Nina Atanasova (University of Toledo): "Convergent Perspectivism: A Model of Integration in Neuroscience"

Convergent perspectivism is a model of integration in neuroscience. In this model, a plurality of experimental perspectives producing converging results is necessary for validation of models and convergence of experimental results is sufficient for knowledge integration in neuroscience.

Integrative accounts such as Giere's (2006) perspectival pluralism and Mitchell's (2003) integrative pluralism rely largely on the condition of complementarity of models. The pluralism they allow is trivially perspectival and poses no challenge to knowledge integration (Chakravartty 2010 and Longino 2013).

Longino endorses a more aggressive, ineliminable, form of pluralism. Her account of science assumes the inherent incommensurability of different theoretical and experimental approaches aimed at the study of identical phenomena. The difference of the ontological and epistemological commitments of different scientific communities, thus, results in noncomplementary parsing of the world. Therefore, the knowledge they articulate is irreducibly perspectival.

Models of integration in neuroscience such as Craver et al.'s and Bickle et al.'s account for the noncomplementary parsing of neurocognitive phenomena by requiring robustness analysis (Craver 2007) and convergence of experimental results (Silva et al. 2014). However, Sullivan (2009, 2016) raises a challenge that, similarly to Longino's, assumes incommensurability of experimental perspectives. In her view, integration is not currently possible in neuroscience and related disciplines because different experimental approaches do not share the same ontological assumptions about their explanatory targets, they do not share a paradigm. In her view, "construct stabilization", or standardization, is a necessary condition for knowledge integration.

The problem with standardization, as articulated by practicing neuroscientists, is that it may lead to the reproduction of measurement errors and observational artifacts (Vorhees 1996, Würbel 2000, Wahlsten 2001). This is to show that, contrary to Sullivan's view, the plurality of noncomplementary experimental perspectives is necessary. However, contrary to Longino, it does not prevent knowledge integration. Convergent perspectivism provides a better solution.

Matthew Baxendale (Central European University): "Resisting the Reductionist Retreat: Towards a Pluralism of Research Strategies"

'The reductionist retreat' is a philosophical move that consists in two stages. First, research strategies take primacy over their products such as explanations, for the epistemic focus of philosophy of science (Wimsatt, 2007, Waters, 2008, Ayala, 1974). Second, reductive research strategies are always appropriate ones to adopt because even when they fail, they are instructive and productive in their failure (Wimsatt, 2006; 2007). In contrast, I argue that focusing on research strategies rather than their products demonstrates that in certain cases a non-reductive (or systems-level) research strategy will be more appropriate than a reductive one. Accordingly, my argument generates a pluralism about the applicability of research strategies. The reductionist retreat maintains an asymmetry between reductive and non-reductive research strategies: whereas the former is universally appropriate, the latter only becomes applicable to situations in which the former has failed. A thorough-going pluralism about research strategies removes this asymmetry and establishes a continuum between the two based on the nature of the inquiry being undertaken. One factor that will affect the applicability of a research strategy will be the degree of integration exhibited by the system under investigation. Integrated systems feature minimal decomposability (Simon, 1996; Bechtel & Richardson, 2010), feedback mechanisms, non-linear dynamics, and often self-organisational features (Mitchell, 2003; 2009). The more integration a system exhibits, the more appropriate a systems-level research strategy will become. To illustrate this, I draw on the work of Thomas Seeley (1989; 1995) concerning the foraging behaviour of honey bees. Seeley's 'unloading difficulty hypothesis' treated the behaviour of the honey bee as embedded within an integrated system and accordingly resulted in a systems-level research strategy. His successful results provide a paradigm case in which a systems-level approach was more appropriate than a reductive one.

