12th BPSW 2024, 5-6 DEC. TITLES AND ABSTRACTS

Richard Dawid (Stockholm). Unification and Surprise: How Unification gets confirmatory

Abstract: It seems plausible to many that the fact that a theory unifies increases credence in that theory. On the other hand, Myrvold has argued that, on a Bayesian account, only a specific form of unification, which he calls mutual information unification, can have confirmatory value. In this paper, we argue that Myrvold's analysis suffers from an overly narrow understanding of what counts as evidence in a Bayesian framework. If one frames evidence in a way that includes observations beyond the theory's intended domain, one finds a much richer and, we suggest, more interesting perspective on the connection between unification and theory confirmation. One factor, on this understanding, becomes crucial for generating confirmation value for unification: the element of surprise. The talk is based on joint work with Elena Castellani and Radin Dardashti.

Jingyi Wu (LSE). Rigor Capture

Abstract: In the foundations of physics and other formal disciplines, women and some racial minorities often feel a need to meet an elevated standard for rigor in their work. This is plausibly an adaptive response to negative stereotypes about technical competence based on their social identities. This phenomenon is arguably an instance of respectability politics: a political strategy wherein members of a marginalized community consciously conform to prescribed mainstream standards in order to assimilate. I will argue that this strategy, though reasonable (and sometimes necessary!) as a survival mechanism, has undesirable consequences. Notably, it leads to a case of "rigor capture" that is analogous to elite capture (Taiwo 2022): it benefits the "elites" within the marginalized community who already have a propensity for technically rigorous work, and/or have resources to receive rigorous training in technical work. Those less well-resourced within the marginalized community who have a propensity for "qualitative" work are further marginalized. Moreover, this phenomenon can arise even without actual negative stereotyping, so long as members of the marginalized community expect negative stereotyping. Rigor capture, similar to elite capture, does not transform social structures for the better.

Michael Miller (Toronto). Precision and Determinacy

Abstract: The phenomena of indeterminacy, as it arises in quantum mechanics, involves the failure of a quantity value to be fully precise. This characterization of indeterminacy presupposes an antecedent standard of full precision. This standard is tacitly fixed by the choice of the space of numerical values in which the quantity values are represented. So, for example, the position of a particle moving in one-dimension is fully precise if it is fixed with real number precision and to have an indeterminate position is to have a position which is somehow less precise than real number precision. In this talk, I present a worry for this standard approach to understanding the relationship between precision and quantum indeterminacy. The most natural approach to specifying what it means to have position with less than real number precision is to take a value in a numerical structure which is a strict subset of the order structure on the real numbers. I show, however, that taking such a value still amounts taking a value with full precision: taking a value in such a space does not lead to indeterminacy at all. This problem points the way to a novel theory of the relationship between precision and quantum indeterminacy. I show how to identify a partial order on the set of position determinables. This order structure allows for a completely general characterization of what it means for a quantum particle to have a more or less precise position: a particle is more precisely located if it is in an eigenstate of a position determinable for a smaller region of space. This approach to the relationship between precision

and indeterminacy avoids the worry raised above, and allows for a better understanding of the phenomenon of quantum indeterminacy.

Luna de Souter (Bergen). Restoring Reductiveness in Regularity Theories of Causation

Abstract: This presentation examines a significant problem for regularity theories of causation and proposes a solution. I begin by providing an introduction to the regularity theory of causation as developed by Michael Baumgartner and Christoph Falk in their 2023 paper, Boolean Difference-making: A Modern Regularity Theory of Causation. I then present a recently discovered issue with this theory: their theory fails to distinguish certain causal structures from causally incompatible alternatives, even given optimal evidence. This failure undermines the theory's goal of providing a reductive account of causation. I demonstrate that incorporating the recently proposed "NR3" minimality condition resolves this issue, restoring the theory's capacity to provide a reductive account of type-level causation.

Sam Fletcher (Oxford). The Limits of Approximation

Abstract: Since the 1970s, philosophers have recognized that not all reductive explanations in the sciences are deductions, in the logical sense, of an explanandum. Some involve instead "limit relations" between theories or models. More recently, some have suggested that some explanations involving approximation, such as asymptotic expansions, involve no limits at all or cannot be reductive. I will argue that limit relations do represent a special class of approximations, but that their success in reductive explanations accrues to their properties as good approximations, not their special properties as limits.

