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FORMAL METHODS AND SCIENCE IN PHILOSOPHY

Inter-University Centre, Dubrovnik, Croatia
March 26–28, 2015

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ABSTRACTS

Keynote lectures

The Problem of the Definition or Description of God in Gödel's and Other Ontological Proofs

PAUL WEINGARTNER

Salzburg University, Department of Philosophy

The lecture is concerned with the problem of giving a definition or description of God. In the first section different attempts in the history of philosophy will be discussed. These attempts will be divided into two classes: (A) Those descriptions which mention properties of God in relation to the world as being its creator. (B) Those descriptions which mention properties of God which are (more or less) independent of his relation to the world. For example Aristotle's description of God as the unmoved mover belongs to (A) whereas Anselm's description of God as the id quo majus cogitare non potest belongs to (B).

In the second section the distinction of negative and positive properties and consequently of negative and positive statements about God will be discussed. This is connected with the so called negative theology which allows only negative statements about God (where the negation can be taken as sentence-negation or as using a type of negative properties). For example: immutable, not in time, not material, not composed . . . etc. Its also connected with the so called positive theology which permits also positive statements about God, usually with two types of positive properties: those attributed to God per analogiam and those attributed to God by way of surpassing or transcending or maximizing. The latter seems to be the case in Gödel's idea of the sum of all positive properties. Precursors concerning surpassing,transcending or maximizing are Augustin, Boethius, Anselm, Leibniz, Spinoza and Kant.

In the third section it will be asked which properties belong to God's essence and which do not. The properties belonging to (A) do not belong to God's essence, if the world was created freely by him and did not follow necessarily from his essence (as christianity assumes). Accordingly we speak of the contingent (not necessary) world. The negative properties may demarcate his essence from properties of the world. The positive properties belonging to (B) may partially describe his essence per analogiam or by surpassing or transcending or maximizing properties taken from creation.

Gödel's Ontological Argument in the Public Eye

ANDRÉ FUHRMANN

Goethe University, Frankfurt, Department of Philosophy

Gödel's ontological argument is without doubt the most "technical" of all arguments for the existence of God. Surprisingly, it is also the one that has lately received the most public attention. Part of the explanation is that Kurt Gödel has long entered the world of intellectual folklore. As such he is perceived as a genius with an unfailing grip on evasive truths. His credentials for rigorous proof of surprising results are thus impeccable. So, if Gödel claims to have proved the existence of God, who would wish to stand up and protest? As it happens, many do. In 2013 and 2014 two widely read German weekly magazines (*Der Spiegel* and *Die Zeit*), both with a reputation for serious journalism, published articles on Gödel's ontological proof. One of the articles was accompanied by a blog in which readers could register their comments. Within three months more than 250 comments were received and published. The result is a unique corpus documenting how laymen respond to philosophical arguments to conclusions of general and immediate interest. In my talk I shall try to analyse this corpus and offer some conclusions about the persuasiveness of arguments for the existence of God and of philosophical arguments in general.

Talks

The Open Reading of Permission and its Logic(s)

ALBERT J. J. ANGLBERGER
Ludwig Maximilian University, Munich, Center for Mathematical Philosophy

Deontic logic has primarily dealt with normative notions (permitted, forbidden etc.) as applied to generic actions or action types, rather than individual acts or act tokens. The relationship between generic actions and individual acts has not attracted much attention. By refining a principle from the deontic logic literature (a version of what has been called "the Open Reading of Permission") we are able to explicitly relate the normative status of an action type to the normative status of certain action tokens. This results in a variety of deontic logics, which we will finally compare to other, more well-known systems of deontic logic.

A Formalization of Aquinas Theory of Creation as Participation of Being

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

In the framework of formal philosophy, we present here a formalization of the Aquinas metaphysics in terms of the formal ontology of the natural realism (NR). The modal logic (ML) of NR is the KD45 system, defined on Aczel non-wellfounded sets, allowing a coalgebraic formalization of ML. In such a way, we can formally justify in QML semantics the use of evaluations based on bounded morphisms among Kripke models, the logical completeness of their unbounded sequences, and the consequent theory of stratified rigidity, constituting the core of the NR ontology as far as formalizing the causal hierarchy of genera-species (natural kinds) of physical bodies in the Aristotelian-Thomistic ontology of nature. More generally, the NR ontology can formalize, in terms of the category theory duality between Universal Algebra/Universal Coalgebra, the duality between the logic (direct) and the ontic (converse) implication, originally suggested by Aristotle as justification of the onto-logical bi-conditional. At the ultimate metaphysical level, such a duality formalizes Aquinas' distinction between the "logical truth" (induction: algebra) for finite intellects like ours, and the "ontological truth" (unfolding: coalgebra) for an Infinite Intellect such as the Divine One. Finally, the quantum field theory (QFT) formalism in fundamental physics – both at the microscopic (Standard Model) and at the macroscopic (condensed matter) levels – can find its proper ontology in the NR system without its metaphysical extension, as far as QFT characterizes any interacting quantum system entangled with its thermal bath, by the duality q-deformed Hopf algebra-coalgebra.

A Frege-Geach Style Problem for Knowledge Closure Schemas

AUDRE JEAN BROKES
St. Joseph's University, Philosophy Program

A Basic Closure Schema is used in the Knowledge Closure Debate: 'if S knows P and knows that P implies Q then S knows Q'. This schema is an English/Logic hybrid I'll call 'Loglish'. Use of Loglish to frame the Knowledge Closure Debate is illegitimate for the following reasons. Its use: a) commits one to an extensional definition of 'implies'; b) implicitly endorses a view that assimilates good inference to 'formally valid inference'; and c) obscures the fact that (pace claims to the contrary) answering the question whether knowledge is closed under known entailment requires an independent account of inferential knowledge, in particular an account of what it is to know a conditional. Abandoning the Basic Closure Schema (and, hence, Loglish) helps make clear that: i) the descriptive content of the concepts involved in an inference is an essential feature of that inference's normative propriety; ii) the question whether knowledge is closed under known entailment has no univocal answer. More generally, the paper argues that the use of quasi-formal representational devices in epistemology is the source of mischief.

Analysis of the Concept of Chance. On the Margin of Kotarbińska's Article

ANNA BROŻEK, ALICJA CHYBIŃSKA
University of Warsaw, Institute of Philosophy

The aim of our paper is to reconstruct, explicate, simplify and standardize various senses of the term "chance" which were collected and presented by Janina Kotarbińska in *An Analysis of the Concept of Chance* (1934).

The following problems will be analyzed: - what is the adequate genus proximum of the definition(s) of the term "chance";
- what is the relation between subjectivist and objectivist concept of chance;
- whether the concept of chance is related to something, e.g. to certain events or laws, or not, and if it is related to some laws, then what is the nature of these laws;
- whether the term "chance" is used in the same sense in various scientific disciplines, e.g. in physical sciences, biological sciences and the humanities.

Our reconstruction of Kotarbińska's ideas will be compared with the results of current debates about the chance and randomness.

Normativity of Meaning in Natural Language and Languages of Scientific Theories. Logical and Epistemological Relationships Between Meaning and Usage

JANINA BUCZKOWSKA

Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

Although vividly discussed in the case of natural language, the problem of the normativity of meaning does not surface in the languages of scientific theories. Can any conclusions be drawn from this fact for the issue of the nature of meaning?

The talk puts forward the thesis of the normativity of meaning and its reference to the truth conditions of sentences and to linguistic convention and confront them with positions rejecting normativity of meaning. The analysis of the use of certain terms in scientific theories performed in the paper indicates significant, systemic, logical and epistemological determinants of meaning forgone in the discussions on natural language. They allow for different justifications for normativity of meaning also in natural languages.

The proposal put forward in the paper brings a contribution to the characteristics of the language of science, provides arguments for normativity of language and epistemological origins of meanings.

