INTERNATIONAL CONFERENCE

FORMAL METHODS AND SCIENCE IN PHILOSOPHY III

Inter-University Centre, Dubrovnik, Croatia
April 11–13, 2019

Organizing Committee:
Gianfranco Basti, Pontifical Lateran University, Vatican City
Grzegorz Bugajak, Cardinal Stefan Wyszyński University, Warsaw
Filip Grgić, Institute of Philosophy, Zagreb
Srećko Kovač, Institute of Philosophy, Zagreb
Kordula Świętorzecka, Cardinal Stefan Wyszyński University, Warsaw

Co-organizing institutions:
Cardinal Stefan Wyszyński University, Warsaw
Institute of Philosophy, Zagreb
Inter-University Centre, Dubrovnik

Publisher:
Institute of Philosophy, Zagreb, 2019

Edited by
Srećko Kovač, Kordula Świętorzecka

Conference venue:
Inter-University Centre, Ul. don Frana Bulića 4, Dubrovnik, Croatia

The conference was supported by: Institute of Philosophy in Zagreb, Cardinal Stefan Wyszyński University in Warsaw, and the Ministry of Science and Education of the Republic of Croatia.

ABSTRACTS

Keynote lectures

Computational Metaphysics: New Insights on Gödel's Ontological Argument and Modal Collapse

CHRISTOPH BENZMÜLLER[1]

Fachbereich Mathematik und Informatik, Freie Universität Berlin; Computer Science and Communications, University of Luxembourg

Recent experiments are presented in which mechanized computational techniques were used to unearth philosophical insights on Gödel's ontological argument for the existence of God. A particular focus is on modal collapse and the question on how it can be avoided in Gödel's argument.

The modal collapse in Gödel's argument was already noted by Sobel [10, 11]. It has recently been confirmed for both Gödel's [7] original variant and Scott's [9] emendation with computational techniques [5, 4]. The modal collapse expresses that there are no contingent truths, from which one may conclude that everything is determined (or that there is no free will).

Emendations of the Gödel/Scott argument have been proposed among others by Anderson [2, 1] and Fitting [6]. Their variants preserve the intended conclusion, the necessary existence of God, but they avoid the modal collapse to be derivable as a side result.

At first sight the variants of Anderson and Fitting appear different. However, when linking and assessing their detailed notions of positive properties with the notion of an ultrafilter from set theory, then some intriguing commonalities between both variants can be revealed. Moreover, by adopting the same idea, Anderson's and Fitting's notions of positive properties can be further compared with the one of the Gödel/Scott variant(s), which is different. This analysis provides an explanation why the modal collapse holds for the latter, but not for the former. We may thus ask: What kind of ultrafilter is actually meant by Gödel's notion of a perfect being? One that avoids modal collapse, or one that doesn't?

[1]Benzmüller is funded by the VolkswagenStiftung under grant CRAP (Consistent Rational Argumentation in Politics).

All findings reported were discovered in interaction with modern theorem proving technology [8] by adopting the universal (meta-)logical reasoning approach [3].

[1] Anderson, C.A., Gettings, M. (1996). "Gödel's ontological proof revisited". In *Gödel'96: Logical Foundations of Mathematics, Computer Science, and Physics: Lecture Notes in Logic 6*, pp. 167–172. Springer.

[2] Anderson, C.A. (1990). "Some emendations of Gödel's ontological proof". *Faith and Philosophy* 7(3): 291–303.

[3] Benzmüller, C. (2019). "Universal (meta-)logical reasoning: Recent successes". *Science of Computer Programming* 172: 48–62.

[4] Benzmüller, C., Woltzenlogel Paleo, B. (2014). "Automating Gödel's ontological proof of God's existence with higher-order automated theorem provers". In T. Schaub, G. Friedrich, B. O'Sullivan, eds., *ECAI 2014*, *Frontiers in Artificial Intelligence and Applications*, vol. 263, pp. 93-98. IOS Press.

[5] Benzmüller, B., Woltzenlogel Paleo, B. (2016). "The inconsistency in Gödel's ontological argument: A success story for AI in metaphysics". In S. Kambhampati, editor, *IJCAI 2016*, vol.1-3, pp. 936-942. AAAI Press.

[6] Fitting, M. (2002). *Types, Tableaus, and Gödel's God*. Kluwer.

[7] Gödel, K. *Appendix A: Notes in Kurt Gödel's Hand*, pp. 144-145. In [11].

[8] Nipkow, T., Paulson, L.C., Wenzel, M. (2002). *Isabelle/HOL: A Proof Assistant for Higher-Order Logic*, volume 2283 of *LNCS*. Springer.

[9] Scott, D. *Appendix B: Notes in Dana Scott's Hand*, pp. 145-146. In [11].

[10] Sobel, J.H. (1987). "Gödel's ontological proof". In *On Being and Saying. Essays for Richard Cartwright*, pp. 241–261. MIT Press.

[11] Sobel, J.H. (2004). *Logic and Theism*. Cambridge University Press.

Existence, Denotation and Equality in Hybrid Partial Type Theory

MARÍA MANZANO

University of Salamanca

After defining several hybrid logics to extend with modal and hybrid operators a variety of systems of type theory, we now face the challenge of defining a hybrid type theory with *non-denoting* expressions, *non-rigid* constants and with a *varying domain semantics*.

Our new system of *Partial Hybrid Type Theory* is based upon Farmer's partial type theory. Farmer distinguishes between *kind e* and *kind t types*; the first includes the type of individuals as well as the functions from elements of any type to elements of kind *e*; the second includes the type of truth values as well as the type of functions from elements of any type to elements of kind t. He chooses to have *partial evaluation for terms and total evaluation for formulas*.

We modify some of his principles as we are now modelling a modal logic and so our hierarchy is not only able to distinguish kind e from kind t types, but inside the partial type hierarchy we have local domains for each world all the way up in the hierarchy. In our formal language we introduce formulas expressing '*α exists*' and '*α denotes*' respectively to distinguish between "*being a member of the local domain*" where the expression is being interpreted and "*having a value*", but maybe outside the local domain of evaluation. We will also introduce a different *binary equality relation*, $\simeq$, to be applied between expressions of the same type to express that either both denote the same in the world of evaluation or both lack denotation.

Formal Philosophy of Mathematics

EDWARD ZALTA
Stanford University

Object theory is an axiomatic theory of abstract objects, with a supporting theory of properties, relations, and propositions. Its foundations do not assume any mathematics. Nevertheless, it gives rise to a formally precise philosophy of mathematics. It yields theoretical descriptions that identify the denotations of the terms of mathematical theories, and allows us to formulate the truth conditions of the theorems of mathematical theories. In addition, object theory: (a) answers Russell's challenge to Dedekind, about the intrinsic nature of objects whose *only* properties are their mathematical properties, (b) shows that different classical "philosophies of mathematics" can be understood as different interpretations of a single formalism, and (c) offers a principle that is needed to both ground Carnap's view that every logical framework is about its own group of objects and provide an easy, affirmative answer to the internal question "Do Xs exist?"

Talks

Completeness and Categoricity: The Debate on Husserl

VICTOR ARANDA
University of Madrid

In mathematical logic, we clearly distinguish between completeness and categoricity. We also know, by Gödel's theorem, that both properties cannot be achieved simultaneously for the interesting cases. However, in Husserl's double lecture (1901) on the imaginary numbers and the axiom of completeness, the ideals of deductive (completeness of a theory) and expressive power (categoricity) were thought to be attainable. His concept of "definiteness" can be read either syntactically or semantically, so it has been a matter of a heated controversy since the publication of Hill (1995) and Majer (1997).

According to Da Silva (2000, 2016), Husserl's notion of absolute definiteness has to be understood as deductive completeness, while "relative definiteness" as completeness with respect to a set of sentences. Contrary to him, Hartimo (2017, 2018) believes that both notions are equivalent to categoricity. Centrone (2010) agrees with Da Silva in his interpretation of relative definiteness, but she argues that absolute definiteness is closer to categoricity.

The aim of my contribution is to assess the plausibility of these readings of Husserl's notion(s) of definiteness and sketch out a possible alternative.

References:

Centrone, S. (2010). *Logic and philosophy of mathematics in the early Husserl*. Synthese library, vol. 345. Dordrecht: Springer.

Da Silva, J. (2000). "Husserl's two notions of completeness". *Synthese* 125: 417–438.

Da Silva, J. (2016). "Husserl and Hilbert on completeness, still". *Synthese* 193: 1925–1947.

Hartimo, M. (2017). "Husserl and Hilbert". In Centrone, S. (Ed.) *Essays on Husserl's Logic and Philosophy of Mathematics*. Synthese library, vol. 384. Dordrecht: Springer.

Hartimo, M. (2018). "Husserl on completeness, definitely". *Synthese* 195: 1509–1527.

Hill, C. O. (1995). "Husserl and Hilbert on completeness". In Hintikka, J. (Ed.) *From Dedekind to Gödel*. Synthese library, vol. 251. Dordrecht: Kluwer.

Husserl, E. (1901). "Double lecture: on the transition through the impossible imaginary and the completeness of an axiom system". In Husserl, E. 2003. *Philos-*

ophy of Arithmetic. Psychological and Logical Investigations with Supplementary Texts from 1887–1901. Dordrecht: Kluwer Academic Publishers.

Majer, U. (1997). “Husserl and Hilbert on completeness”. *Synthese* 110: 37–56.

