeling will diminish if Tom tries to say something other than what he remembers himself saying.

In a second paper, ‘Maybe I Will, Maybe I Won’t’, I consider rival attempts to use deliberation to explain the direction of causation. These accounts take there to be a primitive incompatibility between taking something to be both knowable and under one’s direct control. Tamsin, for example, can’t believe both that she can control the rain, and that she can independently find out whether there’ll be rain. I argue that these accounts don’t adequately explain *why* we take it we can control the future, and so can’t explain the asymmetry of causation. In a third paper, ‘Propensities for Agent-based Accounts of Causation’, I develop an account of the evidential relations appealed to in my account of causation. I argue that these relations are probabilistic relations, or chances, of the type explained by scientific theories. These chances are objective, based in science and temporally symmetric, and so can explain causal asymmetry.

My next major project concerns agency and justification in science—how our standards for scientific enquiry depend on our abilities and interests. It might seem tailoring our standards to suit our needs would compromise our epistemic justification in science. I argue instead that we should adopt a broadly ‘pragmatist’ account of the objectivity that science aims to provide. Science does not need to be grounded in standards beyond our own, or unquestionable foundations. Instead, we are justified in theories that help us achieve our ends. My methodology for this project follows one I employed in my dissertation—drawing on a range of philosophical sources, and fundamental science. I’ll appeal to case studies from philosophy of physics and accounts of scientific enquiry from a range of historical and contemporary sources including the 18<sup>th</sup> century German philosopher J. G. Fichte, the American pragmatists C. S. Peirce and John Dewey, and the 20<sup>th</sup> century analytic philosopher David Lewis. I plan to use their work to develop a rich and nuanced account of justification that foregrounds science’s relevance for us.

I envisage this work as a series of independent papers that form parts of the project. In one paper, ‘Checking Science: Peirce and Fichte on the Limits of Justification’, I will undertake a novel historical study of Fichte and Peirce’s accounts of objectivity. Fichte and Peirce argue that we can’t appeal to the nature of the world independently of our theorising to justify science. Yet the world still provides a ‘check’ on our enquiries—it tells us when we’re wrong. A second paper, ‘Whatever Happened to Unification?’, revives an underappreciated account of explanation by comparing it to a popular account of scientific laws. Both accounts feature standards like simplicity that seem to make the phenomena depend on us. But, I argue, in neither case do these standards compromise the objectivity of science. In ‘Epistemic Sabotage’, I consider cases from physics in which a theory’s truth would undermine our reason for holding it. I argue that such cases show that a theory and our reasons for holding it must form a coherent package. A final paper, ‘What’s Wrong with “Primitive” in “Primitive Ontology”?’’, considers attempts to place constraints on scientific theories—such as requiring theories to treat spacetime as fundamental. I argue that such requirements are misplaced—our standards are not fixed, but evolve with science.

Overall, my work aims to make sense of science by considering how our interests are built into investigation. Science is a very human enterprise, not founded on anything more basic than our own needs. I look to understand the methods and aspirations of even our most fundamental theories with an eye to understanding our place in science. These explorations help us understand how our practical needs as agents are built into science—giving us a better understanding of ourselves and what we achieve in enquiry.