The 'Substrative' Concept of Matter

GRZEGORZ BUGAJAK

Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

Matter is one of the crucial, classical categories that have been used in various philosophical attempts at rational explanation of the world. Despite its long history (or, possibly, because of this rich tradition) an answer to the seemingly simple question "what is matter?" remains far from being clear. It would appear that after centuries of inconclusive philosophical disputes, science (mainly physics) provides the final answer to this question. Is it, however, the case?

There are two distinct concepts of matter that can be identified in this long tradition: attributive and 'substrative'. The former assumes that an adequate definition of matter needs to point to such properties of beings commonly called material, that are characteristic of each and all of such beings, and can be predicated only of them (and not of any other kinds of beings). Lists of those properties vary between philosophical schools, but usually contain such attributes as extension, spatiotemporal character or perceivability. The other concept, present in philosophy from Aristotle to Descartes to some contemporary accounts, treats

matter as some kind of material, which all things consist of. This understanding (or rather such use of the word "matter") stems from the etymology of the Latin word "materia", which in one of its basic meanings referred to the material that can be used to build something, "timber", "substance" – in the physical meaning of the latter.

The talk considers the substrative concept of matter in its historical roots and contemporary forms. In particular, some quite persistent misunderstandings, which stem from failing to distinguish between physical and metaphysical forms of this concept, and from conceptual difficulties with the classical notion of the prime matter, will be discussed. The ultimate aim of the presentation is to see if science can help to settle the issue, and to decide whether the concept in question should be abandoned as a noble, but empty relic of the past, or still can be of use in philosophical attempts at answering the question of "what is matter?"

Some Extensions and Certain Interpretation of Gödel's Theological System

JOHANNES CZERMAK
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In his note "Ontologischer Beweis" Gödel formulates some axioms which allow him to carry out his ontological proof for the existence of God. The basic concept is the positiveness of properties; his short comment is: "*Positive means positive in the moral aesthetic sense (independently of the accidental structure of the world). Only then the ax. true.*" Therefore it seems to be obvious that – when quantifying over properties – he had not in mind to consider all extensionally definable properties and especially to admit unrestricted λ-abstraction (even when he used special cases of the comprehension axiom).

We take Gödel's axioms as the heart of more general theological systems, enriched by statements about the existence of other individuals and about relations between them and God. (If there would be only God, there would be extensionally only two properties, one positive – to be identical with God – and one negative, to be empty. This wouldn't be very informative.) We distinguish different kinds of properties, restrict quantification over properties in context of *positiveness* to a certain class of (intensionally understood) properties, by this way avoiding the modal collapse. We incorporate also other proofs for God's existence (like that of Leibniz and of Bolzano), and study certain properties of God which were already considered in the theological tradition (e.g. in scholastic times). Of course, in this way Gödel's axioms loose their pure "ontological" character, but on the other hand they gain some expressiveness.

Reliability and Meta-Reliability in the Structure of Epistemic Justification

ZVONIMIR ČULJAK

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The process of *reliabilism* (PR), championed by A. I. Goldman (1975, 1979, 1986, 1992), gives an analysis of knowledge or justified belief in terms of the propensity of a type of the belief producing processes to yield true beliefs. The *meta-reliability* or the *second-order reliability* condition (MR), stipulated by Goldman (1986), was designed to defend PR against several objections to the necessity and sufficiency of the reliability condition. The focus of the paper is the applicability of MR concerning *communal* belief-producing processes and the epistemic role of expertise, along the lines proposed by Goldman (1999a,b, 2001, 2010a, b, c, 2014).

Definitionicism

CHRISTIAN FELDBACHER

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In Frege's *Grundlagen* (1884) we find the first comprehensive attempt of "logicising mathematics". By the partial reduction of mathematics to logic also the epistemic notion of analyticity became unified inasmuch as the three parts of analytic truths, namely mathematical, logical, and definitional/conventional truths were at least partly reduced to the latter two categories. In subsequent investigations also the foundations of logic were discussed quite extensively by providing even more fundamental principles for distinguishing logical truths from non-logical ones. Three main approaches can be differentiated in these investigations: Belnap's structural rules approach (1962), Quine's approach of substitution salva congruitate (1979), and Tarski's invariance approach (1986). All three suggestions fail in its details in distinguishing adequately logical from non-logical truths. In this paper a fourth approach will be discussed which serves also as further unification of the analyticity concept: with the help of definitional/conventional criteria alone we try to show how one may reconstruct a bulk of the predicate calculus' logical truths. In doing so, we are able to unify the notion of analyticity even further: from logical and definitional/conventional categories to just the latter one.

Counterfactuals within Scientific Theories

SAMUEL FLETCHER

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The language of our scientific theories is rife with alethically modal statements. The truth of counterfactual conditionals concerning matters that scientific theories describe, however, is not adequately given by the application of standard possible world semantics. As developed by Lewis and others, this semantics depends on entertaining possible worlds with miracles, worlds in which laws of nature, as described by science, are violated. This is clearly unacceptable if one is interested in evaluating certain counterfactuals not as sentences broadly of natural language, but more narrowly as propositions concerning only the connections between possibilities warranted by particular scientific theories.

It is clear that many scientific theories do describe with mathematical precision the possibilities they warrant, and the practice of science itself often involves introducing additional structure on these possibilities to represent relevant similarities among them. These structures include so-called uniformities, which are used to introduce the concept of a uniformly continuous variation. Any uniform space – a collection with a uniformity – turns out to be a model of Lewis' system of spheres, in particular his modal logic **VWU**. If the uniformity is separating – the uniform-structure analog of the Hausdorff condition from topology – then the corresponding system of spheres yields Lewis' modal logic **VCU**. The possible worlds, however, are all consistent with the scientific theory of interest, so evaluating counterfactuals using them does not require entertaining miracles.

As an application, I consider the possibilities described by the theory of general relativity, discussing the contextuality of the appropriate choice of uniformity and the failure of the so-called Limit Assumption.

Revisionist Demarcationism and Formal Criteria for Genuine Explanations

STAMATIOS GEROGIORGAKIS

Erfurt University, Faculty of Philosophy

Bayesian confirmation theory provides a framework which enables to assess the likeliness by which any proposition h holds, given that any other proposition e holds. Likeliness, in this sense, is calculated by means of Bayes's Rule as the probability value of the function $P(h|e) = P(e|h)P(h)/P(e)$ – the only obvious restriction here being that the denominator does not equal zero, i.e. that the evidence is not impossible. In order to make this, admittedly, too liberal concept of confir-

mation adequate to grasp the concept of scientific explanation, one has to make further restrictions as to what data are acceptable as arguments of the function.

Until now, Bayesian philosophers of science have been content with the fact alone that scientific hypotheses have often higher intrinsic probability values – and eo ipso a better point of departure to be confirmed vis-à-vis given evidence – than non-scientific hypotheses. The few exceptional cases of confirmed hypotheses which appeared not to fit in the "canon" of empirical science have been at most criticized by appeal to the role of priors.

In the last years, however, Gerhard Schurz, his disciples, and some more scholars in Wolfgang Stegmüller's tradition have been attempting to relaunch the debate on the demarcation problem – this time by reference to Bayesian confirmation. I would like to call their program "revisionist demarcationism".

I am discussing revisionist demarcationism and show its shortcomings. More precisely, I argue for the claim that the general criterion which the revisionist demarcationist proposes as a solution for the demarcation problem for Bayesian confirmation, the desideratum of new evidence, is, as it stands, too weak to prevent cases which challenge empirical science. In effect, the revisionist demarcationist strengthens this criterion so to characterize as science only a fragment of what can be intuitively said to deserve the name.

Selected Literature:

Gerogiorgakis, S.: 2014. Bayesian Theism and the Interpretation of Bayesian Probabilities, in: Ramelow, A. (ed.), *God* (Munich: Philosophia), 127-145.

Gerogiorgakis, S.: 2013. Combining Bayesian Theism with Pascal's Wager, in: Hoeltje, M. / Spitzley, T. / Spohn, W. (eds.), *Was dürfen wir glauben? Was sollen wir tun? Sektionsbeiträge des achten internationalen Kongresses der Gesellschaft für Analytische Philosophie e.V.* (`http://duepublico.uni-duisburg-essen.de/servlets/DocumentServlet?id=31200` downloadable online publication of the University Duisburg-Essen (DuEPublico)), 405-411.