Categorical Version of the Ontic Structural Realism in Natural Philosophy

GIANFRANCO BASTI
Pontifical Lateran University, Faculty of Philosophy, Vatican City

In the framework of the actual vivid debate about the Category Theory (CT) as the proper metalanguage for formalizing philosophy, E. Laindry recently stated that CT, used as mathematical metalanguage of quantum physics (i.e. the fundamental physics of natural sciences), cannot justify a position of “structural realism”, either in its “epistemic”, or in its “ontic” versions, but only in a “relational” one. In fact, according to her, in CT, what “does make conceptual sense is to talk of relations without relata and structures without objects”. However, what properly characterizes CT-based conceptualizations is not the lack of “objects”, but an anti-Platonic and neo-Aristotelian primacy of relations (morphisms) over objects, i.e., an “arrow-theoretic” way of thinking – as opposed to a “set-theoretic” one – in which relations have a primacy over objects (S. Abramsky). In fact, an “object” x exists in CT only as a “reflexive morphism”, that is, as an identity relation Id_x. In a word, objects exist in CT only as domains-codomains of morphisms. Then, also in set theory, we can have, in a significant way, “objects without elements”, since CT hom-sets do not have to satisfy Russell’s “set-elementhood” axiom (and the related self-identity condition) for existing in V, and so to satisfy primitive recursion without impredicative definitions like “numerals” in ZF. A significant application of this notion concerns the formalization of a non-reductionist “part-whole” relationship (“emergence”) in the natural philosophy of dissipative QFT systems in condensed matter physics coalgebraically modeled (G. Vitiello), using the categorical distinction between “coproducts” (sums) and “colimits” (A. Heresmann), which allow the use of the powerful “univalence axiom” (S. Awodey). This construction applies significantly also in a formalized natural philosophy of complex systems, for the semantics of Kripke models on a coalgebra of rooted trees of “non-wellfounded sets” over a Stone space (sharing the same topology of Hilbert space C^*-subalgebras (N. Landsman)), given the “dual equivalence” between the category of coalgebras on Stone spaces, **SCoalg**, and the category of modal Boolean algebras **MBAlg**, for the so-called contravariant functorial “Vietoris construction” T (Y. Venema), i.e. $\mathbf{SCoalg}(T) \simeq \mathbf{MBAlg}(T^{op})$ that applies also in the QFT case. In a word, the structures $\mathbb{S}$ of modal sentences of a Boolean propositional logic of a formalized natural philosophy are validated directly onto the QFT complex coalgebraic structures $\mathbb{S}^+$ of physics to which they refer, so to give a precise formal justification of the "ontic structural realism" stance in formal ontology.

Rigidity and Hybrid Logic

PATRICK BLACKBURN
Roskilde University

In this talk I will discuss the well-known modal concept of rigidity and the central role it plays in hybrid logic. Hybrid logic is usually viewed as a variant of modal logic in which it is possible to refer to worlds (or times, or states, or whatever it is that the elements of Kripke models are taken to be). This is certainly a useful way of thinking about hybrid logic, but as soon as one moves beyond the setting of propositional hybrid logic, and starts working with first- or higher-order hybrid logic, it becomes more useful to view hybrid logic as a modal language of rigidification. As I shall discuss, the @-operator (which is usually viewed as a modality) can be usefully viewed as a general purpose rigidification device.

This way of viewing things has both conceptual and technical implications. On the conceptual side, it becomes possible to express modally useful distinctions. On the technical side, model building in hybrid logic turns out to amount to using Henkin techniques to build models out of rigidified descriptions.

The material I will discuss in this talk draws on recent work with María Manzano, Antonia Huertas and Manuel Martins.

New Science of Infinity

PIOTR BŁASZCZYK
Pedagogical University of Cracow, Institute of Mathematics

Cantor established two kinds of infinity: cardinal and ordinal numbers, each with its own arithmetic and its own relation *greater than*. In modern developments, ordinal numbers are special sets, cardinal numbers are specific ordinal numbers. In both cases, the set of natural numbers $\mathbb{N}$ makes the yardstick of infinity—be it the cardinal number $\aleph_0$ or the ordinal ω. Thus, Cantor's theory of infinite numbers defines a finite number as a positive integer, and it seeks to extend the system $(\mathbb{N}, +, \cdot, 0, 1, <)$. However, while Cantor infinities try to extend the system of finite numbers, they hardly mimic its arithmetic, e.g. the addition and multiplication of ordinal numbers are not commutative.

In our theory, a finite number is a real number. By extending the system $(\mathbb{R}, +, \cdot, 0, 1, <)$ we obtain a non-Archimedean field that necessarily includes infinitesimals. Accordingly, we define infinite numbers as inverses of infinitesimals. The 'biggest' non-Archimedean field is the field of surreal numbers as developed in (Conway 1976/2001) and (Gonshor 1986). We show that it includes Cantor's ordinal numbers, although their sums and product differ from sums and products as defined by Cantor. Therefore, in our theory, Cantor's infinite numbers as well as infinitesimals belong to one and the same mathematical system of a commutative ordered field. Thus, in addition to the number ω, that system also includes numbers like $-\omega$, $\frac{\omega}{2}$, ω^{-1}, as well as $\sqrt{\omega}$ (since the field of surreal numbers is a real closed field). Similarly, within that system each Cantor's ordinal number is subject to ordered field operations.

We show that our specific understanding of finiteness originates in Euclid's notion of $\mu\acute{\epsilon}\gamma\epsilon\theta o\varsigma$. Then, *via* a field of line segments as developed in (Descartes 1637), it evolved into a non-Archimedean field explored in (Euler 1748) and (Euler 1755). In fact, Euler explicitly defined infinite numbers as inverses of infinitesimals. On the other hand, Cantor repeatedly sought to prove inconsistency of infinitesimals. Within our framework, we can easily demonstrate flaws in his arguments.

References:

Cantor, G. (1932). *Gesammelte Abhandlungen mathematischen und philosophischen Inhalts*. Berlin.

Conway, J. H. (1976/2001). *On Numbers and Games*. London/Natick.

Descartes, R. (1637). *La Géométrie*. Leiden.

Gonshor, H. (1986). *An Introduction to the Theory of Surreal Numbers*. Cambridge.

Euler, L. (1748). *Introductio in Analysin Infinitorum*. Lausanae.

Euler, L. (1755). *Institutiones Calculi Differentialis*. Saint Petersburg.

Scientific Realism and the Pessimistic Induction Argument

JANINA BUCZKOWSKA

Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The No Miracles argument, which is the main argument for scientific realism in the contemporary debate between scientific realism and antirealism, claims that the predictive success of scientific theories can be best explained with the assumption of their truthfulness. The main counterargument—the Pessimistic Induction argument—appeals to the history of science and to the facts that theories that effectively predicted facts turned out to be false.

This paper is focused on the question how to reconcile the realistic position with the Pessimistic Induction counterargument and explain how, by formulating theories which turned out to be false, science could provide true knowledge about the world. A newer solution, that is, structural realism, proposes a kind of synthesis of both arguments. It says that science delivers true knowledge about the formal structures of the nature but not about the real items. In this paper, it will be argued that science can deliver true knowledge about the real objects, too. The distinction between the linguistic level of theory and the real word which is the object of scientific experiments allows us to say that science can confirm or deny the reality of postulated items. Analysis of the concept of theory truthfulness used in the realism–antirealism dispute shows that it is possible to interpret the changing of scientific theories as an advance of knowledge about the world.

The Variety of Logical Hylomorphism

ELENA DRAGALINA-CHERNAYA
National Research University, Moscow, Higher School of Economics, International Laboratory for Logic, Linguistics and Formal Philosophy

This paper addresses the dichotomy of substantial and dynamic hylomorphism in logic. Since substantial hylomorphism considers logic as a theory of formal relations, I suggest systematizing the variety of substantial hylomorphism according to different types of formal relations. Focusing on the distinction between formal and material consequences in medieval logic, I offer an analysis of the containment criterion (a consequence is valid when the consequent is contained, i.e. formally understood in the antecedent) as the grounding formality of consequence not only on the power of understanding, but also on transcendental relations. In contrast, I suggest considering Kant's transcendental logic not as a system of consequences with ontologically grounded transcendental limitations, but rather as a logic of conceptual design. Finally, Wittgenstein's conception of internal relations is argued for as a contribution to dynamic perspective on logical hylomorphism. For him, logic as a formal science is about constructing concepts. It deals with formal agency, i.e. internal relations of concepts which exist in virtue of their roles in our practice. Thus, Wittgenstein's approach to internal relations shifts focus from substantial towards dynamic model of formality.

Mathematical Argumentation in the Explanation of a Scientific Phenomenon – The History of One Example

VLADIMIR DREKALOVIĆ
University of Montenegro, Faculty of Philosophy, Department of Philosophy

There are several characteristic examples in the literature that illustrate the explanatory role of mathematical objects in science. Such are, say, the honeycomb, the bridges of Königsberg, the asteroid belt around Jupiter and the cicada case. The last example has already been analyzed in biological literature in the first half of the previous century (Howard (1937)), while a more detailed philosophical analysis had to wait for the beginning of this century (Baker (2005)). Regarding the methodology of the mathematical explanation the example has undergone several essential changes in recent times (Baker (2016), Baker (2017)). We shall show that the changes made, however, did not provide a significant reliability of the explanation. Namely, in each version of this example, including the original one, specific mathematical facts are used as well as specific empirical assumptions related to mathematical objects. We shall also show that the authority of the formal exactness of a mathematical tool, which in a methodological sense has always been a kind of ideal, not only in natural sciences, in some sense is "abused" by combining with unverified empirical assumptions.