Matthew J Brown (The University of Texas at Dallas): “Pluralism, Realism, and Values in Scientific Metaphysics”

The sciences, taken at face value, display a bewildering variety and disunity. Conflicting practices, models, ontologies, laws, and theories seems to be the lot of science in practice. This fact of scientific pluralism can inspire a synchronic version of the pessimistic meta-induction; as the commitments of the best sciences at present, taken together, contain or imply contradictions, assuming the principle of noncontradiction, our best scientific theories cannot (all) be true. Not only do we have conflicts underdetermined by evidence and scientific standards, often scientists will not agree on what "the" evidence is, or how to evaluate theories and models in light of it.

If this is right, then one cannot simultaneously be committed to (a) scientific realism, (b) a single, coherent, mind-independent structure of the world, and (c) epistemic naturalism (drawing standards for judging knowledge from the sciences). One can give up on (a) and remain a kind of pragmatist, empiricist, or instrumentalist. One can give up (b) and accept some kind of perspectival, local, or promiscuous realism. Or one can give up on (c) and introduce some philosophically-principled or ad hoc selection of parts of science to be realist about. As there are costs and benefits to each of these options, we appear to have a free choice about how to resolve this trilemma. Likewise, as their are many different ways to execute (c), any attempt to draw a realistic, coherent, unified system out of science will involve a series of unforced choices.

One style of argument in the values in science literature has it that such unforced choices can and ought to be guided by our interests and values, when they are relevant. Our epistemic and metaphysical interpretation of science, decisions about research and ontology, turns out to be such a case.

Samuel Cusimano (Michigan) and **Beckett Sterner** (Arizona State): "Integrated Pluralism for Biological Function"

What is it for part of a living organism to have a "function"? After wrangling over this question for decades, philosophers have largely surrendered to relativism. Nowadays, the prevailing narrative holds that there are two main types of biological function, etiological functions and causal role functions, each of which compatible with work in different disciplines: e.g., the former in evolutionary biology, the latter in functional anatomy. We aim to redirect this narrative, arguing that biological functions exemplify a stronger form of pluralism in which distinct yet overlapping ontological views provide a basis for epistemic integration across different research programs. In addition to etiological and causal role functions, this pluralism also encompasses accounts that are often dismissed as overly narrow or easily refuted, such as the goal-directed, propensity, and biostatistical views. Using a comprehensive, comparative study of all the major accounts of biological function, we demonstrate that these different accounts share messy, non-hierarchical overlap in terms of which biological processes they designate as functions. As a result of the messy interrelationships among these accounts, the different types of biological function they describe cannot be neatly unified. Nontheless, this radical pluralism has epistemic value for biology. Each account of biological function demands different kinds of evidence to establish function ascriptions, and some kinds of evidence are easier to obtain than others. Because these different accounts have intersecting extensions, biologists can use what they know about the function of a trait in one sense, e.g., goal-directed function, to infer details about the trait's function in another sense for which evidence is more elusive, e.g., etiological function. Thus, the absence of ontological monism does not imply a collapse into relativism about knowledge in biology. On the contrary, pluralism about biological function highlights the distinctive epistemic value of interdisciplinary research.

Louise Daoust (University of Pennsylvania): “Pluralism, Realism and Color Science”

The dominant positions in color ontology have much to offer one another when it comes to understanding color as an object of theoretical inquiry. Valuing scientific tractability, cognitive scientists treat colors as physical, and so stable, perceiver-independent properties of objects. A supposedly competing philosophical tradition values flexibility in the face of variation in color appearances across species, individuals, and lighting conditions, and so understands colors as relational, unstable properties that depend on specific viewing circumstances and minds. I articulate a pluralist approach to color normativity according to which these different views of color succeed at modeling different features of the phenomenon. I argue that taking colors to be stable properties of objects is compatible with a commitment to the dependence of colors on perceivers; moreover, views with both of these features will tend to be the most philosophically interesting and empirically useful accounts. The resulting account is pluralist about scientific theories and scientific knowledge, but in the second half of the paper I use it to illustrate how a pluralist conception of scientific knowledge need not be at odds with our realist ambitions. I do this by distinguishing between types of scientific realisms. In particular, I argue that realism does not entail a commitment to the mind-independence of scientific objects. The proposal embraces a diversity of disciplinary interests without demanding a reduction of some to others. All objects of scientific inquiry, like color, place significant constraints on the usefulness of particular theories. Robustness analysis can help us refine theories (even if trade-offs are ineliminable), and has the potential to get us closer to a richer range of knowledge about the world.