Grünbaum, A.: 1991. Creation As a Pseudo-Explanation in Current Physical Cosmology. *Erkenntnis* 35, 233-254.

Grünbaum, A.: 2000. A New Critique of Theological Interpretations of Physical Cosmology. *British Journal for the Philosophy of Science* 51, 1-43.

Schurz, G.: 2009. Kreationismus, Bayesianismus und das Abgrenzungsproblem. Paper read at the 7th triennial conference (GAP.7) of the German Society of Analytical Philosophy (Gesellschaft für analytische Philosophie), Bremen 14-17/9/2009. Published online at: `http://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-29983/Proceeding_GAP7_Nachdenken_Vordenken.pdf`, 169-182. Retrieved on 2/1/2013.

Schurz, G.: 2011. Bayesianische Bestätigung des Irrationalen? Zum Problem der genuinen BestÃd'tigung. Paper read at the 22nd German Congress of Philo-

sophy, Munich, 11-15/9/11. Published online: `http://epub.ub.uni-muenchen.de/12354/`. Retrieved on 2/1/2013.

Schurz, G: 2014. Bayesian Pseudo-Confirmation, Use-Novelty and Genuine Confirmation. *Studies in History and Philosophy of Science* 45, 87-96.

Williamson, J.: 2010. *In Defence of Objective Bayesianism*. Oxford: Oxford University Press.

Aristotle and the Principle of Alternate Possibilities

FILIP GRGIĆ
Institute of Philosophy, Zagreb

In his *Nicomachean Ethics* 3.5 Aristotle says that if acting is up to me, so too is not acting. This might be interpreted as saying that an action is up to me if I could have done otherwise than performing that action. Given that Aristotle also argues that an agent is responsible for an action only if it is up to her, it would follow that he endorses the principle of alternate possibilities, according to which an agent is responsible for an action only if she could have done otherwise. I will argue against such a reading. That is to say, I will argue that "If Φ-ing is up to me, so too is not Φ-ing" should not be interpreted as "Φ-ing is up to me iff, if I have Φ-ed, I could have not-Φ-ed (or restrained from Φ-ing)". I prefer a different reading, according to which to say that an action is up to me is to say that I am its causal origin, or that I have causal control over it. But then the question remains as to how to understand the apparent two-sidedness included in Aristotle's definition of "up to me". I will consider several possibilities and conclude that it is misleading to talk of two-sidedness as a feature of agents' ability to act.

Spacetime Points as Classes of Mereotopologically Structured Basic Entities

LAURENZ HUDETZ
Salzburg University, Department of Philosophy

It has been suggested by a number of authors (most prominently Whitehead and Russell) that spacetime points should be identified with classes of mereotopologically structured basic entities. These suggestions are mainly motivated by (a) the empiricist or relationist view that sentences about spacetime points should be reduced to sentences about epistemologically or ontologically preferable basic entities and their relations, or (b) the view that we should be able to talk about spacetime points even in the case that the structure of spacetime regions is atomless.

I show that the philosophical problem of finding an adequate method of identifying spacetime points with classes of basic entities can be translated into a mathematical problem. I have developed a unified formal framework for analysing and evaluating point representation methods. The most important methods identify points either with ultrafilters, completely prime filters or maximal round filters. It can be proven that only the method using maximal round filters is generally adequate.

Metatheory of Tableau Systems

TOMASZ JARMUŻEK
Nicolaus Copernicus University in Toruń, Department of Logic

Tableau proofs have a number of advantages in comparison to other proof methods. They can often be conducted automatically and countermodels are often delivered by failed proofs. The advantages are most evident in comparison to standard axiomatic proofs. The chief disadvantage of the tableau method is its intuitiveness, which is extremely problematic in proving soundness and completeness of tableau consequence systems with respect to some semantic consequence relation.

In our talk a formal account is presented of the question of the tableaux as well as tableau proofs. The approach we propose turns out to be quite successful in dealing with such metalogical problems as soundness and completeness, which will be demonstrated. The account we present extends ideas described in such works as [1], [2], [3]. And we especially extrapolate the tableau method for modal logic, delivered in the work [2] on other kinds of sentential calculi as well as calculi of names.

The theory we deliver covers sentential calculi as well as calculi of names. In our talk we present main metatheoretical concepts, the chief metatheoretical theorem and show some instructive examples of application.

Literature:

[1] Jarmużek, T., *Formalizacja metod tablicowych dla logik zdań i logik nazw* (*Formalization of tableau methods for propositional logics and for logics of names*), Wydawnictwo UMK, Toruń, 2013.

[2] Jarmużek, T., Tableau Metatheorem for Modal Logics, *Recent Trends in Philosphical Logic, Trends in Logic*, (Eds) Roberto Ciuni, Heinrich Wansing, Caroline Willkomennen, Springer Verlag, 2013, 105–128.

[3] Jarmużek, T., Tableau System for Logic of Categorial Propositions and Decidability, *Bulletin of The Section of Logic*, 2008, 37 (3/4), 223–231.

Mechanistic and Computational Explanations in Neuroscience

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Institute of Philosophy, Zagreb

Universal agreement concerning the nature of explanation in neuroscience is far from being achieved. Nevertheless, it is widely accepted that many of the explanations employed by neuroscientists are mechanistic ones. The development of computational neuroscience over the past few decades has introduced computational explanations dealing with phenomena at the neuronal level. The need for establishing criteria of explanatory adequacy has led some researchers (Kaplan, Craver, Piccinini) to claim that computational explanations are just a species of mechanistic explanations. Recent developments concerning "canonical neural computations" suggest that the relation between these two species of explanation is likely to be far more complex. In my talk I will try to shed some light on the question to what extent are computational explanations autonomous from the mechanistic characterisation of the realizational level.

Challenges of the Philosophical and Scientific Explanations of the Origin of First Life

TONČI KOKIĆ
University of Split, Faculty of Humanities and Social Sciences

The naturalistic stance of science includes explanation of the origin of first life with the general conviction that life is a natural property of certain types of (self) organized matter. Explorations in this area should obey reductionist-reversibility principle of continuity and mechanistic principles. There is a belief that due to its complexity it is hard to imagine that the origin of first life is an unlikely, unique successful random event which occurred from a series of highly unlikely events. According to the methodological commitment of science it is more likely that the origin of first life is a process of numerous intermediate steps, although the first life occurred early in formation of the Earth. Both possible explanations are challenging for philosophy of science: in the first case, it would be necessary to question the possibility of the scientific explanation of the single event – is it the origin of life solvable scientifically; otherwise it would be necessary to find an answer as to why up until now no successful attempt has been made at recreating life (de novo).

Causal Interpretation of Gödel's Ontotheology

SREĆKO KOVAČ
Institute of Philosophy, Zagreb

Gödel has in various ways expressed the view that causality is "the fundamental concept of philosophy". He states that causation "should explain the general and the particular" and that "the real idea behind time is causation". Accordingly, he also holds that metaphysical and theological worldviews could be transformed into exact science as based on the principle of causality. On this ground we propose a causal reformalization and reinterpretation of Gödel's modal ontotheological theory and of his ontological proof, and focus especially on the semantical aspect of the theory. The modalities of the system are replaced by (possibly complex) causal terms. We modify Fitting's models for justification logic by transforming their proof-related features into causal ones. On the ground of the obtained formalism we analyze possible "absolute" concept of cause, in correspondence with Gödel's "absolute" concept of proof (as appearing in his justification logic sketch from 1938). Gödel's original modal ontotheology, as well as its causal reformalization, are put in the context of Gödel's criticism of Leibniz's concept of possibility, Gödel's extending of Kantian concept of intuition into "constructive" epistemology of concepts, and of inductive-constructivist criticism of Leibniz by R. Bošković.

