

Eclectic Approaches to Causation and Explanation

Nicolaus Copernicus University in Toruń

December 16 and 17, 2021.

The poster is for a workshop titled "Eclectic Approaches to Causation & Explanation". It features a central illustration of a diverse group of stylized cartoon characters with various features like glasses, beards, and different colored clothing, arranged in a circular pattern. The background is dark blue with a yellow border. Text on the poster includes the university name, dates (16-17 December 2021), and a list of speakers with their affiliations.

Nicolaus Copernicus University
Department of Logic
Emerging Field Logic and Philosophy of Science

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ECLECTIC APPROACHES TO
CAUSATION &
EXPLANATION

16-17 DECEMBER 2021

Jean-Yves Béziau
(Federal University of Rio de Janeiro)

Michèle Friend
(Université Lille and
the George Washington University)

Mateusz Klonowski,
Tomasz Jarmużek
(Nicolaus Copernicus University in Toruń)

Fabio Sterpetti
(Università degli Studi di Roma La Sapienza)

Jessica Wilson
(University of Toronto)

Michał Oleksowicz
(Nicolaus Copernicus University in Toruń)

Moisés Macías-Bustos
(University of Massachusetts-Amherst and
National Autonomous University of Mexico)

Anna Kuzmiruk
(Nicolaus Copernicus University in Toruń)

Otávio Bueno
(University of Miami)

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This workshop aims at combining novel approaches from logic and philosophy of science in order to shed light on the logical, metaphysical, and epistemic grounds of causal relations and (different types) of scientific explanation.

Program

December 16, 2021

16:00-16:15 Central European Time *Introduction to the emerging field
Logic and Philosophy of Science*

Tomasz Jarmużek (Nicolaus Copernicus University in Toruń)

16:15-17:05 CET *Modeling causality*

Jean-Yves Béziau (Federal University of Rio de Janeiro)

Chair: Maria del Rosario Martinez-Ordaz (Federal University of Rio de Janeiro)

17:05-17:55 CET *A Second-Order Formal Language for Chemical Processes*

Michèle Friend (Université Lille and the George Washington University)

Chair: Natalia Carrillo-Martinez de la Escalera (University of Vienna)

18:05-18:20 CET [BREAK]

18:20-19:10 CET *Some simple logics of causal implications*

Mateusz Klonowski (Nicolaus Copernicus University in Toruń),

Tomasz Jarmużek (Nicolaus Copernicus University in Toruń)

Chair: Alejandro Javier Solares-Rojas (University of Milan)

19:10-20:00 CET *Counterfactual Accounts of Non-Causal Explanation:
The Case of Evolutionary Biology*

Fabio Sterpetti (Università degli Studi di Roma La Sapienza)

Chair: Elisangela Ramírez-Cámara (National Autonomous University of Mexico)

Program

December 17, 2021

15:30-16:20 CET *The Two-Dimensional Argument Against Materialism*

Jessica Wilson (University of Toronto)

Chair: Alejandro Vázquez del Mercado-Hernández (National Autonomous University of Mexico)

16:20-17:10 CET *15:30-16:20 CET* *Ontic and epistemic differentiation: New mechanistic problems for biological classification*

Michał Oleksowicz (Nicolaus Copernicus University in Toruń)

Chair: Arturo Javier-Castellanos

17:10-17:25 CET [BREAK]

17:25-18:15 CET *15:30-16:20 CET* *Fundamental and Non-Fundamental Causation in Russell's Metaphysics of Science*

Moisés Macías-Bustos (University of Massachusetts-Amherst)

Chair: Alejandro Vázquez del Mercado-Hernández (National Autonomous University of Mexico)

18:15-19:05 CET *15:30-16:20 CET* *Change or causality? Bergson on the essence of time in the context of his philosophy of science*

Anna Kuzmiruk (Nicolaus Copernicus University in Toruń)

Chair: Maria del Rosario Martinez-Ordaz (Federal University of Rio de Janeiro)

19:05-19:55 CET *15:30-16:20 CET* *Causation and Explanation: Empiricism and Partial Truth*

Otávio Bueno (University of Miami)

Chair: Cruz Davis (University of Massachusetts-Amherst)

Important information for the online meeting

1. The meeting will be held via the *BigBlueButton* platform.
2. **The link** (for both days): <https://vc.umk.pl/b/tom-zjd-edt>
Password: 483879
(if the link seems broken, copy the URL and paste it into the address bar)
3. If you have any problems logging in, please, email us at martinezordazm@gmail.com

Note that the time is given for the Central European Time zone.

