

Editorial

Contemporary Questions of Metaphysics in Science: NNPS 2016

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This journal issue showcases a selection of papers presented at the Fourth Meeting of the Nordic Network for Philosophy of Science that took place on the 21st–23rd April 2016 in Pärnu, Estonia. The event was organized by the members of the Chair of Philosophy of Science of the Department of Philosophy at the University of Tartu. The main organizers of the conference were Associate Professor Dr Endla Lõhkivi, Research Fellow Dr Ave Mets and Research Fellow Dr Edit Talpsepp-Randla; the members of the local organizing committee were PhD Student Kristin Kokkov, Coordinator of the Centre for Ethics Triin Paaver and Research Fellow Dr Mats Volberg.

The Nordic Network for Philosophy of Science (NNPS) was founded in 2012, with philosophers of science from different Nordic Countries (Denmark, Finland, Iceland, Norway, Sweden) as its members. This organization “provides researchers with a platform for exchange and collaboration within all areas of philosophy of science”¹ and its “main instrument is an annual workshop-style meeting.”² So far, five Meetings have taken place—in Uppsala (2013), Lund (2014), Helsinki (2015), Pärnu/Tartu³ (2016) and Copenhagen (2017). Philosophers from the University of Tartu first participated in Helsinki where the third NNPS Meeting was held.

As measured by conference delegates and presenters, the Fourth Meeting was the biggest up until that point in time. The programme committee

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¹ A quote from the webpage of the NNPS: <https://nnpsscience.wordpress.com>

² Ibid.

³ The Fourth Meeting, organized by our Chair of Philosophy of Science, was initially supposed to take place in Tartu. However, as there were some other big events taking place in Tartu at the same time, there was a shortage of accommodation in local hostels and hotels. Hence the event was moved to a spa hotel Strand located in Pärnu, one of the most popular summer holiday resorts in Estonia.

of the event received 66 submissions for contributed papers, the majority of which were accepted.⁴ This resulted in a programme with 49 speakers in 18 sessions, 3 of which were invited keynote plenaries. The latter were given by Professor Hanne Andersen (University of Copenhagen), Professor John Dupré (University of Exeter) and Professor Mikael Karlsson (University of Iceland). Professor Andersen's talk was titled "The Structure and Development of Contemporary Science" and it provided an analysis of "the tension that seems to be inherent in contemporary science between, on the one side the development towards collaboration and interdisciplinarity, and on the other side classical ideals of individual accountability and community based quality control."⁵ Professor Dupre's talk was titled "Process, Organisms, and Kinds," and it concentrated on the process-based (as opposed to the traditional substance-based) ontology in biology, and on "the problems that this ontological situation [the processuality of living nature] poses for individuating, and also for classifying, biological organisms."⁶ Professor Karlsson's talk was titled "What is Inference, anyway?" and it aimed to give a methodological account of inference by reflecting upon "how the differences between deductive and inductive inference have been explained by those who believe in the logical property of both forms" (in his paper, Karlsson considers two such explanatory accounts, one by Wesley Salmon and another by Stephen Barker).⁷

The selection of contributed presentations was conducted by the international programme committee, the members of which are listed here in alphabetical order: Lise Marie Andresen (University of Aarhus), Rani Lill Anjum (Norwegian University of Life Sciences), Daniel Cohnitz (University of Utrecht), Finnur Dellsén (University of Iceland), Lars-Göran Johansson (University of Uppsala), Ólafur Páll Jónsson (University of Iceland), Soren Harnow Klausen (University of Southern Denmark), Carlo Martini (University of Helsinki), Peeter Mürsepp (Tallinn University of Technology), Michiru Nagatsu (University of Helsinki), Ahti-Veikko Pietarinen (University of Helsinki, Tallinn University of Technology), Petri Ylikoski (University of Helsinki, Linköping University), Frank Zenker (University of Lund).

⁴ It has to be noted that, in terms of the countries of origin and residence of conference delegates, the Meeting was not limited to the Nordics—we received abstract submissions from all over Europe, as well as other countries such as the US and India.