References:

Baker, A. (2005). "Are there genuine mathematical explanations of physical phenomena?". *Mind* 114: 223–238.

Baker, A. (2016). "Parsimony and inference to the best mathematical explanation". *Synthese* 193: 333–350.

Baker, A. (2017). "Mathematical spandrels". *Australasian Journal of Philosophy* 95: 779–793.

Howard, W. J. (1937). "Bird behavior as a result of emergence of seventeen-year locusts". *Wilson Bulletin* 49: 43–44.

The Question of Transdisciplinarity

DOMINIKA DZWONKOWSKA
Cardinal Stefan Wyszyński University, Warsaw

The aim of my paper is to answer the question whether transdisciplinary research can support complex problem solving. I will answer my question by analyzing an emerging field of research, namely the sustainability science. Sustainability science has been started to solve complex ecological problems and to help to achieve the sustainable societies. It is a fast-developing field of research that includes interdisciplinary and transdisciplinary approach of experts from various fields of research, as well as non-researchers.

There is a growing number of publications on sustainability science. In this paper, I will present: the introduction to Sustainability Science; the real and ideal type of transdisciplinary processes; selected challenges of transdisciplinarity in dealing with complex sustainability problems. I will answer the following question: can transdisciplinary research support complex problem solving? I will also analyze whether the aim of the achieving of a sustainable society through sustainable science can be realized. If yes, which type of transdisciplinarity is conducive to it?

Generalized Interpretability and Meaning

MIRKO ENGLER
Humboldt University, Berlin

As a general notion for the reduction of formal theories, relative interpretations play an important role in science and philosophy. We investigate a necessary condition under which d-dimensional relative interpretations preserve the meaning of the interpreted theory. At first, we give a characterization of d-dimensional relative interpretability in terms of models, which extends the results of Montague (1965) and Hájek (1966). By taking into consideration basic semantic intuitions, we state and justify a condition on subdomains of definable models of interpreting theories. This condition will be seen to restrict the class of interpretations to those which could be called “meaning preserving”. As an example, we show that by a theorem of Świerczkowski (1990) there can be no such meaning-preserving interpretation of d-dimensional ($d > 1$) Euclidean geometry into theories of real numbers (RCF). A similar result can be obtained by Pillay (1988) for interpretations of theories of complex numbers (ACF_0) into RCF. We argue that these formal results are supported by intuitions relevant to the philosophy of mathematical practice.

References:

Hájek, P. (1966). “Generalized interpretability in terms of models”. *Časopis pro pěstování matematiky*, 91(3): 352–357.

Montague, R. (1965). “Interpretability in terms of models”. *Indag. Math.* 27: 467–476.

Pillay, A. (1988). “On groups and fields definable in o-minimal structures”. *Journal of Pure and Applied Algebra* 53: 239–255.

Świerczkowski, S. (1990). “Interpretations of Euclidian Geometry”. *Transactions of the Amer. Math. Soc.* 322(1) : 315–328.

Formal Ontology

JOHAN GAMPER
Subrosa KB, Vendelsö, Department of Scientific Ontology

A problem of philosophical ontology, if we respect the basic assumption of causal closure, is how it is defined. This is because the traditional definition does not allow interaction between different ontological realms. This view typically boils down to monism and the inability to account for first causes regarding any ontological domain. This view also entails that the world is either physical or non-physical. Recent research, however, has opened up for new possibilities in this regard (Gamper 2017). According to this research, interfaces between universes are possible even though all universes are closed. The interaction between separate ontological realms, therefore, could possibly take place via interfaces. An immediate result of the redefinition is that the world possibly consists of universes and interfaces. Accordingly, the first universe in a causally linked multiverse must be caused by an interface. In this talk, I discuss formal ontology defined as the challenges to establish a consistent theoretical framework that accommodates the modal properties of an ontology that matches the possibility of interfaces between universes, as outlined in (Gamper 2018).

References:

Gamper, J. (2017). “On a loophole in causal closure”. *Philosophia* 45: 631–636.

Gamper, J. (2018). “Scientific ontology”. *Axiomathes*. `https://doi.org/10.1007/s10516-018-9396-0`

From Formal to Informal. The Variants of the Paraphrase Method

ALEKSANDRA GOMUŁCZAK
Adam Mickiewicz University, Poznań, Institute of Philosophy

Some contemporary philosophers including Beaney and Woleński state that *paraphrasis* plays an essential role in methodology of analytic philosophy. Beaney points out that Frege’s analysis of existential statements and Russell’s theory of descriptions are flagship examples of what he calls “paraphrastic analysis”. These analyses are based on the rephrasing of propositions to be analysed into their logical form. Let us call it "logical paraphrase".

We can distinguish other variants of this method. The second one can be called "explicatory paraphrase", since it is based on reformulation of propositions comprising problematic terms into more precise language, including e.g. empirical language of natural sciences. This kind of *paraphrasis* is present in Carnap's explications, Ryle's analysis of systematically misleading expressions, Tarski's semantic definition of truth. Thirdly, we can distinguish Ajdukiewicz's "semantic paraphrases", where the deductive system is a model language, although in a different way than in analyses by Russell or Tarski. Finally, there are linguistic versions of "semantic paraphrases", e.g. Føllesdal's interpretation of Husserl's theory of meaning by using Frege's theory of sense and reference.

Hence, both formal and informal methods of analysis fall under the concept of *paraphrasis*. My aim is to briefly describe some of the examples above and to introduce the theoretical background of the paraphrase method including the main problems concerning it.

Theory of Situations in Topological Ontology

JANUSZ KACZMAREK
University of Łódź, Department of Logic and Methodology of Science

The theory of the situations was studied and developed by many philosophers and logicians, including Barwise, Perry, Zalta, Wolniewicz. The beginning of this theory was outlined by Russell and Wittgenstein, which resulted in the ontology of logical atomism presented in Wittgenstein's *Tractatus Logico-Philosophicus*. In the 1980s, Wolniewicz proposed to formalise the proposals of Russell and Wittgenstein in the language of lattice theory (cf. Wolniewicz 1999). It turns out that Wolniewicz's approach can be generalised by using lattices composed of topological spaces. In (Kaczmarek 2019), I proposed the definitions of:

1) a lattice of situations that meets 10 axioms of Wolniewicz's lattice,

2) a lattice of situations that goes beyond the atomistic model.

The lattices given in point 2) have been called hybrid lattices because they allow the interpretation of a 'world' that is not atomistic. These lattices are built of topological spaces.

Reference:

Kaczmarek J. (2019). "Ontology in *Tractatus Logico-Philosophicus*. A Topological Approach", *Philosophy of Logic and Mathematics, Proceedings of the 38th International Wittgenstein Symposium in Kirchberg*, Walter de Gruyter (to appear).

Wolniewicz, B. (1999). *Logic and Metaphysics. Studies in Wittgenstein's Ontology of Facts*, ed. by Polish Semiotic Association, Warszawa.

Formal Systems and Determinism

SREĆKO KOVAČ
Institute of Philosophy, Zagreb

A formal system S can be conceived as a technical device, a Turing machine (TM, or a register machine) with the theorems of S as its output (Turing 1937, Gödel 1946, 1951, 1963, 1964). We formally describe the work of a TM in general by the use of causally adapted justification logic tools. Because of the halting problem, this formalization is dependent on an outer insight (oracle) into the work (halting/non-halting) of a TM. A TM works only piecemeal, on the ground of the current configuration and the instruction currently to be applied. We analyze several versions of "necessity" that exceed the concept of the determination by a formal proof because of the provable $\Box\neg\Box\bot$ or its analogues (S4 translation of intuitionistic propositional calculus, the outline of justification logic in Gödel 1938, Łukasiewicz's Ł3). All versions include implicit or explicit quantification over (causal or proof) justifications. By an adaptation of Ł3, extended with singular causal terms, we show how a deterministic system (possibly a TM for a formal system) can be generally embedded in a wider causal structure that can include the causality by human intentions and choices.

On the Relation of Multi-valued Logics and M-System Theory

IVANA KUZMANOVIĆ IVIČIĆ[*], SLOBODAN JELIĆ[*], MARIO ESSERT[†], TIHOMIR ŽILIĆ[†], JURAJ BENIĆ[†]
[*]*J. J. Strossmayer University of Osijek, Department of Mathematics,* [†]*University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture*

This talk will give an innovative approach to multi-valued logic by using theory of M-system introduced by M. Šare in [3], which is based on theory of electric circuits.

The M-system is a quadruple $(\Gamma, <_\Gamma, \cdot, M_\Gamma)$, where Γ is a finite alphabet totally ordered by relation $<_\Gamma$, '$\cdot$' is a binary operation of joining two words over Γ, and M_Γ is a set of M-words—words which consist of an even number of symbols from Γ.

Let L be a set of all two-symbol words over Γ. Then the shell of M-word is operator $q : M_\Gamma \to L$, $q(x) = l_x r_x$ where l_x and r_x are the first and the last symbol of the word x. In M-logic system, q is taken as a valuation function, and two-symbol words over Γ as truth values. In this way, M-logic system becomes a multi-value logical system.

It can be shown that Boole's logic, Kleene's logic and Dunn/Belnap B_4 logic correspond to two, three and four-valued M-logic while 16-valued M-logic corresponds to SWEET-SIXTEEN from [2].

M-logic is easily generalized to any number of truth values and it is very natural for the use in computer processing.

