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2011 SPRING MEETING OF THE ASSOCIATION FOR SYMBOLIC LOGIC

Hilton San Diego Bayfront Hotel
San Diego, California, USA

April 21–22, 2011

A meeting of the Association of Symbolic Logic was held April 21–22, 2011, at the Hilton San Diego Bayfront Hotel, in conjunction with the annual meeting of the Pacific Division of the American Philosophical Association. The Program Committee consisted of Aldo Antonelli, Jeremy Heis, and Kai Wehmeier (Chair). The ASL hosted a reception on the evening of Thursday, April 21.

The program consisted of two invited speaker sessions and a plenary session:

Invited Speaker Session on Logic and Linguistics

Kai von Fintel (Massachusetts Institute of Technology) and Anthony Gillies (Rutgers University), *Deontic modality in natural language: the obligatory guide*.

Terence Parsons (University of California, Los Angeles), *Is there a hierarchy of indirect senses and references*?

Ed Stabler (University of California, Los Angeles), *Logics of syntax*.

Invited Speaker Session on Logic and Early Analytic Philosophy

Robert May (University of California, Davis), *The proof of Hume's Principle*.

Erich Reck (University of California, Riverside), *Frege versus Dedekind: on the nature and purpose of logicism*.

Marcus Rossberg (University of Connecticut) and Philip A. Ebert (University of Stirling), *Platonism in Frege's* Grundgesetze?

Plenary Session

Volker Halbach (University of Oxford), *Axiomatic approaches to truth: an overview*.

Allen Hazen (University of Alberta), *Realism and metaphysical necessity*.

Gila Sher (University of California, San Diego), *Truth and knowledge in logic and mathematics*.

The program also included one session of contributed papers in which two talks were presented.

Abstracts of the invited talks and contributed talks given (in person or by title) by members of the Association for Symbolic Logic follow.

For the Program Committee
KAI F. WEHMEIER

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Abstracts of talks in the invited session on Logic and Linguistics

► KAI VON FINTEL AND ANTHONY S. GILLIES, *Deontic modality in natural language: the obligatory guide*.
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In this talk, we will first give an overview of the connections and differences between the concerns of deontic logic and those of natural language semantics, touching on issues like the context-dependency of deontic modal constructions and the distinction between personal deontic modality and propositional deontic modality. The second part looks in more detail at four central problems: the systematic cross-linguistic relationship between strong deontic necessity modals ('must', 'have to') and weak deontic necessity modals ('ought', 'should'), the interaction of 'if'-clauses and deontic modals, Jackson's puzzle of Professor Procrastinate, and Kolodny & MacFarlane's puzzle of the miners.

► TERENCE PARSONS, *Is there a hierarchy of indirect senses and references*?
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Frege argues that when a word or phrase is embedded in an indirect context, it acquires a new, indirect, sense and a new, indirect, reference (which is in fact its customary sense). But his argument relies on a syntactic assumption that a that-clause is syntactically the same as the sentence that it contains. Once we see a that-clause as a complex expression containing a sentence as a part, we can hold that no expression ever changes sense or reference; rather, the that-clause refers to the sense of the sentence that it contains and has a sense of its own, a sense determined by the sense of the contained sentence. A semantic theory is sketched in which no expression ever changes sense or reference and in which there are no "levels" of senses (although there are concepts of propositions). If one makes further assumptions it is possible to reintroduce a hierarchy of senses of the sort that Frege envisaged, with a semantics having a Fregean structure. The additional apparatus, however, plays no additional role in the theory.

► ED STABLER, *Logics of syntax*.
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Important connections between logic and language-defining string automata were established by Buchi, Elgot, Rabin and others, leading to logical perspectives on a range of tree automata and related mechanisms. This work underpins recent attempts to define a weakest logic for human language structure, and provides illuminating perspectives on syntax and on the relation between syntax and semantics. This talk reviews some of these efforts.

Abstracts of talks in the invited session on Logic and Early Analytic Philosophy

► ROBERT MAY AND KAI F. WEHMEIER, *The proof of Hume's Principle*.
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Over the course of the Introduction and the subsequent 52 sections of *Grundgesetze*, Frege lays out his basic laws of the arithmetic of the natural numbers. This exposition includes laying down all of the rules of inference that will be used in the proofs, all the logical laws, as well as deriving all their sub-laws that will stand as premisses, and all the definitions that will be employed. Having done this, in section 53, Frege turns to the proof of a set of theorems that we know to encompass the Peano-Dedekind axioms for arithmetic. In this paper, we will explore the initial part of Frege's deductive development of arithmetic through to numbered theorems (32) and (49), which when taken together constitute what we call today "Hume's Principle" (HP).

The proof of HP was initially outlined by Frege in *Grundlagen*, section 73. The informal exposition there has a characteristic asymmetry that is carried over to the fully formal presentation of *Grundgesetze*. In both, pride of place is given to the proof of the "right-to-left direction", $F \approx G \supset \#F = \#G$. In *Grundlagen*, it is this proposition that is discussed in the text of section 73, while the provibility of $\#F = \#G \supset F \approx G$ is merely remarked upon in a footnote. In *Grundgesetze*, the right-to-left direction is Theorem 32; it is accorded by Frege the status of a Basic Law of Cardinal Number (*Anzahl*). No such special status is assigned to Theorem 49, the left-to-right direction. Why does Frege differentiate the two directions of Hume's Principle in this way, and why does he never bring them together into a biconditional? The route to an answer will take us through a detailed examination of the proofs of Theorems 32 and 49 in *Grundgesetze*.

► ERICH H. RECK, *Frege versus Dedekind: on the nature and purpose of logicism*.
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When thinking about logicism in the philosophy of mathematics, the two representatives that typically come to mind are Bertrand Russell and Gottlob Frege. However, in the late nineteenth century Frege's contemporary Richard Dedekind played an equally important role in this connection, as is sometimes acknowledged. After illustrating that role in terms of Dedekind's early reception, the sense in which he can be seen as another main logicist is analyzed (building on earlier work by Howard Stein, William Demopoulos, and José Ferreirós). This will lead to a further comparison of Frege's and Dedekind's approaches, and especially, of their views about the nature of logic. It will also require a clarification of what the purpose of logicism should be taken to be, including observing how views about this issue have changed over time.

► MARCUS ROSSBERG AND PHILIP A. EBERT, *Platonism in Frege's* Grundgesetze?
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According to the received view, Frege proposes a Platonist philosophy of mathematics in which mathematical and logical objects—i.e., value-ranges—are considered to have objective, non-actual and independent existence. In recent years there have been various alternative interpretations of Frege's philosophy which portray him to be much less of a Platonist than the received view would have it. In this paper, we discuss these competing interpretations with a special emphasis on pertinent remarks in his magnum opus, *Grundgesetze der Arithmetik*.

We will focus on Frege's introduction of value-ranges and contrast his rejection of creative definitions with some rather surprisingly non-Platonist sounding passages in *Grundgesetze* (in particular, §§146–7 of volume II) regarding value-ranges and the status of their governing principle: Basic Law V.

Abstracts of talks in the invited plenary session

► VOLKER HALBACH, *Axiomatic approaches to truth: an overview*.
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The language of arithmetic is augmented with a new unary predicate T and axioms characterizing T as a truth predicate for codes of sentences are added to Peano arithmetic. Some well-known systems such as the Kripke–Feferman and the Friedman–Sheard systems will be surveyed and compared.

I will then concentrate on some more recent developments. For instance, it will be shown that there are consistent and attractive systems that are purely disquotational, i.e., based on T-sentences as axioms and that therefore deflationary axiomatizations of truth are not necessarily weaker than compositional systems. Moreover I will look at the prospects of formulating axiomatic theories of truth in non-classical logics.

I will discuss different ways to compare axiomatic truth theories. For instance, such theories can be compared by their proof-theoretic strength, their truth-free content, or their ability to define the truth predicate of the other theory. Applications of these different ways of comparing theories will be discussed.

[1] Volker Halbach, ***Axiomatic theories of truth***, Cambridge University Press, 2010.

► GILA SHER, *Truth & knowledge in logic & mathematics*.
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In this talk I develop:

1. An approach to logical and mathematical truth based on indirect correspondence.
2. A related approach to logical and mathematical knowledge based on holistic, quasi-apriori principles.