⁵ The book of abstracts of the NNPS Meeting, see <https://nnpscience.files.wordpress.com/2016/03/abstract-andersen-the-structure-of-contemporary-science.pdf>

⁶ Ibid., see <https://nnpscience.files.wordpress.com/2016/03/abstract-dupre-process-organisms-and-kinds.pdf>

⁷ Ibid., see <https://nnpscience.files.wordpress.com/2016/03/abstract-karlsson-what-is-inference-anyway.pdf>

The themes of the parallel sessions were highly varied.⁸ For instance, we had sessions on philosophy of the special sciences, such as Philosophy of Physics, Biology, Medicine and the Cognitive Sciences. The session on *Philosophy of Physics* involved talks on questions concerning the relationship between classical and quantum physics. The session on *Philosophy of Biology* discussed questions about what it means for a trait to be biological vs socially constructed, about how can we give functional explanations of traits in the face of the existence of functional equivalents of these traits, and the questions about explaining the relation between sensations and the physical world. The session on *Philosophy of Cognitive Science* concentrated on Michael Tomasello's "ratchet argument." The session aimed to explain the connection between imitation and cumulative culture, the methodological and ontological implications of quantitative psychology, and to answer questions concerning the different processes that influence early vision. The *Philosophy of Medicine* session involved papers on the defense of the evidence-based medicine model in psychotherapy, on descriptions of the structure and reasoning patterns involved in clinical diagnostic medicine, and on radical disagreement and transparency of warrant in medical epistemology. The session on *Math in the Sciences* involved talks on the principle of the constructive mathematizability of any theory, on mathematical indexing in complex science, and on topological explanations in the social sciences. The papers presented at the *Logic and Probability* session discussed questions concerning whether probabilistic explanations can count as objective in contemporary science, about the logical framework of logical (opposition) relations among scientific assertions and hypotheses, and about whether the ideal of Logic can be a social good as was stated by Lewis Carroll.

The topics of some sessions covered questions related to science in general. The session on the *Scientific World Picture* included: a talk that analyzed the behavioural approach to law and policy as a case of scientific imperialism; a talk about the relationship between patent law and the scientific world picture; and a talk about the problem of individuality formation in the technological society. The session on *Causality* discussed the connection between causal powers in nature and in mind, and the question of how idealizing models provide understanding-why (understanding why a phenomenon occurred). The session on *Science Policy* included talks: on the question of whether democratically mandated pluralistic research communities should involve laypersons; on an empirical study of trust-formation

⁸ Time table of the conference with the names of authors can be found here: <https://nnpscience.files.wordpress.com/2016/04/nnps-sessions-titles-chairs-20-041.pdf>; book of abstracts of the conference can be found here: <https://nnpscience.files.wordpress.com/2016/04/book-of-abstracts1.pdf>

in think-tank research; and a talk on the problem of recognition in academic communities. The session on *Scientific Realism* analyzed: the epistemic implications of the scientific realism debate; a dilemma for empirical realism between idealism and empiricism; and the epistemic burdens of scientific anti-realism. The session on *Metaphysics in Science* dealt: with a question about whether we need metaphysical assumptions in the course of science-making; with a phenomenological approach to inferring scientific phenomena from data sets; and with prediction and the limits of science using as an example the work of C. S. Peirce. The session on the *History of Science* involved talks: on the interpretation of Newton's work in the Soviet Union; on the question of whether Fleming's discovery of penicillin was a paradigmatic case of serendipity; and on the limits on testing philosophical theories against the history of science. The session on *Models* discussed: a model-based account on interdisciplinary collaborations, using the example of economics and ecology; idealization in folk psychology; and the dialectics of H. Putnam's model-theoretic arguments. The session on *Naturalism* involved talks: on *a posteriori* and *a priori* knowledge in philosophy of science; on the scientific method between theory and practice; and on the coherence of naturalism. And finally, the session on *Unity of the Sciences* discussed the works of Cassirer and von Wright on the unity and plurality of Science and the question of what it means to do philosophy on the basis of scientific practice.