Should Scientific Realists Rely on Technological Success?

BORIS KOŽNJAK
Institute of Philosophy, Zagreb

Although the 'argument from success' is considered to be the 'ultimate argument' for the claim that our best scientific theories are true or at least approximately true in respect to the world which they intend to describe, in the first part of this paper I will argue that the argument loses its strength once we accept that it relies on the still widespread but false belief that technology is merely an applied science. In the second part of the paper, I will offer a more general approach to the question whether the technological success – in so far as it is the use of pure science – does indeed corroborate scientific realism, in light of what can be called the underdetermination of theories by technological applications, with which it is intended to shift the debate over the success argument from the abstract and general saving-the-phenomena domain to the real-life technologies and engineering practices, in particular in the history of nanoelectronics.

Philosophy of Nature and Its Method

ANNA LEMAŃSKA

Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

I suggest the following method of building the system of the philosophy of nature. The solving of any philosophical problem starts with establishing the facts concerning a given issue. The next stage involves searching for the explanation for these facts. This is done through putting forward a hypothesis. Subsequently, this hypothesis is confronted with the facts obtained at the previous stage. If there are any inconsistencies discovered throughout this comparison, it becomes necessary to modify the hypothesis, or to reject it completely, replacing it with a new one. This modified or new hypothesis is again confronted with the information about the world. If the hypothesis wins a few subsequent confrontations, it can be included into the philosophical system as its thesis.

When we apply this method, we can develop a realistic system of the philosophy of nature which is the reflection upon the whole of the physical world; makes significant use of the results of natural sciences, but is autonomous in relation to the natural sciences.

Discrete Mathematical Representations of the Heresies of Pelagius and Leo Tolstoy, and of their Interrelations with St. Augustine's Doctrine of Grace and Free Choice

VLADIMIR LOBOVIKOV

Russian Academy of Sciences, Institute of Philosophy and Law, Yekaterinburg

Herein two-valued algebra of formal ethics of moral rigor is considered as a generalization of the classical two-valued algebra of formal logic. Hence 16 mathematically different binary moral operations are to be studied as generalizations of the corresponding binary operations of Boolean algebra of logic. This talk is devoted to discussing only one of the 16 operations, namely, to a *moral analogue* of the material implication. In the algebra of ethics, the role of the moral analogue of implication is played by the binary moral operation Cxy – "realizing y in response to realizing x". Here the variables x and y stand for moral actions or persons, which, by definition, are either morally good or bad ones. The moral variables and functions take their values from the set {g (good), b (bad)} elements of which are called moral values of actions or persons. It is quite natural that the below tabular definition of the moral analogue of material implication is paradoxical (see the bottom rows 3, 4). Its paradoxical character is expressed by the hard religious controversies represented below by the table 1.

Table 1: Definitions of the moral-value-functional sense of the binary moral operation "realizing *x in response to* realizing *y*" in algebra of formal ethics of moral rigor

	x	y	1 Pelagius's definition	2 Tolstoy's definition	3 St. Augustine's definition	4 Strange but mathematically possible definition
			$C^P xy$	$C^T xy$	$C^A xy$	$C^S xy$
1	g	g	g	g	g	g
2	g	b	b	b	b	b
3	b	g	b	g	g	b
4	b	b	g	b	g	b

Modal Relationship between History and Epistemology about Science for a Historical Ontology of the Science

FLAVIA MARCACCI

Pontifical Lateran University, Faculty of Philosophy

The history of science uses formal methods to clarify its contents, but historians do not agree on the methodology of this use: one of the questions is, for example, if reading the past with modern formalism is allowed, if it is, in which sense, and how an historian shall use modern formalism to interpret ancient texts. Thus, the history of science needs clearer methodological perspectives. Vice versa, philosophy of science needs the history of science to find itself realistically. Respectively, I mean, these are a top-down and a bottom-up aspects of the relationship between history and epistemology. Thus, history of science can be used not as a mere erudition exercise and epistemology can concretely improve any reasoning about science. However, orienting oneself around history seems to be very difficult because historical contingency encloses a particular causal category: what is contingent is not accidental (as causeless) but it is lawless. Many philosophical questions arise: e.g. if history of science reports just a gallery of images on the science, or if it reports a knowledge about the ontology of the scientific objects. My talk follows the last point of view, by inquiring in which sense history can have an ontic space too. Secondly, I try to interpret the relationship between historical and epistemological knowledge from the point of view of modal logic: by proposing a KD45 modal system to give a structure to this relationship.

Literature:

Marcacci, Epistemology for the History of Science and the History of Science for Ontology. In Alai, Buzzoni, Tarozzi (eds.), *Between Truth and Ethical Responsibility*. Evandro Agazzi in the Contemporary Scientific and Philosophical Debate, Springer 2015, forthcoming

Marcacci, La scelta, l'essere e la veritá: uno spazio ontico per la storia. In Gherri (ed.), *Discernere e scegliere nella Chiesa. Atti della IX Giornata canonistica interdisciplinare*, Città del Vaticano, 2015, forthcoming

The Concept of the *Infiniti mysteria* in Bošković's Geometrical Investigations

IVICA MARTINOVIĆ
Institute of Philosophy, Zagreb

When Bošković first mentioned the concept of the "the mysteries of the infinite" (*Infiniti mysteria*) in his treatise *De maris aestu* (1747), he asserted that it was necessary to introduce the mysteries of the infinite into the investigation of geometric transformations. At that time, on the basis of the demonstration in his early treatise *De natura et usu infinitorum et infinite parvorum* (1741), he already had some experience in disputing the actual infinite in geometry.

While forming the theory of geometric transformations in his treatise *De transformatione locorum geometricorum* (1754), he gave a large meaning to this concept: all the manifestations of the potential and actual infinite. Only with his treatise *De continuitatis lege* (1754) did he start to make a strict distinction between mystery and absurdity in the understanding of the geometric infinite, and from that time he recognized the mysteries of the infinite only in those geometric quantities and transformations, in which the potential infinite was manifest, on condition that the principle of continuity was preserved.

On the contrary, absurdity always follows from the assumption of the actual infinite, and it is ascertained during the process in which the structure of bijection and relationship 'part-whole' are used, that is, both aspects which strongly mark Bolzano's paradoxical conception of the relationship between infinite sets, and Dedekind's mathematical definition of the infinite system. In his model for ascertaining absurdity, Bošković always uses the relations between geometric quantities as representatives of the relationships between infinite quantities. The turning point which was prepared by Bolzano, and achieved by Dedekind and Georg Cantor, took place in another mathematical field, namely, in the set approach to the real numbers.

Gödel's *summum bonum* vs. Leibniz's *ratio sufficiens*

EDWARD NIEZNAŃSKI
Łazarski University, Warsaw

The present talk adopts two assumptions: (1) that the issue of the nature and essence of God has been mainly addressed in classical philosophy and in the language of classical ontology; (2) that Aristotle and philosophers who followed his style of metaphysical discourse basically used the logic of names based on the model of reality consisting of only individuals of different categories, differentiated intensionally on kind-species abstractions. Whereas the so called *principia* such as essence-existence, form-matter, substance-accident, act-potency, and later *transcendentalia* such as object, real being, truth, good, beauty, if they were transcendent in relation to a category, then only intensionally *in se* and extensionally – in the sense of aspects *quo ad nos*. Kurt Gödel in his *Ontological Proof* used classical terminology unclassically, and replaced the traditional logic of names applied to categories and abstractions with the modal calculus of types and orders. Thus arose the possibility of attempting to translate Kurt Gödel's formalized vision of absolute positiveness into the classical language of the theory *summum bonum*. By applying Leśniewski's logic of names (within his elementary Ontology), the author of the present article used this possibility and presents five such translations accompanied by proofs in the computer program *Prover9-Mace4*.