References:
[1] Essert M., Kuzmanović, I., Vazler, I., Žilić, T. (2017). "Theory of M-system." *Logic Journal of the IGPL* 25(5): 836–858.
[2] Shramko, Y., Wansing, H. (2005). "Some Useful 16-Valued Logics: How a Computer Network Should Think." *Journal of Philosophical Logic* 34(2): 121–153.
[2] Šare, M (2000). *Jorbologija*. Zagreb: Element.

What Kind of Philosophy Do Environmental Protection Need?

MIHAŁ LATAWIEC*, ANNA MARIA LATAWIEC†
* *Cardinal Stefan Wyszyński University, Warsaw, Institute of Ecology and Bioethics*†
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

Since the 1970s, we have been observing an increased degradation of the natural environment. Numerous preventive actions have been taken. What is the issue here is whether it is necessary to make a change in philosophical thinking about the environmental protection in the current situation. We suggest that environmental protection should be understand as a human activity, not a science. In this approach, a human being is object and subject as an element of environment.

The important question is whether it is possible to ensure objectivity in assessing human activities. A human being functions in two areas of philosophy: colloquial philosophy (e.g. philosophical coaching) and classic academic philosophy (e.g. axiology, ontology or methodology).

We want to prove that:

1. We need philosophy in both areas (colloquial and academic).

2. Relations between the elements of the environment are important, but even more important is the way how we justify the taking or the abandoning our actions.

3. It is possible to work out a way of thinking that will make you sensitive to dilemmas present in environmental protection and will encourage you to look for the best solutions.

The above analyses will be supported by examples of actions that were taken in order to protect environment.

About Some Problems with Formalization

ANNA LEMAŃSKA
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The formalization of reasoning allows its presentation in a logically convenient form for analysis. It is then easy to find errors and gaps in reasoning. But this is the end of the profits of formalization. In the paper, I will discuss some of the difficulties that formalization creates in philosophy. These are:

1. problems with the choice of the logical system underlying the formalization,
2. problems with the "translating" the language of the informal theory into formal language,
3. problems with the choice of axioms,
4. problems with the loss or change of the original intuitions or meanings of the terms used,
5. problems resulting from the limitation theorems.

These problems call into question the sense of formalization, especially in philosophy. Some difficulties will be shown in the context of the formalizing the arguments for the existence of God.

A Model Σ for the Theory Ξ

VLADIMIR LOBOVIKOV
Ural Federal University, Yekaterinburg

Definition of Ξ is given in [Lobovikov 2018]. Let the meta-symbols α and β in the theory Ξ be substituted by the object-one q. Also let Ω be substituted by the modality P ('It is *provable* that'). In this case, the axiom-schemes of Ξ are represented by the following axioms, respectively.

1: $Aq \rightarrow (\Box q \rightarrow q)$.

2: $Aq \rightarrow (\Box(q \rightarrow q) \rightarrow (\Box q \rightarrow \Box q))$.

3: $Aq \leftrightarrow (Kq \,\&\, (\Box q \,\&\, \Box\neg Sq \,\&\, \Box(q \leftrightarrow Pq)))$.

4: $Eq \leftrightarrow (Kq \,\&\, (\neg\Box q \vee \neg\Box\neg Sq \vee \neg\Box(q \leftrightarrow Pq)))$.

The interpretation Σ is defined as follows.

$\Sigma\neg\omega = \neg\Sigma\omega$ for any formula ω. $\Sigma(\omega \oplus \pi) = (\Sigma\omega \oplus \Sigma\pi)$ for any formulae ω and π, and for any classical-logic binary-connective $\oplus$.

Σq = false. ΣAq = false. ΣKq = true. $\Sigma\Box q$ = true. $\Sigma\Box\neg Sq$ = true.

$\Sigma\Box(q \rightarrow q)$ = true. ΣPq = true. $\Sigma\Box(q \leftrightarrow Pq)$ = false (according to Gödel's theorems). In Σ all the axioms of Ξ are true. Hence, Σ is a model for Ξ. Hence, Ξ is consistent. Also, by Σ it is proved that $(Eq \rightarrow q)$, $(Kq \rightarrow q)$, $(Pq \rightarrow q)$, $(\Box q \rightarrow q)$ are not provable in Ξ.

Reference:
Lobovikov, V. O. (2018). "Moving from the Opposition of Normal and Not-Normal Modal Logics to Universal Logic". *Handbook of the 6th World Congress and School on Universal Logic*, June 16–26, 2018 Vichy, France, pp. 449–450.

Formalization of the Leibnizian Cosmological Argument

GORAN LOJKIĆ
Institute of Philosophy, Zagreb

The so-called existential stage of any cosmological argument is based on three central premises. The first one describes a certain "big" fact or some "cosmic" feature of the universe, the second is some explanatory or causal principle that claims that every item of a certain sort has a (causal) explanation, and the third is some regularity principle that either excludes non-well-founded explanations and causal chains (e.g. causal loops) or implies that they themselves have an explanation of a relevant kind. Depending on the particular forms of those three central premises, cosmological arguments might be classified into three basic kinds: *kalam*, Thomistic, and Leibnizian. In the last few decades, there has been a significant revival of philosophical interest in cosmological arguments, but they are mostly treated in an informal or semi-formal way. We present a system of the logic of states of affairs (LSA), which includes elements of protothetic, modal logic, mereology, and justification logic, and propose a formalization of some versions of the Leibnizian argument in its framework.

The Logic of Modal Changes LMC

MARCIN ŁYCZAK
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The logic of change LC, formulated by K. Świętorzecka in [1], had its original motivations coming from the Aristotelian theory of *substantial change*. Substantial changeability is understood by Aristotle as a transformation consisting in *disappearing* and *becoming* of *individual substances*. The transition between becoming and disappearing (or conversely) is expressed in LC by the primitive operator C to be read: *it changes that* ... and a successively expanding vocabulary. We are interested in *attributive* changes of individual substances. The attributes are of two sorts: *accidental* and *essential* ones. We want to consider a formalism with two non-reducible operators of *possible* and *necessary change*. They correspond to the change of accidental and essential attributes. We adopt from LC the idea that temporal concepts may be defined via change operators and the idea of expanding language. In the presentation, we clarify philosophical intuitions, next we characterize the axiomatisation of our new logic, and we describe its semantics, giving the proof of its completeness.

References:
[1] Świętorzecka, K. (2008). *Classical Conceptions of the Changeability of Situations and Things Represented in Formalized Languages*, CSWU Publ. House, Warsaw.
[2] Świętorzecka, K., Czermak, J. (2012). "Some Calculus for a Logic of Change", *Journal of Applied Non-Classical Logics* 22(1): 1–8.

A Fregean Logical Objects Theory

GIOVANNI MARCO MARTINO
Vita-Salute San Raffaele University, Milan

My aim is to present a metaphysics of abstract objects based on Boolos' [1997] intuition that all Fregean abstraction principles rely on explicit existential assumptions. Zalta [1999], Zalta & Anderson [2004] derived all Fregean existential principles from the principle called *Explicit Logical Objects*. However, ELO is inconsistent with full-SOL.

Differently from Zalta's *Object theory*, my goal is to employ a full-SOL without modalities: I called my theory FOT. Kriener [2014] has investigated a link between the truth-theory inspired by Kripke [1975] and class-theory. Using Kriener's approach, I will provide FOT with Kripke's $\mathcal{T}(x)$ in order to determine which instances are valid and which are not: CA will be restricted semantically, while ELO will be unrestricted and closed under classical logic employing a model based on Heck [1996]. FOT is consistent and it manages to recover both FA and PA^2.

Lastly, FOT is philosophically justified by the Context Principle: there is an almost perfect correspondence between Kripke's notions of extension and anti-extension of $\mathcal{T}(x)$, and Fregean extensions.

Tolerating Inconsistencies: A Study of Logic of Moral Conflicts

MEHA MISHRA
Indian Institute of Technology Kanpur, Humanities and Social Sciences Department

Moral conflicts are the situations that arise as a reaction to dealing with conflicting obligations or duties. In particular, a systematic study of the resolution of moral conflicts has been carried out extensively in the area of moral reasoning (cf. utilitarians, Bernard Williams, Rawls) and the corresponding reasoning with moral conflicts in the area of Deontic logic. Moral conflicts are special situations in which an agent ought to do a number of things, but it is impossible to do them all at once. On the one hand, we observe that moral conflicts are very much part of our linguistic discourse, but, on the other hand, the core principles of standard deontic logic entail that it is not possible to have "moral conflicts". This poses a major challenge to come up with adequate logics of normative propositions involving moral conflicts. We argue that situations involving moral conflicts are situations tolerating some inconsistencies. The best known logics in which we tolerate inconsistencies are paraconsistent logics. Hence, we require a plausible paraconsistent logic that deals effectively with these inconsistencies, just as we consider both situations to be true together. In distinction to classical logic and other similar logics, paraconsistent logics can be used to formalize inconsistent but non-trivial theories. I examine three paraconsistent logics: Graham Priest's logic *LP*, the logic *RM* from the school of relevance logic and Da Costa's logics C_n. I illustrate my work with two classic examples from the famous Indian epic 'Mahabharata', where the protagonist Arjuna faces moral conflict in the battlefield of Kurukshetra. In the process of piecemeal analysis of Arjuna's dilemma, both cases are intuitively characterized and logically examined. The inquiry is to find an adequate set of principles to accommodate Arjuna's moral conflicts in paraconsistent logics. Meanwhile, it is also interesting to relate Krishna's arguments for resolving Arjuna's conflict to paraconsistent approach of conflict tolerance.