This journal issue is the first attempt at putting together Proceedings of an NNPS Meeting and its aim is to showcase written-up versions of some of the work presented at the conference. The present issue contains five peer-reviewed contributions sourced from the 2016 Meeting (papers by Angeloni, Johansson, Mürsepp, Sova, Togni), and one independently submitted peer-reviewed paper (by Livadas) that did not serve as the written text of a conference presentation. As the title of the issue ("Contemporary Questions of Metaphysics in Science") suggests, all contributions are to a greater or lesser extent focussed upon metaphysical questions—pertaining either to science in general or to some specific branch of science. In what follows, this preface gives a brief overview of the content of the resulting articles.

In the first paper of the issue, Roberto Angeloni discusses the philosophical foundations of the early correspondence principle (1917–1924) between quantum theory and classical mechanics, by comparing the conceptual structure underlying this principle with the procedure of analogy used by Immanuel Kant. Using such a comparison, Angeloni wants to show that the correspondence principle applies to the classical "concepts" of space and time in a way that is similar to how these *a priori* forms (space and time) relate to the separate faculty of intuition in Kant's philosophy. Angeloni's aim

is to demonstrate that Bohr's thinking in physics, at least until 1924, was still *indirectly* but steadily anchored in a Kantian conception of nature. However, with the advent of quantum mechanics in 1924–1925 a conceptual turn occurred, when Max Born, Werner Heisenberg, and Pascual Jordan inaugurated a new formalism which rejected space-time representation.

In the second paper Lars-Göran Johansson focusses on ontological questions in electromagnetics by asking which of the following are real: particles, electromagnetic fields, or both. Johansson discusses three different claims. Firstly, he discusses the claim that particles are real but fields are not. The electromagnetic field at a certain point is a mere expression for the effect that distant charged particles would have on a charged particle placed at that point; secondly, he discusses the claim that fields (an electron field, a proton field, an electromagnetic field) exist and particles are to be reduced to mere epiphenomena. Thirdly, he discusses the claim that both charged bodies and electromagnetic fields exist. In weighing the arguments for and against each position, Johansson finds that the third option must be rejected. He then explains why the assumed “tension” between the ontologies of classical and quantum electrodynamics is actually “nothing else than the much debated measurement problem of quantum mechanics.”

In the third paper Peeter Mürsepp discusses Nicholas Maxwell's approach to science—aim-oriented empiricism—that is supposed to constitute a challenge to the regular way of seeing the world—standard empiricism. According to Maxwell, standard empiricism is unable to make sense of the progress of science because it does not account for some basic general metaphysical assumptions—viz. the comprehensibility, unity and simplicity of science—which scientists actually adhere to without acknowledgement. By including these metaphysical assumptions in science, Maxwell is looking for ways to make sense of scientific progress from a philosophical perspective. While trying to challenge Maxwell's view with the help of Rein Vihailemm's practical realism, Mürsepp is looking for an answer to the question of whether we need metaphysical assumptions at all when doing science.

In the fourth paper, Henrik Sova's first aim is to analyse and compare Hilary Putnam's model theoretic indeterminacy argument against external realism with Saul Kripke's so-called Kripkensteinian argument against semantic realism. Sova claims that both these arguments have the same dialectical structure and the same upshot—namely, they both force the opponent to either adopt meaning minimalism or postulate unobservable semantic facts (i.e., adopt robust semantic realism as a transcendental precondition for reference). Sova's second aim in this paper is to analyse the first horn of the above-mentioned dilemma—meaning minimalism—according to which there are no truth conditions for meaning ascriptions and which

is considered incoherent by some authors. Sova claims that there actually is a coherent option for meaning minimalism available if we follow Crispin Wright's suggestion that we adopt a structured two-level truth predicate, and that this option subsequently leads to a position close to Huw Price's global expressivism.