Possible Worlds in non-Fregean Theories

MIECZYSŁAW OMYŁA
Cardinal Stefan Wyszyński University, Warsaw, Faculty of Law and Administration

In my lecture, I take into consideration language L, the vocabulary of which contains, among others, the following sorts of symbols: sentential variables: p, q, r, . . .; truth-functional connectives: $\neg, \wedge, \vee, \rightarrow, \leftrightarrow$; identity connective: $\equiv$; quantifiers binding sentential variables: $\forall, \exists$.

In order to express certain ontology presuppositions in the language of non-Fregean logic, let us adopt the definitions:

$$1 \equiv \exists p(p)$$
$$0 \equiv \forall p(p)$$
$$\forall p \forall q[(p \leq q) \equiv (q \rightarrow p) \equiv 1]$$
$$PWp\{p \not\equiv 0 \wedge \forall q[(q \leq p) \vee (\neg q \leq p)]\}$$
$$RWp[p \wedge \forall q(q \rightarrow p)]$$

We read:

$(p \leq q)$ – the situation p is contained in the situation q; PWp – the situation p is the possible world; RWp – the situation p is real world, that is p is fact and it contains each fact.

Intuitively, possible worlds are a maximal (with respect to order of situations) and consistent situation, and the real world is a situation which is a fact and a possible world.

Features of the set of possible worlds implied by the theories expressed with the non-Fregean logic shall be discussed in the lecture.

Logical Structure of Leibnizian and Bolzano's Argument for the Existence of God

PIOTR ORZESZEK
Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

In 1834 Bernard Bolzano formulated in *Lehrbuch der Religionwissenschaft* his version of the cosmological argument for God's existence. He tried to overcome the shortcomings of Aristotelian-Thomistic arguments developed earlier. The main idea is based on a notion of "unconditioned" (germ. *bedingt*) which is the key term in his proof. In 1987 Ganthaler and Simons formalized Bolzano's argument. A new approach was used in *An Argument for the Existence of God by Bolzano. An Analysis with a Distinction between Menge and Inbegriff*, by K. Świętorzecka, where she formalized the proof in a frame of some fragment of unitary theory of individuals and sets.

Proof of a similar structure, but based on other primary notions, was made by Gottfried Wilhelm Leibniz. In his work *De Arte Combinatoria* he presented the cosmological argument for the existence of God based on the notion of "being moved" as a primitive term.

In this presentation the two versions of the argument will be compared and critically analyzed. A new formal proof inspired by Leibnizian argument will also be demonstrated. The author is going to check the logical structure of the two versions of the proof and undertake an attempt to determine how ideas of Leibniz and Bolzano differ from each other.

Literature:

Bolzano B. (1834), *Lehrbuch der Religionwissenschaft*, Bd. 1, Sulzbach: Seidel.

Leibniz G. W. (1666), *De Arte Combinatoria*.

Ganthaler H., Simons P. (1987), Bernard Bolzanos kosmo-logischer Gottesbeweis, *Philosophia Naturalis* 24, 469-475.

Świętorzecka K. (2014), An Argument for the Existence of God by Bolzano. An Analysis with a Distinction between Menge and Inbegriff, *Bulletin of the Section of Logic* 43, 155-172.

A Formalization of Anselmian Ontological Arguments

ANDRZEJ PIETRUSZCZAK, TOMASZ JARMUŻEK
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The paper presents a formalization of Anselm's so-called Ontological Arguments from *Proslogion*. The main idea of our research is to adhere to the original text as close as is possible. We show, against some common opinions, that

  (i) the logic necessary for the formalization must be neither a purely sentential modal calculus, nor just non-modal first-order logic, but a modal first-order theory;

 (ii) such logic cannot contain logical axiom $\ulcorner A \rightarrow \Diamond A \urcorner$;

(iii) none of Anselm's reasoning requires the assumption that God is a consistent object or that the existence of God is possible (in symbols "$\Diamond \mathtt{Eg}$");

 (iv) no such thing as the so-called Anselm's Principle (in symbols "$\Box(\mathtt{Eg} \rightarrow \Box\mathtt{Eg})$") is involved in any of the proofs;

  (v) Anselm's claims (that God exists in reality and that God necessarily exists in reality) can be obtained independently, hence there is no need for presenting them in an opposite order than Anselm did.

Moreover we show a single line of reasoning underlying the whole *Proslogion* and allowing Anselm to deduce many theorems concerning God's nature. Last but not least, we study the possibility of proving the uniqueness of God within the outlined theory.

A Modal Logic Over Jaśkowski's Discussive Logic D_2

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Jaśkowski's logic D_2 is expressed with the help of the modal logic S5 as follows:

$$D_2 := \{ A \in \mathrm{For}^d : \ulcorner \Diamond A^\bullet \urcorner \in \mathrm{S5} \},$$

where $(-)^\bullet$ is a translation of discussive formulae into the modal language, i.e., the function $-^\bullet$ from For^d into For_m such that:

1. $(a)^\bullet = a$, for any propositional letter a,

2. for any $A, B \in \text{For}^d$:

   (a) $(\neg A)^\bullet = \ulcorner \neg A^\bullet \urcorner$,

   (b) $(A \vee B)^\bullet = \ulcorner A^\bullet \vee B^\bullet \urcorner$,

   (c) $(A \wedge B)^\bullet = \ulcorner A^\bullet \wedge \Diamond B^\bullet \urcorner$,

   (d) $(A \rightarrow^d B)^\bullet = \ulcorner \Diamond A^\bullet \rightarrow B^\bullet \urcorner$,

   (e) $(A \leftrightarrow^d B)^\bullet = \ulcorner (\Diamond A^\bullet \rightarrow B^\bullet) \wedge \Diamond (\Diamond B^\bullet \rightarrow A^\bullet) \urcorner$.

Although the modal operator is used to define D_2, it does not appear explicitly in its language. From this point of view D_2 is not a modal logic.

In the talk we consider an extension of D_2 with the help of modal operators of possibility '$\Diamond^d$' and necessity '$\Box^d$'.

Thus, we consider an extension $-^{\bullet_n}$ of the translation $-^\bullet$ onto the set of modal formulas by adding to the above conditions two clauses:

   (f) $(\Diamond^d A)^{\bullet_n} = \ulcorner \Diamond A^{\bullet_n} \urcorner$,

   (g) $(\Box^d A)^{\bullet_n} = \ulcorner \Box A^{\bullet_n} \urcorner$.

The obtained logic will be called $S5_{D_2}$, where:

$$S5_{D_2} := \{ A \in \text{For}^d : \ulcorner \Diamond A^{\bullet_n} \urcorner \in S5 \},$$

As an outcome, for example we can consider formulas of the form:

$$\Diamond^d(p \rightarrow^d q) \rightarrow^d (\Box^d p \rightarrow^d q) \tag{1}$$
$$\Box^d(p \rightarrow^d q) \rightarrow^d (\Box^d p \rightarrow^d \Box^d q) \tag{2}$$
or
$$(\Box^d p \rightarrow^d \Diamond^d q) \rightarrow^d \Diamond^d(p \rightarrow^d q) \tag{3}$$

We see that (??), (??) $\in S5_{D_2}$ and (??) $\notin S5_{D_2}$, while $\Diamond(p \rightarrow q) \rightarrow (\Box p \rightarrow q) \notin$ S5. and of course $\Box(p \rightarrow q) \rightarrow (\Box p \rightarrow \Box q), (\Box p \rightarrow \Diamond q) \rightarrow \Diamond(p \rightarrow q) \in$ S5.

We will present a characterisation of the system $S5_{D_2}$ and propose a comparison with some chosen modal systems.

Literature:

[1] Costa, N.C.A. da, and L. Dubikajtis, *On Jaśkowski discussive logic*, pp. 37–56 in A.I. Arruda, N.C.A. da Costa, and R. Chuaqui (eds.), *Non-Classical Logics, Model Theory and Computability*, North-Holland, 1977.

[2] Jaśkowski, S., *Rachunek zdań dla systemów dedukcyjnych sprzecznych*, *Studia Societatis Scientiarum Torunensis*, Sect. A, vol. I, no. 5 (1948): 57–77. In English: "Propositional calculus for contradictory deductive systems", *Studia Logica*, 24 (1969): 143–157; and "A propositional Calculus for inconsistent deductive systems", *Logic and Logical Philosophy*, 7 (1999): 35–56.