Justification Logic as a Framework for Structured Argumentation

STIPE PANDŽIĆ
University of Groningen

We, first, define a logic of default justifications that relies on operational semantics. One of the key features that is absent in standard justification logics is the possibility to weigh different epistemic reasons or pieces of evidence that might conflict with one another. To amend this, we develop a semantics for "defeaters":

conflicting reasons forming a basis to doubt the original conclusion or to believe an opposite statement. This enables us to formalize non-monotonic justifications that prompt extension revision already for normal default theories.

In the second part, we present our logic as an argumentation framework with structured arguments. The format of conflicting reasons overlaps with the idea of attacks between arguments to the extent that it is possible to define all the standard notions of extensions, analogous to argumentation framework extensions. We connect Dung's abstract argumentation frameworks and our logic through formal results that show how a limited class of default theories translates into abstract argumentation frameworks. In addition, we show that the notorious attack cycles in abstract argumentation cannot always be realized as default theories.

From Reverse Engineering to Mechanistic Explanation: Explanatory Power of Predictive Processing Framework

MICHAŁ PIEKARSKI
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

According to the predictive processing (PP) framework (see Clark 2013, 2016; Howhy 2013; Friston 2009, 2010), the basic function of brain (understood as a multilevel, hierarchical generative model) is to minimize predictive errors, i.e. potential discrepancies between the information from sensory input and the expectations related to the sources and nature of such information. To minimize such errors is of key importance for an organism because, according to the view advocated here, all perception serves the aim of ensuring that the organism functions efficiently in the environment. The brain keeps creating statistical predictions of what happens in the world. They predict the current and future form of information reaching the brain through sensory modalities. They are also hierarchically arranged and created at individual levels of the generative model.

It is widely argued that this framework gives a model for the explanation of many cognitive phenomena and also for unified cognitive sciences. I will argue that PP framework as a Bayesian modeling (Fink, Zednik 2017; Harkness, Keshava 2017) is a kind of reverse engineering (Dennett 1995) method of investigations into cognitive phenomena which uses mechanistic explanations (Bechtel 2008; Craver 2007; Miłkowski 2013).

A Reconciling of Semantic and Cognitive Approaches to Concepts

ROBERT PIŁAT
Cardinal Stefan Wyszyński University, Warsaw

I will discuss the explanatory gap that arises between two approaches to concepts: Renate Bartsch's (1998) semantic theory of concept and Peter Gärdenfors's (2000) cognitive theory of conceptual representation. Bartsch provides a general method of picking out the concepts' extensions and other semantic properties out of the process of acquiring language: in order to form a concept, we have to impose a structure onto a set of pairs made of situations and utterances in those situations. Such pairs are obtained by attesting the correctness of an utterance in a situation by a competent language speaker. Gärdenfors interprets concepts as mental representations, which properties can be plausibly captured in a theoretical model called conceptual space. Bartsch is focused on linguistic properties of concepts and Gärdenfors on the cognitive ones. The problem is how to combine the cognitive and semantic theories. I would like to see whether the data in Bartch's model can be mapped into spatial model thus showing how the process of acquiring concepts may lead to their cognitive properties.

The Application of S. K. Thomason's Conception of Event Ordering to Determining Mereological Genidentity

MAREK PORWOLIK
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The identity of objects that are subject to changes is called genidentity. This term was introduced into the language of science by Kurt Lewin [1]. The problem of continuity and change has been present in philosophy since its inception. Among the various kinds of genidentity there is mereological genidentity. In this approach to identity, an important role is played by the part-whole relationship and the notion of temporal part [2], [3]. To talk about the conception of time, we must have a certain structure of instants and events. In S. K. Thomason's publications, we can find a proposition of constructing instants on the basis of events and a definition of event ordering. [4], [5]. The aim of the present paper is to discuss the possibility of applying Thomason's ideas in the description of temporal parts and the mereological genidentity of objects.

References:

[1] Lewin K. (1992). *Der Begriff der Genese in Physik, Biologie und Entwicklungsgeschichte*. Berlin: Springer.

[2] Zimmerman D. (1993). “Persistence and Presentism”. *Philosophical papers* 25 (2): 115–26.
[3] Sider T. (2001). *Four-Dimensionalism*. Oxford: Clarendon Press.
[4] Thomason, S. K. (1984). “On Constructing Instant from Events”. *Journal of Philosophical Logic* 13: 85–96.
[5] Thomason, S. K. (1989). “Free Conctruction Time from Events”. *Journal of Philosophical Logic* 18: 43–67.

Psychology Plus Knowledge-First Epistemology Implies the Philosophical Insignificance of Knowledge

BENJAMIN T. RANCOURT
North Carolina State University, Department of Philosophy and Religious Studies

Knowledge-first epistemology says, among other things, that the concept of knowledge is not dependent on the concept of belief; knowledge is not defined in terms of belief. If true, this claim rescues the study of knowledge from the need to find an adequate “true belief plus something else” analysis. However, I argue that it also—when conjoined with results from psychology—implies that knowledge is not philosophically significant. There is evidence that knowledge is easier to attribute than belief, and there is evidence that some animals can recognize knowledge/ignorance while lacking the capacity to recognize beliefs. I argue that this supports the hypothesis that the concept of knowledge is a cognitively cheap shortcut approximating the concept of belief in many circumstances, with no special significance beyond that. By rejecting the claim that knowledge should be analyzed in terms of true belief plus something else of epistemic value, knowledge-first epistemology has no natural rebuttal to the conclusion that knowledge is intrinsically unimportant and only valuable as a shortcut.

Logics of the “Exodus of Consciousness”

IVAN RESTOVIĆ
Institute of Philosophy, Zagreb

According to Brouwer, intuition is not given a priori. In its full name, this “basic intuition of mathematics” he also calls “the empty two-ity”, as opposed to a non-empty one. The former is constituted out of the latter by eliminating all sensational content. Original mathematical intuitionism is only a part of a larger structure, Brouwer’s theory of the “exodus of consciousness”. We propose a formal account of the said theory.

The first two "phases" of the exodus of consciousness are formally described by the "simple logic of the exodus of consciousness", LEC. As a starting point we use the logic of change LCG proposed in 2007 by Świętorzecka. We add to the language of LCG four interdefinable unary predicates standing for Brouwer's fundamental notions: egoicity, estrangement, desire and apprehension. The relations among these predicates are represented by the logical hexagon.

The remaining phases of the exodus are formally described by a modal, "extended logic of the exodus of consciousness", LEC^+. Based on Brouwer's definition of a causal sequence, we propose a truth condition for causal propositions. Causal relations are depicted by axiomatic schemata.

The Phenomenology of Time through the Lense of Tense Logic

NICCOLÒ ROSSI
University Ca' Foscari, Venezia

"Prior tense logic programme is unviable [...] because grounded in bad physics and indefensible metaphysics". The aim of our speech is to show this claim by Massey can be subverted, changing the angle of reflection: tense logic (TL) can be an excellent tool to study the phenomenology of time rather than its physics/ metaphysics. In *Time and Modality*, Prior elaborates TL, a symbolic language able to deal with tensed propositions thanks to special modal operators, which rests on the privilege of a moment in time: the present. This conception is hard to defend considering the theory of relativity: TL looks like a *naïf* description of the world science shown to be wrong more than a century ago. Nonetheless, we experience time as an A-series (McTaggart), where some events precede our present, and other events will follow it. What Hoerl and McCormack call "temporal thinking"—the capacity of reasoning on a model which contains different points in time—is not undermined by the theory of relativity and relies on our psychological structure, hence we can ignore metaphysical implications and restrict ourselves to a phenomenological perspective. In order to show why TL is an adequate tool to deal with temporal thinking, we shall examine its basics. Then we shall see how the phenomenological solution can only be a betrayal of Prior's original intentions, who developed TL to examine the metaphysical question of contingency. We shall conclude by showing how further developments in TL allow to model some complex intuitions about the structure of time.

Formal Epistemology as Modelling

JOE ROUSSOS
London School of Economics, Department of Philosophy, Logic and Scientific Method

This paper aims to draw connections between the philosophy of scientific modelling and the way in which formal epistemologists work. Its conclusions are metaphilosophical, concerning the methodology of formal epistemology: formal epistemology (FE) is in the business of modelling, and therefore ought to learn from that practice and its philosophy. I draw on four characteristic features of scientific models: (1) they are an indirect means of inquiry, (2) they involve simplifying and idealising assumptions, (3) they have restricted domains of applicability, and (4) only some of their properties should be imputed to their target systems. FE displays these characteristics, and modelling language helps clarify what we're doing in FE. Taking this description seriously rules out certain moves made in FE debates, which I illustrate with two examples. First, using (2) and (4), I argue that the defence of Probabilism using representation theorems is misguided. Second, using (1) and (3), I show that the debate about the Objects of Credence rests on a mistaken approach to reconciling disagreeing models.

Two Ways to Think about (Implicit) Structure

GEORG SCHIEMER
University of Vienna

According to a dominant view in modern philosophy of mathematics, mathematics can be understood as the study of abstract structures. In this talk, I will compare two ways to think about the structural content of theories of pure mathematics. According to the first approach, the implicit structure or the structural properties of mathematical objects (such as number systems, groups, vector spaces, and graphs) are specified with reference to formal languages, usually based on some notion of definability. According to the second approach, structures are determined in terms of invariance criteria. For instance, the structural properties of a given mathematical system or its objects are often said to be the properties invariant under certain transformations of the system or under mappings between similar systems. In the talk, I will further investigate these two approaches to think about implicit structure in terms of invariance and definability conditions by drawing attention to several examples from finite geometry. Based on this, I will give a philosophical analysis of the conceptual differences between these methods and

discuss their relevance for our present understanding of mathematical structuralism.