Justin Donhauser (Rotman Institute of Philosophy) and **Jamie Shaw** (Rotman Institute of Philosophy): "What Theoretical Ecology Reveals about Knowledge Transfer"

Well-known epistemologies of science have substantive implications for how best to understand knowledge transfer. Yet, to date, few have made serious attempts to detail those implications. This paper infers views about knowledge transfer from two popular epistemologies; what we characterize as neo-incommensurability views (after Devitt 2001; Bird 2002, 2008; Sankey and Hoyningen-Huene 2013) and voluntarist views (after van Fraassen 1984; Dupré 2001; Chakravartty 2015). We argue views of the former sort define the methodological, ontological, and social conditions under which research operates within 'different worlds' (to use Kuhn's expression), and entail that true knowledge transfers under those conditions should be impossible. By contrast, more liberal voluntarist views recognize epistemological processes and constraints that allow for transfers across different sciences even under such conditions. After outlining these antithetical positions, we identify knowledge transfers of two kinds present in well-known episodes in the history of ecology—specifically, successful model transfers from kinetics and thermodynamics into areas of ecological research—which suggest rejecting neo-incommensurability views. We then conclude by discussing how the selected examples support a variety of pluralistic voluntarism regarding knowledge transfer that is in line with an epistemology defended independently by Bas van Fraassen and Anjan Chakravartty.

Luis H Favela (University of Central Florida): "Pluralistic Explanatory Practices for an Ontologically Pluralistic World"

The predominant view in the life sciences is that the most fundamental and viable kinds of explanations are mechanistic. Whether implicitly or explicitly, to adhere to a position that mechanistic explanations are fundamental explanations is to simultaneously adhere to the idea that the phenomenon being explained—ontologically speaking—just is a mechanism. X ought to be explained as a mechanism because X is a mechanism. We believe this to be an unnecessarily restrictive position. Investigations in the life sciences ought to begin from a pluralistic position concerning both explanatory style and ontological commitments. There are phenomena that require multiple explanatory strategies. That is to say, that there are different kinds of explanations of the same system; or, as we show here, different kinds of explanations of the different but closely related aspects of the same system. Natural phenomena can have some features that are properly considered as mechanisms and others as dynamical systems. This is not necessarily a case of underdetermination, or a failure to find the single, actual mechanistic or dynamical explanation. We defend this position by means of a discussion of the application of both mechanistic and dynamical strategies to different features of starling murmurations, or bird flocking. In this case, the orientations of individual birds in the flock are properly explained mechanistically, while their velocity is properly explained dynamically. If we are willing to read ontology off our explanatory practices and vice versa, then a murmuration is both a dynamical system and a phenomenon that has an underlying mechanism. There is no reason to think that starling murmurations are unique in this respect.

Stuart Glennan (Butler University): "Pluralism without tears: mechanistic ontology and the pluralistic character of scientific knowledge"

The growing interest in pluralism in 21st century philosophy of science has coincided with the re-emergence of philosophical interest in mechanisms. I shall argue that this is no accident, and that at least some versions of the New Mechanist approach provide an ontological account that can make sense of methodological pluralism while justifying a perspectival but realist account of scientific knowledge.