[3] Jaśkowski, S., *O koniunkcji dyskusyjnej w rachunku zdań dla systemów dedukcyjnych sprzecznych*, *Studia Societatis Scientiarum Torunensis*, Sect. A, vol. I, no. 8 (1949): 171–172. In English: "On the discussive conjunction in the propositional calculus for inconsistent deductive systems", *Logic and Logical Philosophy*, 7 (1999): 57–59.

[4] Kotas, J., and N.C.A. da Costa, *On some Modal Logical Systems Defined in Connection with Jaśkowski's Problem*, pp. 57–73 in A.I. Arruda, N.C.A. da Costa, and R. Chuaqui (eds.), *Non-Classical Logics, Model Theory and Computability*, North-Holland, 1977.

Human Rationality in Light of Decision Theory

ROBERT PIŁAT

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Rationality has been a long cherished norm of human thinking and conduct. The idea was based on the assumption that complete and accurate knowledge of relevant facts and norms is available to subjects. The assumption renders the idea of rationality useless in many interesting contexts: moral choices, economy, legal practices, social polices. It is because these contexts typically involve decision-making under uncertainty. Decision theory aims at establishing rules and regularities of subject's preferences and choices. Unlike cherished philosophical tradition the decision theory does not interpret these rules in terms of opposition between rational choice and irrational drives (passions, desires, etc.). These two are now considered two sides of decision making processes. Even in situations in which all goods (utilities) involved in the decision are known to the subjects and the subjects explicitly want to act rationally they will face difficulties in ordering their preferences. The task is still harder when one acts under uncertainty and has to consider probabilities and expected utilities. It is widely accepted that in light of contemporary decision theory the tradition concept of rationality, as a kind of self-governance by means of logically ordered and justified beliefs has to be revised so that our known cognitive limitations are recognised and incorporated in rational decision-making. However, there is no universal consent about the nature and extent of this revision.

The question I am asking is the following: Given what we know about the constraints of decision-making is it possible to preserve the normative sense of rationality? My hypothesis is to the effect that a certain normative core of Kantian rationality can be preserved in contemporary decision theory and that the tradeoff between normative and descriptive rationality does not necessarily lead to abandoning rationality as a norm. I suggest that the norm of rationality should be interpreted as referring to properties of an acting subject and not to action or

decision-making themselves. This stipulation poses a challenge for philosophy of action as it undermines the straightforward relation between action and acting subject. I pursue the idea that rational subject is a prospective construction build-in into a person. This construction consists in ordering one's subjective probabilities and utilities (variables bound by a utility function). This ordering serves as a rational basis for actions, decisions, and expectations. Rationality is reserved here as a normative concept, because one cannot describe one's own ordering but only prescribe it by resorting to certain ideal model.

Selected literature:

Binmore, K., *Rational Decision*, Princeton University Press 2011.

Broome, J., *Ethics out of Economics*, Cambridge University Press 1999.

Gilboa, I., *Rational Choice*, The MIT Press 2010.

Jeffrey, R., *Subjective Probability, The Real Thing*, Cambridge University Press 2002.

Kahneman, P. Slovic and A. Tversky (eds.) *Judgment under Uncertainty: Heuristics and Biases*, Cambridge University Press, Cambridge 1982.

Zimmerman, M., *Living with Uncertainty. The moral significance of ignorance*, Cambridge University Press 2008.

On the Character and Use of Physical Models

DRAGAN POLJAK, MIRKO JAKIĆ
University of Split, Faculty of Electr. and Mechanical Engineering, Faculty of Humanities and Social Sciences

One of the crucial issues in the analysis of natural phenomena is primarily related to the proper understanding of natural phenomena and then in the development and use of physical model enabling one to predict the behaviour of a system with a satisfactory level of accuracy.

The present work deals with the character of a physical model and the corresponding mathematical method to solve the problem formulated within the framework of the applied model as the essence of natural laws. Thus, models are simplified imaginary simulations of the real-world systems one attempts to understand. However, models include only those properties and relationships required to understand those aspects of real systems one is interested at the moment, i.e. those aspects of real systems one knows, or those one is aware after all. The rest of the details about real system is simply neglected from a model. As a matter of fact, how much the model of a given physical phenomenon is satisfactory strongly depends on what is required from the particular model. In other words, one makes conclusions from an incomplete information set. This approach to studying

natural phenomena represents the essence of the reductionistic approach which represents the heart of modern scientific method. A fundamental science framework necessary to describe physical systems; equations representing physical laws, values of all constants of nature appearing within equations and initial conditions of a system, is discussed.

Some illustrative examples arising from some applications of classical electromagnetic field theory will be presented throughout this work. Therefore, models could be referred to as tools or 'devices' for capturing particular insights of the phenomena and they do not represent a full picture of a system behaviour under all circumstances.

Laurent Larouche's and Eugeniusz Żabski's Axiomatic Definitions of Genidentity

MAREK PORWOLIK

Cardinal Stefan Wyszyński University, Warsaw, Institute of Philosophy

The term *genidentity* is used for describing the identity of an object subject to change. It was introduced into science by Kurt Lewin in 1922. The concept of genidentity can be characterized by means of certain axiomatic definitions. The main aim of the talk is to analyze and compare two of them. The first one was presented by Laurent Larouche and the second one by Eugeniusz Żabski. These definitions differ with respect to the circumstances of their origin. Laurent Larouche's definition of geindentity is part of his theory of change that corresponds with the Aristotelian and Thomistic concept of Prime Mover. Eugeniusz Żabski's definition was introduced to solve certain paradoxes of change, such as the Ship of Theseus Paradox. These analyses are intended to help answer the question whether genidentity as a relation can be adequately described by indicating only its formal properties.

Brouwer's Logic

IVAN RESTOVIĆ

University of Zagreb, Croatian Studies, Department of Philosophy

My presentation is about the philosophy of science, more specifically, philosophy of mathematics and logic. This is perhaps correctly so; if anything is to be called science, it's mathematics and logic, at least according to L. E. J. Brouwer and some of his influences.

The route to get to these sciences will be the route of intuitionistic theory of mathematics. Following the original philosophy of L. E. J. Brouwer, I will lay out some logical principles of our mathematical intuition. After that I will explore if they are in accordance with the intuitionistic logic, developed later by Arend Heyting.

It is surprising to see that Brouwer takes as valid some propositions that are not theorems of modern intuitionistic logic; nor were these propositions proposed by Heyting in his initial formalization.

More specifically, Brouwer accepts as valid a weak version of the principle of excluded middle, which states that every proposition is either consistent or absurd. This principle cannot be inferred from the axioms of Intuitionistic Propositional Calculus.

Defense of the Theory of Ideas

BARTŁOMIEJ SKOWRON
Academy of Young Scholars and Artists, Wrocław

In this talk I develop a structural and dynamic theory of Ideas and defend this theory against traditional counterarguments. The theory of Ideas is inspired by category theory. The starting point is theories of Ideas of Plato and Ingarden and an ontology of Ideas proposed by Kaczmarek; these theories are paraphrased – using a slightly modified method of semantic paraphrases of Ajdukiewicz – and presented in terms of the basic concepts of category theory. To paraphrase Ideas as categories I propose recognized category theory as a pattern for the theory of Ideas. I invoke an arrow-like, i.e. no-object-oriented, formulation of a category and I base the proposed theory of Ideas on that formulation. The components of an Idea are the arrows and their compositions (the equivalents of changes and transformations); objects in this approach are special arrows (identity arrows). Using the category of higher dimensions I introduce the concept of the dimension of an Idea (and other concepts) which allows me to refute the argument of the "third man".

Basic Concepts in Physics

FRANJO SOKOLIĆ
University of Split, Faculty of Natural Science and Mathematics

There are several questions which may be asked concerning basic concepts, like space, time, mass, force and energy.

If they are the basic concepts, is it possible to explain and understand them?

Do they have the same meaning in different branches of physics: mechanics, electrodynamics, theory of relativity and quantum theory?

Do these notions achieve their meaning through their use in mathematical formulae?

Is there a unique correspondence between mathematical formalism and physical phenomena?

The example of the emergence of the theory of relativity will be used to show how much the questions of symmetry and covariance may be crucial for the construction of a novel perception of things.

The question of the role played by mathematical formalism in a physical theory will be comparatively studied in classical and quantum mechanics. The case of quantum theory is much more complicated, because there is no unique interpretation of the mathematical expressions.

Complexity Theory, Machine Learning and Philosophy of Mind: Preliminary Reports

KRISTINA ŠEKRST

University of Zagreb, Croatian Studies, Department of Philosophy

Computational complexity theory is a branch of computer science and mathematics, which deals with classification and analysis of various computational problems regarding the amount of resources one must use to solve a problem or to verify it. The P versus NP problem is a major unsolved problem in modern mathematics and computer science, which deals with the question whether a problem can be solved quickly using a computer if one can verify it quickly. P problems are ones that run in polynomial time and a computer can can rapidly provide us with an answer, while NP ones are characterized by the ability to verify the answer quickly, but not providing us with one in the same amount of time (which often rises exponentially or worse). If one can state that NP problems can be reduced to P problems, we would be able to solve these hard problems quickly, which would mean a great advance in philosophy of mind and artificial intelligence.

In this lecture, we will observe some major paradigms in machine learning, such as clustering and neural networks, especially regarding unsupervised learning and fast algorithms, which try to simulate polynomial time solving, and that will lead us to possible explanations of certain mental phenomena and a possible way of a path for resolving burning issues in philosophy of mind.

Non-Fregean Framework for the 'Slingshot' Effect in Gödelian Ontology

KORDULA ŚWIĘTORZECKA

Cardinal Stefan Wyszyński University, Warsaw, Department of Philosophy

K. Gödel sketched his version of a 'slingshot' argument in 1943/44 to explain the Russellian way of avoiding its problemtatic effect of collapsing of situational/propositional semantics to the two-element universe of the Fregean Falshood and Truth. Indeed, the Russellian theory of descriptions seems to block this unwanted reduction, but in Gödel's opinion it does not offer a generally satisfactory solution if (at least some) definitions are treated as referring just to the descriptively given individuals and not only as some linguistical abbreviations. Indeed, this opinion suits Gödel's Platonic philosophy. Moreover, according to a S. Kovač's thesis inspired by H. Sobel, Gödel's theological convictions also expressed in 'Ontologischer Beweis' actually seem to lead to some sort of 'slingshot' argumentation. We claim - following the abovementioned approach - that this effect does not trivialize the Gödelian ontological system, but rather shows the essential balance between purely philosophical discourse and the theological discourse of the universe of the necessary existent Absolute.

An analysis of the suggested connection requires at first some precise formulation of Gödel's original 'slingshot' argument. In the lecture we propose a non-Fregean framework to express some different versions of it. We are inspired by the approaches of H. Wansing and Y. Shramko. We consider the subsequent free versions of minimal logic *PCI* and its *WB* and *WT* extensions but enriched to theories of descriptions in style of the weakest free theory of Lambert *FD*. Then we investigate the formal structure of the Gödelian 'slingshot'. Our essential interest is in specifying extralogical and logical components for the reconstructed versions of Gödel's reasoning. Finally, we show what is the deductive minimum to reach a 'slingshot' effect, which is an assumption of a necessary existence of some individual(s) described by some given $\imath$ term(s). We consider this result as a starting point for formulating a specific Gödelian theory of the necessary existent Absolute, in the frame of which the main slingshot theorem is derivable.

Many Valued Logics and Future Contingents

MARCIN TKACZYK

John Paul II Catholic University of Lublin, Faculty of Philosophy

This talk is a case study of using formal tools of logical matrices and multiple valued logic in solving the philosophical problem of future contingents. It is claimed that formal tools may play an analogical rôle in philosophy to that which

experiments play in the natural sciences. A particular analysis of the case as well as some general theses on applying formal tools in philosophy are delivered.

A significant number of scholars from Aristotle to Jan Łukasiewicz claim that no sentence describing a future contingent event can be either true or false. The thesis has been claimed to have serious consequences from logic through metaphysics to theology. Such areas of philosophical thought as the nature of time, including the doctrines of presentism and eternalism, the doctrines of causality, including backward causality, the doctrines of God's knowledge of future and human freedom, including strong determinism, have been involved.

According to Łukasiewicz the problem of future contingents calls for revising classical logic and introduction of some alternative logic is a necessary and sufficient condition to solve the problem. It is certainly a philosophical thesis. The famous construction of many valued matrices by Łukasiewicz is being considered an experimental model of neither true nor false sentences. The construction has been profoundly criticized by Ferdinand Gonseth, Arthur N. Prior, Ludwik Borkowski, Alasdair Urquhart and others. An overview and analysis of the debate is being delivered as well as a formal solution of the raised problems. Some general methodological conclusions with respect to the rules of applying logic in philosophy are being suggested.

Arrow's Impossibility Theorem. Political Philosophy, Aristotelian Logic and Nowadays Mathematics

MARIAN TURZAŃSKI

Cardinal Stefan Wyszyński University, Warsaw, Faculty of Mathematics and Natural Sciences

Aristotle in his work of political philosophy *Politics* formulated the thesis that the best solution for polis is some type of monarchy.

More than two thousand years later Arrow proved that it is impossible to formulate a social preference ordering that satisfies some natural axioms:

1. Social choice must be complete and transitive.

2. If every individual prefers one choice to another, then the group ranking should do the same.

3. If a choice is removed, then the others' order should not change and the preferences of an individual should not become the group ranking (Non-dictatorship).

It seems to be interesting that for proving the mathematical version of Arrow's Theorem we need only formal logic tools.

On the other hand, based on the ideas from Arrow's Theorem, we can define some some fundaments of today's mathematical objects (ultrafilters, ultrapro-

duct). From a mathematical point of view, the infinite version of Arrow's Theorem is a theorem about ultrafilters.

Three-Valued Logic of Beliefs Based on Kleene's and Bochwar's Ideas

JANUSZ WESSERLING
Cardinal Stefan Wyszyński University, Warsaw, Faculty of Law and Administration

The aim of the lecture is to show construction and to discuss some metalogical properties of the three-valued logic of beliefs (which I call LB3). In the system, there are symbolic equivalents of operators expressing two kinds of beliefs: certainty (strong belief) and admission of possibility. Due to intentionality of operators expressing beliefs, logic of beliefs is in general a type of modal logic with possible worlds semantics. It is so because, despite the intentionality of epistemic operators, the logical value of a subjective opinion depends on whether the fact is an objective proposition referring to the epistemic subject's attitude (however, taking into account not only the real world but all possible worlds). The starting point for the construction of the logic of beliefs, LB3, is making the logical value of a proposition with an epistemic operator as a main operator independent of objective proposition regarding the external world with regard to the epistemic subject.

The inspirations for logic LB3 are: Kleene's three-valued logic and Bochwar's idea of the division of logic to the internal logic and external logic. The use of the division of logic into internal logic and external logic seems to be necessary in the construction of the many-valued logic of beliefs. We can notice that the epistemic subject's attitude of conviction can be analyzed on several levels. On the first level (connected with internal logic), there are epistemic subject's attitudes of conviction towards objective propositions. On another level (connected with external logic), we analyze: (1) relations between a given attitude of conviction (e.g. supposition or admission) towards some sentences and the same kind of attitude of conviction towards other sentences, (2) relations between various attitudes of conviction towards the same sentence.