In the fifth paper Andrea Togni discusses Hermann von Helmholtz's work concerning the relation between the external world, on the one hand, and sensations that external causes impress on our sense organs, on the other hand. As Togni brings out, Helmholtz points at the difficulty of defining a notion of *causality* suitable for explaining this relation, stating that: 1) physical stimuli, understood as the causal origins of sensations, are unknowable in themselves; 2) there is no empirical evidence for the kind of causality from which sensations originate; 3) a transcendental causality is nothing but the urge of the intellect to know everything. When studying Helmholtz's struggles with providing a suitable explanation of the relation between sensations and reality, Togni claims to be making use, among other things, of "Emile Du Bois-Reymond's work on the limits of human understanding, and in particular the transcendent difficulty of grasping the origins of sensations."

In the sixth, and independent paper, Stathis Livadas attempts to broaden "the phenomenologically motivated perspective of Hermann Weyl's *Das Kontinuum* (1918) in the hope of elucidating differences between the intuitive and mathematical continuum." Livadas claims that Weyl sought to develop an arithmetical theory of continuum, based on both the naturally accessible domain of natural numbers and the classical first-order predicate calculus, but stumbled "in the evident lack of intuitive support for the notion of points of the continuum." Livadas aims to "deal from a Husserlian viewpoint with the general notion of points as appearances reducible to individuals of pre-predicative experience in contrast with the notion of an interval of real numbers taken as abstraction based on the intuition of time flowing experience." Livadas argues that "the notions of points and of real intervals in the above sense are not by essence related to objective temporality and thus their incompatibility in mathematical terms is ultimately due to deeper constituting reasons independently of any causal and spatio-temporal constraints."

In the remaining part of this Editorial, I would like to express my gratitude to those who made the publication of this issue possible. First I would like to thank the authors who decided to submit their manuscripts to our journal and patiently perfected those in the course of the editing and publishing process—their contribution is obviously the main attraction and precondition of the existence of this issue. I would also like to thank the referees who are listed here in alphabetical order: Jüri Allik, Roberto Angeloni, Jaana Eigi, Rasmus Jakslund, Sreekumar Jayadevan, Piret Kuusk, Riin Kõiv, Harry

Lewendon-Evans, Endla Lõhkivi, Ave Mets, Alex Miller, Amirouche Moktefi, Peeter Mürsepp, Michiru Nagatsu, Veiko Palge, Vasil Penchev, Indrek Reiland, Henrik Sova, Petri Ylikoski. Additionally, I would also like to thank the editorial board of *Studia Philosophica Estonica*, especially Mats Volberg for his elaborate and detailed work as a technical editor. I am also grateful to Dr Alex Davies for proofreading this Editorial. The funding for both the conference and the Proceedings came from the Institute of Philosophy and Semiotics and the Faculty of Arts and Humanities of University of Tartu, Estonian Research Council PUT732, Ministry of Education and Research IUT20-5, The Centre of Excellence in Estonian Studies (CEES), Estonian Council of Gambling Tax, and an anonymous donator.

I would also very much like to acknowledge the co-organizers of the conference, the local organizing committee and other people from the organizing team (Dr Jaana Eigi, former MA student and current PhD student Eveli Neemre) who contributed their work and efforts to make this great conference possible. Endla Lõhkivi and Ave Mets, both of whom contributed as referees to this issue, also rendered their assistance during different stages of the editing process. Special thanks to the Head of the Chair of Philosophy of Science, Endla Lõhkivi, who served as the leading force of the conference organization. I would also like to express my gratitude to the programme committee whose members were not given much time for their painstaking and effective job of choosing the contributed papers, keynote speakers for delivering their very interesting and enlightening plenary talks, and all the conference delegates for coming together and sharing their ideas. Last but not least, in the name of our organizing team and our Department of Philosophy, I would like to thank the people from NNPS who trusted us with the responsibility of hosting the Fourth Meeting, especially Dr Michiru Nagatsu and Dr Carlo Martini from University of Helsinki, Professor Frank Zenker (University of Lund) and Professor Lars-Göran Johansson (University of Uppsala). Michiru and Carlo came up with the idea that University of Tartu should be the host of the Fourth Meeting and helped us to take the next relevant steps to make this happen. Professor Johansson and Professor Zenker also gave us useful suggestions, feedback and support during the process of conference organization.