As I interpret the New Mechanist account, natural and social phenomena depend upon mechanisms, in the sense that these phenomena are caused and constituted by the organized activities and interactions of the mechanism's parts. Knowledge about mechanisms is embodied in models that represent various features of the phenomena and the mechanisms upon which they depend. I shall argue (contra some interpretations of New Mechanism) that modeling mechanisms necessitates adoption of what Weisberg (2013) has called multiple models idealization (MMI), and that it is the plurality of models that accounts for the pluralistic character of knowledge of natural phenomena and the mechanisms upon which they depend.

The model-based approach has implications for our understanding of scientific knowledge claims. On traditional accounts, propositional knowledge requires justified true belief; models though are not typically thought to be true representations of their targets, but are instead understood taken to be similar to their targets in various degrees and respects. The similarity-based account suggests a natural path for disentangling the objective and pragmatic elements of scientific knowledge. That a model resembles a target mechanism in some degree and respect may be a mind-independent truth, but the degrees and respects in which a model must resemble a target in order to count as a model of that mechanism will depend deeply upon pragmatic questions of how such models are to be used.
Time:

David Glick (Oxford): “Pluralist Structural Realism”

An alleged benefit of structural realism is the response it allows to the “pessimistic metainduction” argument against scientific realism. The structuralist claims that if one focuses only on structure, the history of science reveals the sort of continuity that is missing from the traditional realist picture. This same general strategy can be applied to the synchronic case as well, allowing for a reconciliation of realism and pluralism. Of course, it’s clear that structural realism allows distinct isomorphic theories to be equally faithful representations of the world (although one may question in what sense they are distinct). But structural realism also allows non-isomorphic theories to each accurately represent world, or so I will argue. In the historical case, the structuralist needn’t claim that subsequent theories are isomorphic to their predecessors, but only that they can plausibly be taken to represent the same structure more or less. Similarly, the structuralist may claim that distinct synchronic theories each capture the structure of the world approximately, even though each attributes to it a different structure. This is possible because (a) all theories are concerned with the same kind of entity (i.e., structure) and (b) the same worldly situation may be (approximately) represented in inequivalent ways. The traditional realist, by contrast, must deny (a) and (b) for the same reasons that drive the PMI: theories often have inconsistent ontological commitments, and this precludes more than one faithfully representing the world, even approximately. Thus, structural realism allows one to be a pluralist and a realist without denying there is only one way the world is. This pluralist orientation may also allow the structural realist to deal with certain challenges that have been raised in applying the view, such as the problem of unitarily inequivalent representations in quantum field theory.

Eric Hochstein (Washington University in St. Louis): "Why Scientific Pluralism Requires an Ontological Monism"

Scientific pluralism has gained a great deal of popularity in recent years, with an increasing number of philosophers emphasizing the importance of employing distinct and often incompatible representational and modeling practices in the scientific study of complex phenomena. Despite this, the explanation for why science requires such a plurality of representational practices is still hotly debated. Some appeal to the limitations on scientific representation, others appeal to the sheer complexity of the world, while others appeal to the limits of human understanding and our need for simplifying assumptions. Some, however, have argued that the most plausible explanation for why science requires a plurality of inconsistent representational practices is because the world itself may be inconsistent, disordered, or dappled (Dupré 1993, Cartwright 1999). Here, the justification for the inconsistencies in our modeling practices is that such inconsistencies mirror the inconsistencies in the world itself.

In this paper, I argue that the very success of scientific pluralism in fact provides evidence that the world cannot be inconsistent, dappled or disordered. Scientific pluralism frequently requires that we draw inferences across different inconsistent sets of models. The information gathered from one model is used to inform, modify, and identify constraints on, others. It is this very interdependence between inconsistent models that has allowed us to understand and explain phenomena like the action potential (Trumpler 1997, Hochstein 2016), protein folding (Mitchell & Gronenborn 2015), and the evolution of physiological traits (Potochnik 2010). However, if the world were indeed dappled or inconsistent, then the information gathered from one model should provide no constraints on, or insights into, the application of others. Instead, the different models would radically cross-classify the world with little or no relevance to each other. The success of scientific pluralism suggests that different representational techniques are describing different restricted aspects of a single unified phenomenon, and this is what allows us to draw inferences from one model to the next (even if they must idealize or distort different aspects of the same phenomenon in order to do so).