Abstracts of contributed papers

► BRIAN ROGERS, *Propositional functions and expressive completeness of Tractarian logic*.
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Wittgenstein claims in his *Tractatus* that every proposition can be represented as the result of iterated applications of the operator 'N', a generalized NOR operation. In response to Fogelin's charge that Tractarian logic is expressively incomplete, Geach provides a "notation for a class of propositions in which one constituent varies" ([1], p. 169). This notational device allows any proposition of first-order logic to be represented with the N-operator. I show that Geach's device is supported by Tractarian doctrine. Wittgenstein holds that a variable proposition is formed when a constituent name in a proposition is replaced by a variable, and that a set of propositions can then be defined as all of the values of the corresponding propositional function. A device like Geach's is required by the *Tractatus*, since it provides a means for the expression of both elementary and complex propositional functions in a notation using the N-operator. Finally, Fogelin's claim that the employment of Geach's device violates Tractarian requirements is shown to be unsupported by the text. (This presentation is based on joint work with Kai Wehmeier.)

[1] P. Geach, *Wittgenstein's operator N*, ***Analysis***, vol. 41 (1981), no. 4, pp. 168–171.

► JORDAN STEIN, *How many notions of necessity*?
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Evans distinguishes between superficial necessity and deep necessity in his analysis of the contingent a priori. Davies and Humberstone model Evans' distinction in a modal system that adds the operator *Fixedly* to the language of Actuality Modal Logic (S5A), where deep necessity is represented by the combination *Fixedly Actually*. I add *Fixedly* to Wehmeier's Subjunctive Modal Logic, which (as with Actuality Modal Logic) extends the expressive capacity of ordinary modal predicate logic. It is shown that in Fixedly Subjunctive Modal Logic a sentence of nonmodal predicate logic is superficially necessary if and only if it is deeply necessary. It follows from the fact that Subjunctive Modal Logic and Actuality Modal Logic are expressively equivalent, in the sense that for every sentence in the language of the former there is a sentence in the language of the latter that is true in all of the same models (and vice versa), that the existence of the contingent a priori and the distinction between two notions of necessity cannot be asserted independently of the choice of background logic.

Abstracts of papers presented by title

► ADIB BEN JEBARA, *Big Crunch and mathematical logic*.
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I have proven mathematically the disappearance of space in the Big Bang. The set of paths is a set of urelements (locations are urelements), the Cartesian product of which is void.

The Big Crunch happens at the level of elementary particles. The hypothesis that physical space is infinite gives interesting results. The universe with matter is a little like a sand speck in space.

We cannot prove mathematically the reappearance of physical space in the Big Bang as it is a physical matter. But maybe space reappears because a Cartesian product of sets of urelements can be not empty.

My research should be considered mathematical cosmology. Development upon development is like, in the dark ages of Europe, comment upon comment.

So, the universe was not created with the meaning that a transformation occurred.

As the universe was not created, we may consider God as the set of laws of mathematics and of nature, now entwined.

Is it within seconds or minutes or more that space will reappear?

A first idea came to me in 2004 and I published it in the Annual Meeting of ASL in 2005 and it appeared in this Bulletin *About space and time of elementary particles*. Then, I published in this Bulletin of September 2008, a clear text.

The space reappears because the set of locations becomes the void set then again the set of urelements.

The cardinalities of the sets of time (also urelements) and of space are Dedekind cardinals. Time begins again with the Big Bang.

The axiom of choice does not hold even if there exists at least one Cartesian product of sets of urelements not void.

I thank Mr. Jamil Satouri for his comment about the space reappearing.

► JOHN CORCORAN, *Expressions in Tarski's* ***Logic, semantics, metamathematics***.
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This lecture treats contrasting senses of *expression* (and thus *sentence*) in Tarski's [3]—building on [1], [2], and *Meanings of word: type-occurrence-token*, this BULLETIN, vol. 11 (2005) p. 117.

Many metalinguistic words are *ambiguous* (have multiple senses). Tarski knew that *expression* is ambiguous: he compared three important senses of *expression* used in [3]: materialist, reductionist, and mathematical. In the materialist sense—emphasized in his text—expressions are concrete material objects—tokens, *inscriptions*: [3], pp. 30, 62, 156n, and 282n. In the reductionist sense—mentioned only in footnotes—each expression is a *class* of "equiform" tokens, an *equiform-inscription class*: [3], pp. 31n, 156n, and 282n. But in the mathematical sense required by the context that he created with hundreds of carefully crafted assertions and argumentations—for example, [3], pp. 31–37, 40–60, and 172–265—expressions are ideal abstract *character strings* (*concatenations*) amenable to mathematical study in *string theory* (*concatenation theory*) much as numbers and geometrical figures are treated in number theory and geometry. Compare [1], pp. 228–231, and [2], pp. 625–627. Tarski's [3] contains the first axiomatization of concatenation string theory. See [2]. Tarski proved the categoricity of his string theory—a proof analogous to Dedekind's proof of the categoricity of his number theory and, as Tarski suggests on p. 282 of [3], to Veblen's proof of the categoricity of his geometry.