The Chemical Bond as a Real Pattern

VANESSA SEIFERT
University of Bristol

This paper examines the nature and reality of the chemical bond in the context of the literature on real patterns. It employs Hendry's distinction between the structural and energetic conception of the chemical bond and argues that both conceptions, understood as distinct yet incomplete intensions of the same referent, are consistent with an understanding of chemical bonds as real patterns. Such an understanding is supported by how chemistry and quantum chemistry each describe and pictorially represent chemical bonds. Several questions need to be addressed in order to sufficiently support the reality of chemical bonds as patterns, some of which are considered in the paper. The paper argues that an understanding of chemical bonds as real patterns provides a novel perspective through which one can understand the nature of the chemical bond, but also through which one can re-evaluate the tenability of structural realist accounts in the philosophy of science.

The Unbridged Gap between Entropy and Memory

ATHAMOS STRADIS
King's College London

Why do we know more about the past than the future? One natural explanation of this 'knowledge asymmetry' is the fact that we have *records* of the past but not the future. Being obviously physical in nature, we can expect the asymmetry of records to be grounded in a yet more fundamental time-asymmetry (as the adage goes, 'no asymmetry in, no asymmetry out').

The Second Law of Thermodynamics states that the entropy of the universe increases following any process. Since Boltzmann, various attempts have been made ground the knowledge asymmetry in this 'thermodynamic asymmetry'. Today, the belief that this has met success is a received view in physics and a popular view in philosophy. In this talk I examine two accounts in this vein.

The first appeals to 'Landauer's Principle', which claims that logical erasure (allegedly essential to computation) necessitates entropic increase. Hence, the knowledge asymmetry is tied to a 'computational asymmetry', and this in turn is tied to the Second Law. The second theory I examine claims that the knowledge asymmetry can be derived from a probability distribution over the world's initial state (the 'Past Hypothesis'), augmented by conditionalisation on the world's present state. I shall argue that neither theory is adequate.

Deep Learning and Neural Networks: A Vindication of Empiricism in Cognitive Science

VANJA SUBOTIĆ
University of Belgrade

Deep learning represents a *statistical technique* for the classification of patterns, based on *training neural networks* with multiple layers using a large amount of data. Neural networks, on the other hand, usually consist of three sets of *units*, analogous to *neurons* in the brain, which are mutually and parallelly connected, viz. input units, hidden units, and output units. A neural network is deemed *deep* in case it contains multiple hidden layers. Neural networks were avidly used in connectionist modelling of human cognitive processes during the 1980s and 1990s. However, recent research in AI (e.g. LeCun et al. 2015, Bengio & Lee 2015, cf. Hassabis et al. 2017 for an overview) has been focused on *Deep Convolutional Neural Networks* (DCNNs), whose characteristic structure is quite different from the structure of neural networks used in connectionism. Namely, DCNNs have three distinctive features—convolution, depth, and pooling—which provides them with both computational efficiency and useful neural constraints such as translational invariance. Notably, the tasks which DCNNs performed with great success include perceptive and intuitive judgment tasks.

These techniques stirred controversy in the philosophy of cognitive science regarding the old empiricism/nativism debate, but also provoked skepticism of the renowned scientists. Specifically, Buckner (2018) claims that abovementioned three features of DCNNs allow them to implement "transformational abstraction", thereby providing (1) a support to the traditional empiricist idea of abstraction, as found in the seminal works of Locke, Berkeley, and Hume; and (2) a vindication of contemporary empiricism in cognitive science by showing that abstract category representations can be deployed using only *domain-general mechanisms*. Marcus (2017, 2018) is rather skeptical about the possibility that (1) DCNNs have a natural way to deal with hierarchical structure, which is constitutive of language; (2) DCNNs pose a serious threat to (Chomskyan) nativism, which treats language as *domain-specific*.

In my talk, I will argue *contra* proponents of Chomskyan nativism. I will sketch several models of language processing which are based upon the use of DCNNs (Karpathy & Fei Fei 2015, Karpathy, Fei-Fei & Johnson 2016) in order to show that once we reject the unwarranted presupposition about innate linguistic rules or structures, it is possible to construe a vindication of empiricism in linguistics as well. In addition, by drawing on Stinson (2018 & forthcoming), I will try to show that that such models can be regarded as *idealized*. The goal of idealized modelling is not to reproduce fine-grained biological behavior, but rather they can be used as tools for discovering general-level mechanistic explanations of cognitive processes.

Knowledge Representation and Temporal Algorithmic Logic

DARIUSZ SUROWIK
Łomża State University of Applied Sciences

In the considerations on the representation of knowledge in the language of logic, it is usually assumed that agents have immediate access to all logical tautologies and all consequences of their knowledge. It does not take into account the time an agent needs to make the calculations and conclude these consequences. We can accept such assumption when we describe the knowledge of the ideal agents. In case of the description of the knowledge of real cognitive subjects, what should be taken under consideration is not only what the agent knows at the moment, but we should also consider what the agent is able to deduce under specific conditions in a certain time.

In our talk, we will consider a system of Temporal Algorithmic Logic, in which we take into account the time which an agent needs to conclude the logical consequences of his current knowledge. In the language of the discussed system, it is possible to model the knowledge of real agents. This aim cannot be achieved if we do not take into account some restrictions of knowledge resources, because real agents have not unlimited memory and unlimited computational power. Epistemic modal logic (commonly used to formalize knowledge) is not adapted to the formalization of reasoning that takes into account the limitations of knowledge resources. The system of logic discussed in our talk realizes this purpose.

Creation of Our Universe and Dark Energy Described Using Common 3D Physics

CHARLES SVEN
[affiliation, or city?]

“All things are made of atoms.” Richard Feynman.

Everything that we know about our Universe is the product of someone's mind, putting together their thoughts about observations into a creation that becomes the best explanation of that set of observed phenomena that becomes one of the laws of physics. We have had our observational senses enhanced by the invention of microscopes, telescopes and everything in between allowing us to seek answers to deepest questions of the day including how was our Universe created and what is the Physics of Dark Energy? In that the current cosmological concept of our Universe's atoms created from a 'singleton' popping out of 'nothing' is not well received, that indicates that we need to study these atoms for a better explanation. In that light, a number of pertinent facts assembled here, when properly arranged, allows us to understand the 'physics' of dark energy—before, during, and after the Big Bang.

"Science finds the Tools
Philosophy seeks the Craftsman."

Compounding Objects

ZVONIMIR ŠIKIĆ
University of Zagreb

One of the useful methods in formal sciences is the construction of complex structures by compounding objects of simpler structures. The interesting question is whether it is possible to construct a compound system with the same 1-order properties as the systems it is compound of.

If the compound structure is defined as the Cartesian product of the simpler structures, with coordinate-wise definition of operations and relations, the compound system will not share the 1-order properties of the components, as is well known.

It could share them if the coordinate-wise definition is relaxed in such a way that we do not care about every coordinate but only about "big" subsets of them. It was proved by Łoś (in the famous Łoś's Theorem) that the appropriate families B of "big" subsets are ultrafilters.

Here we want to prove a kind of converse which is the following characterization theorem for filters, proper filters and ultrafilters.

Characterization theorem:

The equality in the compound system, defined as coordinate-wise equality on "big" subsets in B, is an equivalence relation if and only if B is a filter. Moreover, the equivalence relation is then a congruence.

This equality obey the principle of contradiction if and only if B is a proper filter. Moreover, then every compound relation obeys the principle of contradiction.

The equality obeys the principle of excluded middle if and only if B is an ultrafilter. Moreover, then every compound relation obeys the principle of excluded middle.

Łoś's Theorem then easily follows (with a little help from Skolemization).

References:

Łoś, J. (1955). "Quelques remarques, théorèmes et problèmes sur les classes définissables d'algèbres". *Mathematical Interpretation of Formal System, Studies in Logic and the Foundations of Mathematics*, Amsterdam, pp. 98–113.

A Note about LC Logic Applications. The Problem of Definability of Certain Philosophically Interesting LC Histories

KORDULA ŚWIĘTORZECKA
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

LC is a sentential modal logic with a primitive operator C to be read *it changes that*, which was formalized in [1] and extended to LCS4 in [2]. Both calculi are expressed in a systematically growing language of sentential constants, they describe discrete dichotomic change (from A to $\neg A$ or from $\neg A$ to A), and LCS4 takes into account also necessity in a sense of unchangeability. LC was inspired by the Aristotelian theory of substantial changes and interpreted in so motivated semantics of histories of situational changes ([1]). The formal counterpart of a chain of subsequently becoming and disapearing Aristotelian substances belongs to the set of all histories which verify LC and LCS4. LC is also complete in the intended semantics, and the same is applied to LCS4 in respect to the modified version of LC semantics. This gives an occasion to look for other philosophically interesting histories which may be mentioned as formalizations of e.g. Heraclitian variabilism, Parmenidean constancy, Leibnizian concept of time prior to change. On the level of possible extensions of LC, it is now considered the problem of definability of these histories. Apart from the standard concept of definability, we introduce also the concept of definability of all cuts of a given history. We show whether the considered histories are definable in these two senses and whether there may be formed LC histories describing these histories.