Justin Humphreys (University of Pittsburgh): "Local Indeterminacy"

Cartwright (1999, 2012, 2013) has argued that the methodological pluralism of the sciences speaks against a conception of scientific laws as a pyramid, with the fundamental laws of physics at the top. Rather it supports a patchwork conception, according to which nature is governed in different domains by systems of not necessarily interrelated laws. This patchwork conception in turn suggests a "local realist" view of scientific knowledge. According to her neo-Kantian argument for local realism, the possibility of scientific prediction and control depends on there being objective, domain-specific knowledge of "natures." Since prediction and control are possible in specific domains, there is local knowledge of these natures. McArthur (2006) has objected that this view leads to a conflation of methodological pluralism with the stronger epistemological thesis that no translation is possible between branches of empirical science. Drawing on Chakravartty's (1998, 2013) work on properties, he has argued that pluralism is compatible with a structural realism according to which even when one set of laws is irreducible to another, knowledge of those domains is not incommensurable.

In this paper, I argue that Cartwright's epistemology can be vindicated by examining the indeterminacy of local theories. Considering Neurath's (1987) example of a dollar bill blowing around a city square and Norton's (2008) example of a frictionless dome, I argue that physical laws are determinate only up to a local bound. When antecedent knowledge of the nature in question is incomplete, the systems of equations are indeterminate. The upshot is that we can reject the infelicitous view that scientific knowledge is relative, without appealing to an abstract notion of structure to preserve realism. Positively, one can accept Cartwright's local realism as the interpretation of pluralism while maintaining the Kantian conviction that scientific successes depend on antecedent knowledge of natures.

P.D. Magnus (University at Albany, SUNY): "Does pluralism about natural kinds have to be superficial and anti-realist? (Spoiler: No)"

Richard Boyd and P.D. Magnus claim to be realists about natural kinds, although they treat the naturalness of a kind as only holding relative to a domain of enquiry. This introduces an ineliminable pluralism, because different domains of enquiry light up different categories as natural kinds. Some philosophers, thinking in terms more familiar from metaphysics, treat these domain-relative accounts as unreal or as objectionably superficial. I argue that taking pluralism seriously requires allowing for realist ontology without committing to fundamental metaphysics. An example discussed by Magnus is the planet category, which is a natural kind for astronomy but which is neither merely nominal nor characterized by essential, fundamental constituents. I discuss the further example of vitamins. On a standard story about vitamin C, the cause and cure for scurvy was discovered in the 18th-century when citrus was shown to protect sailors. Yet this was a superficial connection. It was unclear what about citrus was proof against scurvy, and so scurvy was still a serious problem in the early 20th-century. The standard essentialist move would be to identify the natural kind with a specific chemical. That almost works for vitamin C, but fails utterly for other vitamins which comprise different chemical species or vitamers. These failures of superficiality and deep metaphysics do not show that vitamins are not natural kinds. Instead, they show the value of starting from categories which we identify in the world, elaborating their structure to the extent that we can do so, but not pretending to jump ahead to a complete story about the metaphysics of everything. This kind of middle range ontology makes space for a pluralist realism without fundamental metaphysics.

Collin Rice (Bryn Mawr College): "Universality and Multiple Conflicting Models"

A key instance of pluralism in science is the construction of multiple idealized models for the same phenomenon. Most attempts to justify the use of idealized models to explain appeal to the irrelevance of the features distorted and to the accuracy of the model with respect to difference-making (i.e. relevant) features. This approach requires that there be a single objective set of difference makers for the target explanandum. However, this idea conflicts with pluralistic conceptions of scientific knowledge and the widespread use of multiple conflicting idealized models to investigate and explain the same phenomenon. Indeed, the standard difference-making approach is difficult to square with the use of a plurality of models that make fundamentally different idealizing assumptions and represent incompatible causal structures. In response, I argue for an alternative way to justify using multiple idealized models to explain that appeals to universality. The term universality comes from mathematical physics, but in its most general form it is just an expression of the fact that many systems that are (perhaps extremely) heterogeneous in their physical features will nonetheless display similar patterns of behavior at macroscales. The group of systems that display similar macrobehaviors despite differences in their physical details are said to be in the same universality class. Using examples from biological modeling, I illustrate how universality can link multiple conflicting models to their target system(s) in ways that allow for the integration of the pluralistic explanations, knowledge and understanding they produce. In addition, I argue that such an approach is compatible with a factive conception of the corpus of scientific understanding produced by these conflicting models. Recognizing this factive conception of understanding allows for a version of scientific realism to be preserved despite the plurality of knowledge we acquire from conflicting scientific models.

Georgie Statham (The Van Leer Jerusalem Institute): “Interventionism and Scientific Pluralism”

In this paper, I argue that there is a connection between James Woodward's interventionist theory of causation and scientific pluralism, and elucidate the consequences of this connection. Using interventionist terminology, I clarify recent arguments for scientific pluralism that have been advanced by Helen Longino. She can be interpreted as claiming that there are at least some phenomena that can't be fully represented by a single interventionist causal model; a claim that, I argue, is supported by the interventionist theory itself. According to this theory, we therefore need multiple causal models--and also multiple scientific theories--of at least some parts of the world. Thus, accepting interventionism forces one to accept scientific pluralism.

Drawing further on Longino's arguments, I then show that accepting scientific pluralism has metaphysical implications for interventionism. More specifically, interventionists have to give up one of the following two claims: (i) that their theory picks out all instances of causation; or (ii) that there is any sense in which the world (and all parts of the world) is a single causal structure. Since there are reasons for interventionists to favour (ii), the theory pushes its advocates away from naive realism about scientific theories and towards a pragmatic--or context sensitive--understanding of the relationship between theory and the world. On this pragmatic picture, there are multiple ways in which the purpose of a causal enquiry influences the construction of causal models/scientific theories. Thus, there is a sense in which scientific theories end up being relative to an enquiry. However, constraints arising from the enquiries themselves prevent this pragmatism from collapsing into a problematic from of relativism.

David Stump (University of San Francisco): “Fallibilism and the epistemic argument for pluralism”

I will argue that pluralism does not necessarily imply relativism, nor any form of anti-realism. Indeed, if pluralism is thought of epistemically, it is compatible with even a strong form of metaphysical realism. Even if there is only one correct interpretation of the world, we may be in a position of being unable to know the world with certainty, and from that starting point, argue that we are better off leaving multiple accounts of the world open to investigation so as to hedge our bets. Thus, fallibilism, even when conjoined with the metaphysically realist idea that there is one independent world, opens the door to one kind of argument for pluralism. Even if we accept that “the ultimate aim of science is to establish a single, complete, and comprehensive account of the natural world,”1 if we are not there yet, we can argue for the benefits of pluralism. Furthermore, there is no reason to hold that the alternative accounts of the world to be left open are all equally valid, as a relativist might argue. Rather, we could see them as approaches that may or may not be shown to be workable, as possibilities, and even if we will never gain certain knowledge of what the world is, we may be able to differentiate them as better or worse. I will consider this position in relation to Hasok Chang’s recent defense of pluralism.2

1. Kellert, Stephen H. , Helen E. Longino, and C. Kenneth Waters, eds. 2006. Scientific Pluralism. Minneapolis: University of Minnesota Press, p. x.
2. Chang, Hasok. 2012. Is Water H2O? Evidence, Realism and Pluralism. Dordrecht: Springer, ch. 5.