[1] JOHN CORCORAN, *Schemata: The concept of schema in the history of logic*, this BULLETIN, vol. 12 (2006), pp. 219–240.

[2] JOHN CORCORAN, WILLIAM FRANK, AND MICHAEL MALONEY, *String theory*, ***The Journal of Symbolic Logic***, vol. 39 (1974), pp. 625–637.

[3] ALFRED TARSKI, ***Logic, semantics, metamathematics, papers from 1923 to 1938***, (John Corcoran, editor), Hackett Publishing Company, Indianapolis, 1983.

► JOHN CORCORAN AND JOAQUIN MILLER, *Lies, half-truths, and falsehoods about Tarski's 1933 "liar" antinomies*.
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We discuss misinformation about "the liar antinomy" with special reference to Tarski's 1933 truth-definition paper [1].

Lies are speech-acts, not merely sentences or propositions. Roughly, *lies* are statements of propositions not believed by their speakers. Speakers who state their false beliefs are often not lying. And speakers who state true propositions that they don't believe are often lying—regardless of whether the non-belief is disbelief. Persons who state propositions on which they have no opinion are lying as much as those who state propositions they believe to be false. Not all lies are statements of false propositions—some lies are true; some have no truth-value.

People who only occasionally lie are not liars: roughly, *liars* repeatedly and habitually lie.

Some *half-truths* are statements intended to mislead even though the speakers "interpret" the sentences used as expressing true propositions. Others are statements of propositions believed by the speakers to be questionable but without revealing their supposed problematic nature.

The two "formulations" of "the antinomy of the liar" in [1], pp. 157–158 and 161–162, have nothing to do with lying or liars. The first focuses on an "expression" Tarski calls 'c', namely the following.

c is not a true sentence

The second focuses on another "expression", also called 'c', namely the following.

for all p, if c is identical with the sentence 'p', then not p

Without argumentation or even discussion, Tarski implies that these strange "expressions" are English sentences.

[1] ALFRED TARSKI, *The concept of truth in formalized languages*, ***Logic, semantics, metamathematics, papers from 1923 to 1938***, (John Corcoran, editor), Hackett Publishing Company, Indianapolis, 1983, pp. 152–278.

► JOHN CORCORAN AND SRIRAM NAMBIAR, *Tarski's inscriptionism*.
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Tarski's *inscriptionism* is his view that an *expression*, and thus a *sentence*, is an *inscription*, a concrete material object ([2], pp. 30, 62, 156n, and 282n). Peirce used the word *token* ([1], pp. 228–231). Building on [1] and *Meanings of word: type-occurrence-token* in this BULLETIN, vol. 11 (2005) p. 117, we discuss problems inscriptionism raises for Tarski's metalogic and the solutions he proposed to them.

Tarski's first observation that such problems occur is in a footnote on page 31 noting counterexamples to the "axiom" that for any two sentences there exists a conditional whose antecedent is the first and whose consequent is the second. Tarski wrote: "they may occur in widely separated places". Nevertheless, on page 156 immediately after introducing schema T, he explained that the quotation-mark name of an expression denotes the expression "which lies between" the quotation marks.

Schema T: *x is a true sentence if and only if p*.

He had just required an instance of schema T to have in place of '*x*' a name of the sentence replacing '*p*'. Again in a footnote, he revealed awareness of difficulties, but he did not explicitly observe that *no instance of schema T can use a quotation-mark name*: the sentence named by a quotation-mark name on the left of the biconditional sign must be the sentence lying inside, which is on the left and thus not the sentence on the right.

[1] JOHN CORCORAN, *Schemata: the concept of schema in the history of logic*, this BULLETIN, vol. 12 (2006), pp. 219–240.

[2] ALFRED TARSKI, ***Logic, semantics, metamathematics, papers from 1923 to 1938***, (John Corcoran, editor), Hackett Publishing Company, Indianapolis 1983.