References:
[1] Świętorzecka, K. (2008). *Classical Conceptions of the Changeability of Situations and Things Represented in Formalized Languages*, CSWU Publ. House, Warsaw.
[2] Świętorzecka, K., Czermak, J. (2015). “A Logic of Change with Modalities”, *Logique et Analyse* 232, 509-525.

The Meno Paradox and the Logic of Questions

RICHARD TEAGUE
Johns Hopkins University, Department of Philosophy

One way of formulating the Meno paradox, the so-called paradox of inquiry, allows us to dissolve it by seeing it as an instance of the fallacy of equivocation. This equivocation is between (a) the question one is attempting to answer in an inquiry and (b) the true answer to this question. When these notions are implicitly conflated one can argue to the conclusion that all inquiry is either unnecessary or impossible, i.e. one can argue to the conclusion of the Meno paradox. In this talk, I explain how this rendering of the paradox may be formalized using the relatively new resources of inquisitive epistemic logic, developed by Ciardelli, Groenendijk, and Roelofsen—a logic based on the underlying framework of inquisitive semantics. However, although this semantic framework and others in the Hamblin tradition offer powerful resources for capturing logical relations among questions and questioning attitudes, I argue that, as they stand, they are crucially limited as tools for representing inquiry. To support this, I show that a version of Meno’s paradox follows from key formal semantic assumptions underlying inquisitive epistemic logic, with the result that there are some questions for which inquiry is either unnecessary or impossible. Thus, if a logic of questions and the attitudes we bear to them is to be of use in clarifying and examining the structure of inquiry, they must be adjusted so as to avoid this conclusion.

Why the Stone–von Neumann Theorem Is Not a Categoricity Result

IULIAN TOADER
University of Salzburg

The Stone-von Neumann theorem states that any irreducible faithful representation of the Weyl algebra describing a quantum system with a finite number of degrees of freedom is uniquely determined up to an isometric isomorphism. This entails the physical indiscernibility of representations, and it is the sense in which one speaks of the physical equivalence of the Schrödinger and the Heisenberg representations of a quantum mechanical system. In philosophy of science, this result has been intuitively interpreted as a categoricity result and consequently taken to satisfy a necessary condition for the objectivity of quantum mechanics. We argue that this intuitive reading is incorrect. An isometric isomorphism is not a model-theoretical isomorphism, nor are representations of the Weyl algebra interpretations in the model-theoretical sense. We show in continuous first-order logic (which is a non-Boolean extension of first-order logic) that the formula expressing the isometric isomorphism is not a definable set and, thus, cannot axiomatize an isomorphism class in continuous first-order model theory. We also consider several possible replies to this argument.

A Computational Pragmatics for Weaseling

LEANDER VIGNERO
KU Leuven

The semantics of probabilistic expressions has long been studied in linguistics and is noted for its vagueness. In his seminal paper, Kent already deplored the usage of such vague verbiage in military and intelligence contexts and argued that it be strictly regulated in order to optimize communication. The interpretation of vague language is the purview of pragmatics, which is studied in a plethora of fields, e.g. cognitive science, computer science, linguistics, philosophy of language... As such, pragmatics has a longstanding interdisciplinary tradition. In this paper, the usage and understanding of probabilistic expressions is viewed through the lens of recent developments in computational pragmatics. The core aim of this paper is to construct a theoretical framework to model the pragmatics of such expressions and to use this model to explain when a rational agent should use probabilistic expressions to weasel. Specifically, several enriched Rational Speech Act frameworks are developed which are designed with the empirical findings of the last half century in mind. The novelty of this approach consists in the combination of empirically informed nuance functions and advanced information-theoretic machinery.

A Stochastic Process Explanation of Conditionals

ANNA WÓJTOWICZ, KRZYSZTOF WÓJTOWICZ
University of Warsaw, Institute of Philosophy

We define a formal model for evaluating probabilities of conditionals in terms of stochastic processes. In particular, it allows us to describe several possible interpretations of the conditional (the global and the local interpretation, and generalizations of them) and to formalize some intuitively valid but formally incorrect considerations concerning the probabilities of conditionals under these two interpretations. It also yields a powerful method of handling more complex issues (such as nested conditionals). The description given in terms of stochastic processes provides a satisfactory answer to Lewis arguments, and defends important intuitions which connect the notion of probability of a conditional with the standard notion of conditional probability.

It also illustrates the problem of finding formal explications of philosophically important notions and applying mathematical methods in analyzing philosophical issues. In particular it contributes to the problem of mathematical explanations. Standard examples come from natural science—but here a linguistic (and philosophical) problem is offered a mathematical explanation.

Metaabstract Explanations in Science

KRZYSZTOF WÓJTOWICZ
University of Warsaw, Institute of Philosophy

The thesis that there are genuine, non-causal, mathematical explanations in science has a strong support in the contemporary discussion. According to it, physical phenomena are explained by referring to the truths of mathematics, not to the causal mechanisms. But then, identifying the mathematical resources needed to prove the respective theorems becomes crucial. Importantly, there are examples of sentences with a clear physical interpretation which are independent of the standard set theory (i.e. ZFC). The program of the Topos Quantum Theory also might be interpreted in this spirit, as it is based on strong metatheoretical assumptions. The problem becomes especially interesting when we think of mathematical theorems as expressing modal constraints: what is their metaphysical and epistemological status? Set theory is focused on studying models—so properties of models, not of physical systems, are most essential. In the talk, I will discuss the possibility of defining the notion of metaabstract explanation which takes these results into account—and focuses rather on the properties of models, not only the systems in question.

What Is the Sense in Logic?

URSZULA WYBRANIEC SKARDOWSKA
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The word 'sense' has many meanings and it appeals in many ways. On the base of philosophy (or/and theology), we have been trying for centuries to grasp and understand what is the sense of our lives, the sense of existence, the sense of our action and endeavor, and what is the sense of the world in general. This meaning of the word 'sense' must be clearly distinguished from the logical, semiotic one. It is transferring from the basic, semiotic meaning of this word, the meaning referring to linguistic objects. In this paper, we would like to characterize and formalize various notions of semiotic sense. The contemporary logic, logic of language (logical semiotics) can define the semiotic sense, *logical sense* strictly with regard to some general aspects of the developing of the cognition of the world and, at the same time, contributing to the explication of one of the most important traditional philosophical problems: *language adequacy of our knowledge in relation to the cognition of reality*, briefly: *language adequacy*.

In the paper, various notions of the semiotic sense, namely: syntactic and semantic, intensional and extensional, are considered and formalized on the basis of a formal-logical conception of any language L characterized categorically in the spirit of some Husserl's ideas of pure grammar, Leśniewski–Ajdukiewicz's theory of syntactic/semantic categories and in accordance with Frege's ontological canons, Bocheński's and some Suszko's ideas of language adequacy of expressions of L. Adequacy ensures their unambiguous syntactic and semantic senses and mutual syntactic and semantic correspondence guaranteed by the acceptance of the postulate of categorial compatibility of syntactic and semantic (extensional and intensional) categories of expressions of L. There are three principles of compositionality which follow from this postulate: one syntactic and two semantic ones already known to Frege. They are treated as conditions of homomorphism of partial algebra of L into algebraic models of L: syntactic, intensional and extensional. They can be applied to some expressions with quantifiers.

PROGRAMME

THURSDAY, PART 1, April 11, 2019

09:00-10:00	Registration	(Secretariat and registration desk)

10:00-10:10	Opening	
10:10-11:00	**Key-note lecture**: Maria MANZANO, Existence, Denotation and Equality in Hybrid Partial Type Theory	
11:05 -11:45	Patrick BLACKBURN, Rigidity and Hybrid Logic	
Chair: S. Kovač		(Large Hall, basement fl.)
11:45-12:15	Coffee break	

Chair: C. Benzmüller		(Room F, section)
12.15-12:55	Kordula ŚWIĘTORZECKA, A Note about LC Logic Applications. The Problem of Definability of Certain LC Philosophically Interesting Histories	
13:00-13:40	Anna & Krzysztof WÓJTOWICZ, A Stochastic Process Explanation of Conditionals	
Chair: M. Porwolik		(Room G, section)
12.15-12:55	Johan GAMPER, Formal Ontology	
13:00-13:40	Janusz KACZMAREK, Theory of Situations in Topological Ontology	

The time slot for each lecture/talk includes 10 minutes for discussion.

THURSDAY AFTERNOON, April 11, 2019

Chair: D. Surowik	(Large Hall, basement fl.)
15:10 -15:50	Georg SCHIEMER, Two Ways to Think about (Implicit) Structure

Chair: J. Gamper	(Room F, section)
16:00-16:40	Urszula WYBRANIEC-SKARDOWSKA, What is the Sense in Logic?
16:45-17:25	Anna LEMAŃSKA, About Some Problems with Formalization
Chair: V. Lobovikov	(Room G, section)
16:00-16:40	Charles SVEN, Creation of Our Universe and Dark Energy Described Using Common 3D Physics
16:45-17:25	Srećko KOVAČ, Formal Systems and Determinism
Chair: M. Latawiec	(Room H, section)
16:00-16:40	Michał PIEKARSKI, From Reverse Engineering to Mechanistic Explanation: Explanatory Power of Predictive Processing Framework
16:45-17:25	Janina BUCZKOWSKA, Scientific Realism and the Pessimistic Induction Argument
17:25-17:55	Coffee break

Chair: K. Świętorzecka	(Room F, section)
17:55-18:25	Marcin ŁYCZAK, The Logic of Modal Changes LMC
18:30-19:00	Ivan RESTOVIĆ, Logics of the “Exodus of Consciousness”
Chair: G. Lojkić	(Room G, section)
17:55-18:25	Meha MISHRA, Tolerating Inconsistencies: A Study of Logic of Moral Conflicts
18:30-19:00	Richard TEAGUE, The Meno Paradox and the Logic of Questions
Chair: V. Aranda	(Room H, section)
17:55-18:25	Joe ROUSSOS, Formal Epistemology as Modelling
18:30-19:00	Stipe PANDŽIĆ, Justification Logic as a Framework for Structured Argumentation

The time slot for each lecture/talk includes 10 minutes for discussion.