ABSTRACTS

December 16, 2021

Introducing our Emerging Field *Logic and Philosophy of Science*

[Tomasz Jarmużek](#)

Nicolaus Copernicus University in Toruń.

The research field “Logic and Philosophy of Science” is created by scientists associated primarily with the Department of Philosophy and Social Sciences of the Nicolaus University; however, an important part of the field’s composition are employees of the Department of Logic. The field’s staff is expected to grow with more people who, regardless of their affiliation, work on philosophical problems of logic and its application in other disciplines. The issues we deal with within the field are: non-classical logics (paraconsistent, relating, positional, deontic, epistemic, non-monotonic, etc.), applications of logic to the construction of formal theories (mereology, pointless geometries, etc.) construction and application of logical systems in the formalization of theories from the social sciences and the humanities, as well as the formal analysis of related problems in the philosophy of language and pragmatics.

Modeling Causality

Jean-Yves Béziau

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Here I present a methodological exercise: applying model theory to causality. I start by explaining that model theory does not reduce to a formal tool, that it is an interesting and deep philosophical approach. I then develop a framework where causality is a binary relation between objects considered as events. From this perspective I examine the so-called principle of causality and we also discuss other possible axioms for the relation of causality analyzing their significance and import. I end discussing a case study: citation in research papers viewed as a cause-effect phenomenon.

A Second-Order Formal Language for Chemical Processes

Michèle Friend

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Chemical processes are formally depicted at the molecular level. At the second-order level, we have no formal language. "Second-Order" is meant to refer to the notion of second-order science - where the context for chemical reactions and processes are included. The context includes the scientist or laboratory technician, the instruments, the experimental parameters of temperature, pressure, timing, container (if any) and so on. Sometimes, in a laboratory, things go wrong, or we have an unexpected result. When this happens, we check the context - was the chemical sample pure enough? Was the temperature correct? Were our instruments performing correctly? What is the error margin in our algorithmic model? The second-order formal language represents this. Formal languages used in this way, obscure unnecessary details and put essential ones into high-relief. They act as a filter-mirror of our practice. The advantage of making a formal representation is to see more clearly and to systemitise our diagnosis.

Some simple logics of causal implications

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Here we propose diverse logical systems of causally interpreted implication. This connective represents in the formal language causally understood conditionals of the form: *if A then it causes B*.

There are two approaches to the construction of logic of causal implication. First, we can assume some sets of theses they should share – this is the syntactical approach. Second, we can start with some semantics intuitions on causal relation – this is the semantic approach. We explore both of them.

In case of semantic approach we give relating semantics for causal theses proposed by Max Urchs as the minimal conditions for causal implication. In the latter case we consider intuitions assumed on causal relation that were assumed by Uwe Shefler (and Stanisław Jaśkowski). Here we also give an adequate axiomatization for the intuitions that we rewrite into relating semantics' frames. Finally, we make some metalogical comments on both approaches.

Counterfactual Accounts of Non-Causal Explanation: The Case of Evolutionary Biology

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Many philosophers claim that non-causal explanations are ubiquitous in science and try to provide a unified account of both causal and non-causal explanations. Mathematical Explanations of Natural Phenomena (MENP) are usually regarded as paradigmatic cases of non-causal, scientific explanation. According to many philosophers, among the unified accounts of scientific explanation that have been proposed so far, the most promising ones are those that try to extend the counterfactual theory of explanation to cover non-causal explanations. I focus on Baron's, Colyvan's and Ripley's attempt to provide an account of MENP that is based on a counterfactual theory of explanation. More precisely, I examine Baron's, Colyvan's, and Ripley's account of why the shape of honeycomb cells is hexagonal.

December 17, 2021

The Two-Dimensional Argument Against Materialism

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Various anti-materialist/anti-physicalist arguments, including the knowledge and conceivability arguments, rely on there being explanatory gaps between consciousness and physical goings-on. But why take such gaps to have metaphysical rather than merely epistemic import? Perhaps the best such reason is associated with Chalmers's two-dimensional argument against materialism, which appeals to 'epistemic two-dimensionalism' (E2D). E2D represents an attractive strategy for re-forging, post-Kripke and the identification of necessary a posteriori truths, an a priori link between meaning (intensions) and modality. Chalmers argues that E2D provides an independent basis for thinking that the conceivability of zombies entails their possibility, which possibility undercuts physicalism. Crucially, however, Chalmers's line of thought presupposes that our access to the intensions at issue in E2D proceeds via a conceiving-based epistemology of intensions (CEI). Here I argue, drawing on Biggs and Wilson 2017b and 2019, that E2D is better implemented using an abduction-based epistemology of intensions (AEI)—an approach in turn supported by Biggs and Wilson 2017a, according to which abduction is an a priori mode of inference. I then argue that when E2D is implemented using abduction rather than conceiving, the prima facie weight of considerations pushes against zombies' being metaphysically possible. This result is consonant with materialism, and in any case blocks Chalmers E2D-based argument against this view.

Ontic and epistemic differentiation: New mechanistic problems for biological classification

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Species are considered the basic unit of biological classification. This means that they are used as benchmark in several fields such systematics, evolutionary biology, genetics, ecology. From Darwin on, the concept of species has always been under debate. The purpose of this paper is to consider the dual nature of species, which is both an entity within a system and a plurality of elements, and the dual dimension of the concept of species, that has both an ontic and epistemic dimension. The topic was faced considering the philosophical scenario of the discussion. Thus, the definition of species is analyzed within the new mechanistic approach. Although the issue of the definition of the category of species could be faced from different perspectives, depending on what we want to describe, new mechanistic analysis highlights the need to consider the epistemological and ontological dimensions of the species definition problem in close parallel. This parallel shows that it is the apt correlation between the methods of observation/analysis (epistemic aspect) and the data itself (ontic aspect): this help to answer the question of the reality of the species, stressing how the concept of species and the reference to data are strictly co-determined.

Fundamental and Non-Fundamental Causation in Russell's Metaphysics of Science

Moisés Macías-Bustos

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Bertrand Russell is well known for his causal eliminativism in his celebrated *On The Notion of Cause* (1912), a view he famously expressed by his claim that causation is retained as an important scientific notion only because, like the monarchy, people assume it to do no harm. On this view metaphysically fundamental scientific theories, such as mathematical physics, dispense with the notion of cause in their fundamental physical laws. However, years later in *The Analysis of Matter* (1927) and *Human Knowledge* (1948) Russell returned to the discussion of causation and argues for the following two views, which are *prima facie* incompatible with each other and incompatible with his earlier claim. First, that there are separable causal lines which should be identified with physically distinguished geodesics in relativistic space-time (1927, 1948) and that, (2) causation is a fundamental postulate in non-demonstrative scientific inference (1948) in his epistemic structural realism. These two claims seem inconsistent with Russell's main claim in *On The Notion of Cause*, but in this talk I will argue, after elaborating on these theses, that these are compatible with each other and with Russell's earlier eliminativistic thesis. Furthermore I explain how these are part of the logical atomist research program (Landini, 2014; Klement, 2017; Elkind, 2019).

Change or causality? Bergson on the essence of time in the context of his philosophy of science

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At the beginning of XXth century the main philosophical stance was still determinism. Even when Einstein proclaimed his relativity theory (both special and then general), determinism was still valid. Scientists and philosophers alike believed, in accordance with Newton's physics or Cartesian philosophy, that there exists a privileged frame of reference, they were talking about empty space, abstract time, and considered a state of rest as a base for any movement. This was met with a large critique from, among others, Henri Bergson, French philosopher, famous for his philosophy of time as duration. One of the main arguments was that time is thought about as if it was space, i.e., people are trying to measure it, they divide it ad infinitum, etc. Even Einstein did not stop perceiving time in terms of space. Time was no longer absolute, but it was still a geometrical figure: a fourth dimension. Moreover, this philosophical stance had influenced not only the perception of time, but also the concept of causality. This manner of thinking about cause and effect became entrenched in common sense. And this is something that Bergson was opposed to. Namely, he criticized the causality as early as his first book, doctoral dissertation, *Time and free will*. In years to come he became only more critical about it. Especially since the quantum mechanics confirmed in a way his critique. In my presentation I am going to present Bergson's critique of causality in the context of the concept of change which, in his view, is intrinsic to causality.

Causation and Explanation: Empiricism and Partial Truth

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Two commonly made claims about causation and explanation in the context of empiricism are that empiricists should avoid causation and that scientific explanation requires the truth of the items that are invoked in explanatory settings. Since causation is taken to exist and scientific explanations are assumed to require truth, empiricist views are deemed inadequate. In this paper, I resist both claims. I argue that empiricists should not fear causation provided that they avoid any reification of causal processes in metaphysical terms. Moreover, empiricists need not require truth as a condition on scientific explanation, unless one intends to jettison scientific explanations altogether given the falsity of most scientific theories. As a result, a more defensible form of empiricism emerges, one that makes room for both causation and explanation without unnecessary metaphysics.

Emerging Field Logic and Philosophy of Science

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