Social Dynamics of Common Knowledge

BERISLAV ŽARNIĆ, GABRIELA BAŠIĆ
University of Split, Faculty of Humanities and Social Sciences)

Individual reflective knowledge about one's own knowledge and social reflective knowledge about knowledge of others constitute common knowledge understood as a semantic information state. The social reflexive equilibrium of common knowledge is an essential part of collective intentionality. The conditions of possibility of creation of common knowledge through communication are encoded in the two norms of trust. The strong norm of trust requires that the receiver adopts the intentional state equal in type and content to the intentional state expressed in a successful locution of the sender. The weak norm of trust requires that the receiver believes that the sender's locution is sincere. The modeling in the public announcement logic (van Benthem et al.) rests on the presupposed observance of the two norms. If a disagreement between communicating actors becomes revealed in communicative incoherence, then the constitution of common knowledge fails. There are two ways to restore communicative coherence: by relying on relations of epistemic authority and by shifting to non-authoritative social form of communication devoid of any epistemic authority relations. Accordingly the strong norm of trust is either relativized to the relation of epistemic authority or completely abandoned. Not every configuration of epistemic authority distribution will enable disagreement resolution. Therefore, if common knowledge is to be restored, it may be necessary to adopt the non-authoritative social form of communication, which is not subordinated to the strong norm of trust. The interaction that takes place in that social form is called argumentation and its rules (as defined by van Eemeren and Grootendorst) presuppose abandonment of the strong norm of trust. Consequently, the validity of the famous thesis of D. Lewis, that the convention whereby a population uses a language is a convention that includes trust, is restricted to specific social forms of communication since the revision of common knowledge may require the shift to a non-authoritative communicative form.

PROGRAMME

9:00-9:10	Opening
9:10-10:10	*Key-note lecture*:
	Paul WEINGARTNER, The Problem of the Definition
	or Description of God in Gödel's and Other Ontological Proofs
10:15 -10:45	Gianfranco BASTI, A Formalization of Aquinas Theory of
	Creation as Participation of Being (40)
Chair: S. Kovač	
10:45.11:15	Coffee break
11.15-12:05	Robert PIŁAT, Human Rationality in Light of Decision Theory (40)
12:10-13:00	Ivica MARTINOVIĆ, The Concept of the *Infiniti mysteria* in
	Bošković's Geometrical Investigations (40)
Chair: K.Świętorzecka	

THURSDAY (26.03.2015) II

15-15:50	Andrzej PIETRUSZCZAK, Tomasz JARMUŻEK, A Formalization
	of Anselmian Ontological Argument (40, Large Hall)
Chair: M. Tkaczyk	

Section (Room A)

16:00-16:50	Kordula ŚWIĘTORZECKA, Non-Fregean Framework for the
	'Slingshot' Effect in Gödelian Ontology (40)
16:55-17:25	Mieczysław OMYŁA, Possible Worlds in non-Fregean
	Theories (20)
Chair: J. Czermak	
17:25-17:45	Coffee break
17:45-18:15	Edward NIEZNAŃSKI, Gödel's *summum bonum*
	vs. Leibniz's *ratio sufficiens* (20)
18:20-18:50	Srećko KOVAČ, Causal Interpretation of Gödel's Ontotheology (20)
18:55-19:25	Piotr ORZESZEK, Logical Structure of Leibnizian
	and Bolzano's Argument for the Existence of God (20)
Chair: T. Jarmużek	

	Section (Room B)
16:00-16:30	Anna LEMAŃSKA, Philosophy of Nature and Its Method (20)
16:35-17:05	Zvonimir ČULJAK, Reliability and Meta-Reliability in the Structure of Epistemic Justification (20)
17:10-17:40	Anna BROŻEK, Alicja CHYBIŃSKA, Analysis of the Concept of Chance. On the Margin of Kotarbińska's Article (20)
Chair: F. Grgić	
17:40-18:00	Coffee break
18:00-18:30	Samuel FLETCHER, Counterfactuals within Scientific Theories (40)
18:35-19:05	Kristina ŠEKRST, Complexity Theory, Machine Learning and Philosophy of Mind: Preliminary Reports (20)
19:10-19:40	Christian FELDBACHER, Definitionicism (20)
Chair: R. Piłat	

	FRIDAY (27.03.2015) I (Large Hall)
9:00-10:00	*Key-note lecture*: André FUHRMANN, Gödel's Ontological Argument in the Public Eye
10.05-10:55	Audre Jean BROKES, A Frege-Geach Style Problem for Knowledge Closure Schemas (40)
Chair: G. Basti	
10:55.11:25	Coffee break
11.25-12:15	Johannes CZERMAK, Some Extensions and Certain Interpretation of Gödel's Theological System (40)
12.20 -12:50	Flavia MARCACCI, Modal Relationship between History and of Epistemology about Science for a Historical Ontology of Science (20)
Chair: Z. Čuljak	

FRIDAY (27.03.2015) II

14:30-15:20	Marcin TKACZYK, Many Valued Logics and Future Contingents (40, Large Hall)

Chair: A. Lemańska

Section (Room A)

15:35-16:25	Berislav ŽARNIĆ, Gabriela BAŠIĆ, Social Dynamics of Common Knowledge (40)
16:30-17:00	Marian TURZAŃSKI, Arrow's Impossibility Theorem. Political Philosophy, Aristotelian Logic and Nowadays Mathematics (20)

Chair: A. J. Brokes

17:00-17:30	Coffee Break
17:30-18:00	Albert J.J. ANGLBERGER, The Open Reading of Permission and its Logic(s) (20)
18:05-18:35	Bartłomiej SKOWRON, Defense of the Theory of Ideas (20)
18:40-19:10	Ivan RESTOVIĆ, Brouwer's Logic (20)

Chair: M. Nasieniewski

Section (Room B)

15.35-16.05	Grzegorz BUGAJAK, The 'Substrative' Concept of Matter (20)
16:10-16:40	Filip GRGIĆ, Aristotle and the Principle of Alternate Possibilities (20)
16:45-17:15	Tonči KOKIĆ, Challenges of the Philosophical and Scientific Explanations of the Origin of First Life (20)

Chair: C. Feldbacher

17:15.17:35	Coffee break
17:35-18:05	Janina BUCZKOWSKA, Normativity of Meaning in Natural Language and Languages of Scientific Theories. Logical and Epistemological Relationships Between Meaning and Usage (20)
18:10-18:40	Boris KOŽNJAK, Should Scientific Realists Rely on Technological Success? (20)
18:45-19:15	Anna KOCSIS, Mechanistic and Computational Explanations in Neuroscience (20)

Chair: G. Bugajak

SATURDAY (28.03.2015) I (Large Hall)

9:00-9.50	Dragan POLJAK, Mirko JAKIĆ, On the Character and Use of Physical Models (40)
9.55-10:45	Stamatios GEROGIORGAKIS, Revisionist Demarcationism and Formal Criteria for Genuine Explanations (40)

Chair: B. Žarnić

10:45-11:15	Coffee break

Section (Room A)

11:15-12:05	Andrzej PIETRUSZCZAK, Marek NASIENIEWSKI, A Modal Logic Over Jaśkowski's Discussive Logic D_2 (40)
12:10-12:40	Laurenz HUDETZ, Spacetime Points as Classes of Mereotopologically Structured Basic Entities (20)
12:45-13:15	Marek PORWOLIK, Laurent Larouche's and Eugeniusz Żabski's Axiomatic Definitions of Genidentity (20)

Chair: M. Omyła

Section (Room B)

11:15-11:45	Tomasz JARMUŻEK, Metatheory of Tableau Systems (20)
11:50-12:20	Janusz WESSERLING, Three-Valued Logic of Beliefs Based on Kleene's and Bochwar's Ideas (20)
12:25-13:15	Vladimir LOBOVIKOV, Discrete Mathematical Representations of the Heresies of Pelagius and Leo Tolstoy, and of their Interrelations with St. Augustine's Doctrine of Grace and Free Choice (40)

Chair: S. Gerogiorgakis

Closing session (Large Hall)

13:20 -13:40	Franjo SOKOLIĆ, Basic Concepts in Physics (20)
13:40-14:10	General discussion and closing

Chair: D. Poljak

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