FRIDAY, PART 1, April 12, 2019

Chair: G. Basti	(Large Hall, basement fl.)
09:00-09:50	**Key-note lecture**: Edward ZALTA, Formal Philosophy of Mathematics
09:55 -10:35	Elena DRAGALINA-CHERNAYA, The Variety of Logical Hylomorphism
10:35-11:05	Coffee break

Chair: M. Piekarski	(Room F, section)
11.05-11:45	Mihał & Anna Maria LATAWIEC, What Kind of Philosophy Do Environmental Protection Need?
11:50-12:30	Dominika DZWONKOWSKA, The Question of Transdisciplinarity
12:35-13:15	Gianfranco BASTI, A Categorical Version of the Ontic Structural Realism in Natural Philosophy
Chair: I. Kuzmanović	(Room G, section)
11.05-11:45	Krzysztof WÓJTOWICZ, Metaabstract Explanations in Science
11:50-12:30	Vladimir DREKALOVIĆ, Mathematical Argumentation in the Explanation of a Scientific Phenomenon - the History of one Example
12:35-13:15	Piotr BŁASZCZYK, New Science of Infinity

The time slot for each lecture/talk includes 10 minutes for discussion.

FRIDAY AFTERNOON, April 12, 2019

Chair: G. Schiemer (Large Hall, basement fl.)

15:10-16.00	**Key-note lecture**: Christoph BENZMÜLLER, Computational Metaphysics: New Insights on Gödel's Ontological Argument and Modal Collapse

16.00-16.30	Coffe break

Chair: S. Pandžić (Room F, section)

16:30-17:00	Giovanni Marco MARTINO, A Fregean Logical Objects Theory
17:05-17:35	Viktor ARANDA, Completeness and Categoricity: the Debate on Husserl
17:40-18:10	Niccoló ROSSI, The Phenomenology of Time Through the Lense of Tense Logic

Chair: M. Łyczak (Room G, section)

16:30-17:00	Vanja SUBOTIĆ, Deep Learning and Neural Networks: a Vindication of Empiricism in Cognitive Science
17:05-17:35	Leander VIGNERO, A Computational Pragmatics for Weaseling
17:40-18:10	Mirko ENGLER, Generalized Interpretability and Meaning

Chair: J. Roussos (Room H, section)

16:30-17:00	Vanessa SEIFERT, The Chemical Bond as a Real Pattern
17:05-17:35	Athamos STRADIS, The Unbridged Gap Between Entropy and Memory
17:40-18:10	Aleksandra GOMUŁCZAK, From Formal to Informal: the Variants of the Paraphrase Method

The time slot for each lecture/talk includes 10 minutes for discussion.

SATURDAY, April 13, 2019

Chair: K. Wójtowicz	(Room F, section)
09:00-09:40	Zvonimir ŠIKIĆ, Compounding Objects
Chair: J. Kaczmarek	(Room G, section)
09:00-09:40	Benjamin T. RANCOURT, Psychology Plus Knowledge-First Epistemology Implies the Philosophical Insignificance of Knowledge
09:40-10:10	Coffee break

Chair: Z. Šikić	(Room F, section)
10.10-10:50	Ivana KUZMANOVIĆ et al., On the Relation of Multi-valued Logics and M-System Theory
10:55-11:35	Vladimir LOBOVIKOV, A Model Σ for the Theory Ξ
10:55-11:35	Iulian TOADER, Why the Stone-von Neumann Theorem is not a Categoricity Result
Chair: P. Błaszczyk	(Room G, section)
10.10-10:50	Dariusz SUROWIK, Knowledge Representation and Temporal Algorithmic Logic
10:55-11:35	Marek PORWOLIK, The Application of S. K. Thomason's Conception of Event Ordering to Determining Mereological Genidentity
11:40-12:20	Goran LOJKIĆ, Formalization of the Leibnizian Cosmological Argument
12.20-12.40	Coffee Break

12:40-13:20	Robert PIŁAT, A Reconciling of Semantic and Cognitive Approaches to Concepts
13.20	*Closing*
Chair: K. Świętorzecka	(Large Hall, basement fl.)

The time slot for each lecture/talk includes 10 minutes for discussion.

LIST OF PARTICIPANTS

Victor Aranda, victor.aranda@uam.es, University of Madrid.

Gianfranco Basti, gbdecfil@gmail.com, Pontifical Lateran University, Faculty of Philosophy, Vatican City.

Juraj Benić, University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture.

Christoph Benzmüller, c.benzmueller@gmail.com, Free University of Berlin.

Patrick Blackburn, patrick.rowan.blackburn@gmail.com, Roskilde University.

Piotr Błaszczyk, piotr.blaszczyk.pl@gmail.com, Pedagogical University of Cracow, Institute of Mathematics.

Janina Buczkowska, janina.buczkowska@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Elena Dragalina-Chernaya, dragalina@gmail.com, National Research University, Moscow, Higher School of Economics, International Laboratory for Logic, Linguistics and Formal Philosophy.

Vladimir Drekalović, drekalovicv@gmail.com, University of Montenegro, Faculty of Philosophy, Department of Philosophy.

Dominika Dzwonkowska, d.dzwonkowska@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw.

Mirko Engler, mir.engler@gmail.com, HU Berlin.

Mario Essert, University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture.

Johan Gamper, johan.gamper@karlpu.org, Subrosa KB, Vendelsö, Department of Scientific Ontology.

Aleksandra Gomułczak, gomulczak.a@gmail.com, Adam Mickiewicz University, Poznań, Institute of Philosophy.

Slobodan Jelić, J. J. Strossmayer University of Osijek, Department of Mathematics.

Janusz Kaczmarek, janusz.kaczmarek@filozof.uni.lodz.pl, University of Łódź, Department of Logic and Methodology of Science.

Srećko Kovač, skovac@ifzg.hr, Institute of Philosophy, a public research institute of the Republic of Croatia, Zagreb.

Ivana Kuzmanović Ivičić, ikuzmano@mathos.hr, J. J. Strossmayer University of Osijek, Department of Mathematics.

Anna Maria Latawiec, a.latawiec@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Mihał Latawiec, Cardinal Stefan Wyszyński University, Warsaw, Institute of Ecology and Bioethics.

Anna Lemańska, a.lemanska@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Vladimir Lobovikov, vlobovikov@mail.ru, Ural Federal University, Yekaterinburg.

Goran Lojkić, goran@ifzg.hr, Institute of Philosophy, a public research institute of the Republic of Croatia, Zagreb.

Marcin Łyczak, m.lyczak@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw.

María Manzano, mara@usal.es, University of Salamanca.

Giovanni Marco Martino, giovanni.martino3@outlook.it, Vita-Salute San Raffaele University, Milan.

Meha Mishra, meha@iitk.ac.in, Indian Institute of Technology Kanpur, Humanities and Social Sciences Department.

Stipe Pandžić, s.pandzic@rug.nl. University of Groningen.

Michał Piekarski, m.piekarski@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Robert Piłat, r.pilat@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw.

Marek Porwolik, m.porwolik@uksw.edu.pl, Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Benjamin T. Rancourt, btrancou@ncsu.edu, North Carolina State University, Department of Philosophy and Religious Studies.

Ivan Restović, ivan@ifzg.hr, Institute of Philosophy, a public research institute of the Republic of Croatia, Zagreb.

Niccolò Rossi, 854852@stud.unive.it. University Ca' Foscari, Venezia.

Joe Roussos, J.D.Roussos@lse.ac.uk, London School of Economics, Department of Philosophy, Logic and Scientific Method.

Georg Schiemer, georg.schiemer@univie.ac.at, University of Vienna.

Vanessa Seifert, van.seifert@hotmail.com, University of Bristol.

Athamos Stradis, athamos.stradis@kcl.ac.uk, King's College London.

Vanja Subotić, subotic_vanja@hotmail.com, University of Belgrade.

Dariusz Surowik, dsurowik@pwsip.edu.pl, Łomża State University of Applied Sciences.

Charles Sven, cjsven@comcast.net, [affiliation, or city].

Zvonimir Šikić, zvonimir.sikic@gmail.com, University of Zagreb.

Kordula Świętorzecka, k.swietorzecka@uksw.edu.pl. Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy.

Richard Teague, rteague2@jhu.edu, Johns Hopkins University, Department of Philosophy.

Iulian Toader, iulian.toader@sbg.ac.at, University of Salzburg.

Leander Vignero, leander.vignero@kuleuven.be, KU Leuven.

Anna Wójtowicz, amwojtow@uw.edu.pl, and Krzysztof Wójtowicz, kwojtowi @uw.edu.pl, University of Warsaw, Institute of Philosophy.

Krzysztof Wójtowicz, kwojtowi@uw.edu.pl, University of Warsaw, Institute of Philosophy.

Urszula Wybraniec Skardowska, skardowska@gmail.com. Cardinal Stefan Wyszyński University, Warsaw. Institute of Philosophy.

Edward Zalta, Stanford University, zalta@stanford.edu

Tihomir Žilić, University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture.