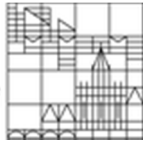


University of
Konstanz



Kick-off workshop on *Agency and (quantum) physics*

AQP2015

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Abstracts



Hans J Briegel (University of Innsbruck)

Projective simulation as a physical model for agency

I will discuss a model of a learning agent that connects concepts from artificial intelligence with statistical physics and quantum information. Its central element is the notion of *projective simulation* (PS), which allows an agent to project itself into conceivable situations before taking real actions, and which gives rise to a primitive notion of creativity. Projective simulation can be formulated entirely in terms of stochastic processes that describe the dynamics of the agent's deliberation and learning. While physically grounded, the model is formulated at a sufficiently abstract level to be suitable to connect to philosophical discussions of agency. Different from other approaches, it also provides a natural way for quantization. This allows us not only to explore how quantum effects, such as quantum superposition and interference, could be exploited by an agent to increase its learning capabilities. It also provides us with an explicit framework to discuss the role of quantum physics for agency and *vice versa*.

Godehard Brüntrup (Munich School of Philosophy)

Agency and Non-Supervenient Emergence

The common sense notion of agency ascribes causal efficacy to the agent as intentional system. If all causal powers of the agent must ultimately be reducible to the causal powers of sub-personal non-intentional systems, then common sense will conclude that we have been wrong about the causal powers of agents. It will be argued that our intuitive idea of agency implies a notion of downward causation.

Metaphysics should attempt to preserve the richness of common sense experience without giving up coherence and consistency. If we want to capture this rich notion of agency in an abstract metaphysical model then, excluding substance dualism, the higher-level causally efficacious entity has to emerge from the dynamics of the underlying system.

Static synchronic supervenience-based models of emergence cannot, however, account for the causal efficacy of supervenient entities. Dynamic diachronic accounts of emergence have a better chance of capturing the common sense notion of agency. Emergence will be construed as a non-deterministic causal connection.

Finally, the question will be raised whether this metaphysical model is – at least in principle – in accordance with quantum mechanics.

Cord Friebe (University of Bonn)

Laws of nature, temporal becoming, and ontological indeterminism

The view that the future is 'open', i.e. not only epistemically but ontologically indetermined, apparently distinguishes the present as being the edge of being. Correspondingly, dynamical views of temporal existence seem to be close to open-future views, whereas the block universe goes with determinism.

However, the meaning of "(in)determinism" rather depends on the status of natural laws. If they were Humean, eternalism, most plausibly, would be presupposed anyway, independently of whether the Best System contains (in)deterministic laws. The block universe could hence be indeterministic. By contrast, consider anti-Humean laws: dispositional properties seem to be productive, i.e. existentially dynamical, independently of whether they act in an (in)deterministic way. Presentism or growing block could hence go with determinism.

Erasmus Mayr (HU Berlin/Oxford University)

Human and animal agency

I will discuss some key issues about animal and human agency and its place in nature. They concern, on the one hand, the question of whether these forms of agency can be understood as forms of a more general genus of activity (being active) which is found in nature even more widely, and, on the other hand, what the distinguishing characteristics of animal and human agency are vis-a-vis other forms of activity (if there are any). Both these questions are of immediate relevance for giving an adequate account of the place of animal and human agency within the natural order. For while a positive answer to the first question would enable us to maintain that these forms of agency don't introduce a radical break in the natural order, answering the second question is essential to ensuring that we don't find a place for such agency in the natural order only at the expense of stripping animal and human agency of its essential characteristics.

In order to qualify some animal or person as an agent (with regard to a particular occurrence) it is necessary that we can, in some sense, identify the animal or person as the source of the occurrence in question. This presupposes that there is a genuine contribution by the animal or person which can be distinguished from causal contributions attributable to other factors external to it (or her). While this seems to be a general pre-condition for activity which might be found more widely in nature than only in the cases of animal and human agency (e.g. in the workings of some inorganic matter and of plants), the latter forms of agency seem to possess additional distinguishing characteristics which go beyond the fact that the agent in question is an animal or human being. One candidate for such a distinguishing characteristics is that the activity ascribed to animals or humans must show a form of adaptability and plasticity that we do not usually require for activity in other natural substances. I will examine how plausible a candidate this is, whether it raises any specific problems for finding a place for such agency in the natural order and whether it requires the falsity of determinism in ways which are not required by other forms of agency in nature.

I will thus mainly be concerned with three questions:

(1) Is there a more basic notion of activity or causal contribution which animal and human agency share with other phenomena in nature?

(2) What distinguishes animal or human agency from these other forms? And can we explain what distinguishes them in ways which do not raise problems for the project of finding a place for such forms of agency 'in the natural order'?

(3) Do human and animal agency require the falsehood of determinism?

Thomas Müller (University of Konstanz)

What can formal modeling contribute to our understanding of agency?

The notion of agency is central for our self-understanding. We know that we are agents who interact with the world around us, which includes other agents, and that our choices have an impact on the way the course of nature unfolds over time. This basic conviction, which arguably anchors our moral assessment of what we ourselves and others do, appears to be threatened by a scientific world view according to which we as agents are, ultimately and at all scales, just a part of nature like everything else.

In my talk, I will discuss the prospects of using explicit, scientifically well-grounded formal models to improve our understanding of agency. I will argue that such models, which are at the core of the "Agency and (quantum) physics" project, can provide crucial elucidations for the conceptual problems of agency. The main case I will consider is the argument from luck against agency under indeterminism.

Josef Quitterer/Lukas Kraus (University of Innsbruck)

Strong autonomy as a necessary condition for agency and its ontological implications

A necessary condition for agency is that the agent be autonomous in a sufficiently strong way: keeping external conditions constant, the agent is able to bring about an effect or not to do so. Only if there is autonomy in this strong sense can one say that it is the agent which brings about the effect. It is insufficient for agency if the effect is simply brought about whenever some special external circumstances obtain.

This necessary condition for agency has profound implications for the ontology of agents. An agent must be an endurer (i.e., a three-dimensional spatial object that can undergo changes in time but that remains the same object nonetheless) and an individual with a definite boundary with its surroundings. Neither mereological stability nor a stable internal functional structure are necessary to meet the condition of strong autonomy. That said, the agent's internal functional structure must possess a certain degree of variability to ensure that it is up to the agent how its powers are manifested.

Renato Renner (ETH Zurich)

How to avoid the need for free choice

The ability of an experimenter to make certain choices freely plays a fundamental role in experiments. For example, in a typical Bell-type experiment, the usual conclusion that there is no underlying hidden-variable model can only be reached if one assumes that the measurement bases are chosen freely, i.e., independently of anything else. In this talk, I will propose a novel approach that allows us to reach similar conclusions under substantially weakened assumptions on the experimenters' ability to make free choices.

Alexander Reutlinger (LMU Munich)

Are Higher-level Causes Really Emergent?

In their *Every Thing Must Go*, Ladyman and Ross defend a novel version of Neo-Russellian metaphysics of causation, which falls into three claims: (1) there are no fundamental physical causal facts (orthodox Russellian claim), (2) there are higher-level causal facts of the special sciences, and (3) higher-level causal facts are explanatorily emergent. While accepting claims (1) and (2), I attack claim (3). Ladyman and Ross argue that higher-level causal facts are explanatorily emergent, because (a) certain aspects of these higher-level facts (their universality) can be captured by renormalization group (RG) explanations, and (b) RG explanations are not reductive explanations. However, I argue that RG explanation should be understood as reductive explanations. This result undermines Ladyman and Ross's RG-based argument for the explanatory emergence of higher-level causal facts.

Rüdiger Schack (University of London)

Agency and QBism

QBism is an approach to quantum theory which is thoroughly grounded in the personalist conception of probability pioneered by Ramsey, de Finetti and Savage. According to QBism, a quantum state represents an agent's personal degrees of belief regarding the consequences of her actions on any part of her external world. The quantum formalism provides consistency criteria that enable the agent to make better decisions. The concepts of agency and action thus form the starting point for a QBist understanding of quantum mechanics. Only an agent can be a user of quantum mechanics. But, by a Copernican principle, an agent's external world contains other agents. In this talk, I explore the question of what it means for a QBist agent to apply quantum mechanics to another agent: in what sense can agency be modelled in QBism?

Mariusz Tabaczek (Graduate Theological Union, Berkeley, CA)

Metaphysics of Downward Causation: New Aristotelianism versus Nonreductionist Physicalism

Many proponents of methodological nonreductionism in contemporary science find the notion of downward causation (DC) a sine qua non condition of the strong (ontological) version of emergence (EM), which strives to give an account of the irreducible character of the complex levels of the organization of matter. But what for many is the essence of nonreductionist physicalism, carries with it quite a bevy of problematic issues, and becomes a stumbling block and an obstacle for those, who acknowledge the metaphysical and logical inconsistencies of the emergent theory based on the idea of DC. For how can physicalism be non-reductionist? How can DC be reconciled with the causal closure of physics? What do “higher” and “lower” levels refer to? What is causal in DC? What is being caused (acted upon)? What is the very nature of DC?

I will argue that the defense of DC requires from us a broader notion of causation, which goes beyond the efficient causes accepted and described in modern science. I want to argue in favor of the retrieval of formal causation in particular. Its acceptance not only makes EM and DC plausible, but also helps to overcome and replace Humean causation of events with the causation of living and non-living beings, explained in terms of their causal powers and dispositions. I hope to show, in the course of my presentation, that true nonreductionism needs to be philosophically grounded. Yet it can still remain compatible with science provided it values and is open to the reflection offered by philosophy of nature. My position follows new Aristotelianism developed within the analytic tradition, although an explicit reintroduction of formal cause goes beyond it to the original thought of Aristotle.