Daniele Molinini (Bologna). Mapping-Based Accounts of Applicability and Converse Applications

Abstract: The philosophical analysis of successful applications of science in mathematics, or 'converse applications', remains a largely unexplored terrain. One key question in this context is whether the mapping view of applicability can be adopted to account for converse applications. In this presentation, I address this question and argue that the mapping view cannot accommodate converse applications because of two specific issues: object-sensitivity and theory-sensitivity. In the final part of my talk, I also consider some potential objections that can be used against my argument, and I maintain that they do not present significant challenges.

Karen Crowther (Oslo). Dumb holes: Universality or Analogy?

Analogue experiments have been promoted as means of potentially confirming theoretical predictions about systems that are inaccessible under the relevant conditions. A focus has been on the example of potential confirmation of Hawking radiation in black holes via analogue `dumb hole' experiments in fluids. Dardashti et al. (2017, 2019) present arguments in support of this possibility, while Crowther et al. (2019) is critical that these arguments suffice. The latter analysis utilises the characterisation of analogue experiments given by the former two papers, upon which analogue experiments are supposed to differ from both conventional experiments as well as analogies. The defining feature was taken, by Crowther et al. (2019), to be the inaccessibility of the target system. This, however, not only rules out the possibility of such experiments being confirmatory, but also conflicts with the common belief that conventional scientific experiments can aim to provide knowledge about inaccessible target systems. So, if not inaccessibility of their target systems, what defines an analogue experiment? Here, inspired by Nappo and Cangiotti (2022), I argue that there is nothing special about analogue

experiments: Either, they are conventional experiments, or they are material analogies. Nevertheless, there remain particular challenges for the case of confirming Hawking radiation via dumb hole experiments, owing to inaccessibility issues.

Monica Solomon (Bilkent). The Road Less Traveled to the Distinction between Absolute and Relative Motion: Newton's *De Motu* manuscripts.

The classical place for Newton's distinction between absolute and relative space, time, place, and motion is the scholium to the definitions in the Principia. Together with the De Gravitatione manuscript, this scholium has been analyzed by recent and not-so-recent philosophers of science as a resource for the metaphysics of space and time. In this paper, I follow a different, less travelled, road to the distinction between absolute and relative space and motion in Newton's manuscripts.

Specifically, I focus on one of the manuscripts from the De Motu series, which is dated around 1684-85 and predates the Principia. The manuscript is known for short as the Augmented De Motu ("De Motu Sphaericorum Corporum in Fluidis"- on the motion of spherical bodies in fluids). In existing literature, this manuscript has been noted for the presence of Copernican scholium and the change in status of certain claims from hypotheses to laws (Wilson, Whiteside, Smith, Biener and Schliesser, DiSalle). I agree with Biener and Schliesser ("The Certainty, Modality, and Grounding of Newton's Laws", 2017) who see the Augmented De Motu as "more than a mathematical exercise" and " as answering the central question of seventeenth-century natural philosophy" (regarding the center of the world):

> "[…] Newton also recognizes that since the center of the solar system is not identical with the sun, the planets "neither move exactly in ellipses nor twice in the same orbit". In what has been dubbed the 'Copernican Scholium,' the complexity of planetary orbits leads Newton to despair." (313)

I show, however, that this difficult and interesting problem is reframed by Newton as a programmatic task of analyzing motions of the planets and of terrestrial projectiles as quasi-isolated interacting groups or systems of bodies. I also show that the distinction between absolute and relative space and motion has its roots in this specific manuscript and the problems it tackles. Briefly put, the distinction shows that qualifying places and spaces as "absolute" and "relative" has a clear function in the analysis of real-world systems and, more precisely, in disentangling causal interactions and idealizing interacting systems of bodies. Finally, I develop the consequences of this thesis and its connections with Newton's Principia.

James Fraser (Paris). Laws of Nature on Different Scales

Abstract: Physicists use different theories to describe the world on different scales. One way to explain this methodological fact is pragmatic in spirit; fundamental theories become computationally intractable on large length scales. By contrast, another way of accounting for the methodological data is metaphysical in spirit; physicists use different theories at different scales because the world actually exhibits different nomic structure on different scales. I sketch a framework for making this second answer precise.