2nd CLE Colloquium for Philosophy and History of Formal Sciences

"Logic and Computing"

"CLE4Science-Colloquia"

JULY 19–22, 2017

Centre for Logic, Epistemology and the History of Science (CLE-Unicamp)

Editors
Fábio BERTATO and Rafael TESTA

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CENTRO DE LÓGICA, EPÍSTEMOLOGIA E HISTÓRIA DA CÊNTEA - UNICAMP
The main goal of the "CLE4Science-Colloquium" is to promote regular meetings enabling collaboration among researchers interested in Philosophy and History of Formal Sciences, i.e., branches of knowledge concerned with formal systems, such as Logic, Mathematics, Systems Theory, Information Theory, Cognitive Sciences, Physics, Probability, etc. The theme of the "2nd CLE Colloquium for Philosophy and History of Formal Sciences" is "Logic and Computing". Our invited speakers will present contributions describing original and unpublished results related with the theme in any of the Colloquium's areas.

Invited Speakers:

Christoph BENZMÜLLER (Freie Universität Berlin, dep. of Mathematics and Computer Science)
Giuseppe PRIMIERO (Middlesex University, dep. of Computer Science)
Gianfranco BASTI (Pontifical Lateran University, Faculty of Philosophy)

CLE Speakers:

Marcelo CONIGLIO, Itala D’OTTAVIANO and Maria Eunice GONZALEZ

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Local Committee

Abner BRITO
Guilherme CARNEIRO
Gesiel DA SILVA
Beatriz REZENDE
João TONIOLO
Invited Speakers

Gianfranco Basti
Pontifical Lateran University, Faculty of Philosophy

A Categorical Formalization of a Dissipative QFT System as a Topological Quantum Computing System

joint work with A. Capolupo, G. Vitiello

In this presentation, we suggest that the construction in Category Theory logic of the dual equivalence between the category of coalgebras for a given functor $\Omega$, and the category of algebras for the opposite functor $\Omega^*$ can be significantly applied to the dual equivalence between the category of the $q$-deformed Hopf Coalgebras and the category of the $q$-deformed Hopf Algebras, for the contravariant application of the same functor $T$ (Bogoliubov transform), in quantum field theory (QFT), interpreted as a thermal field theory in many body physics. Each pair algebra-coalgebra characterizes, indeed, a QFT system and its mirroring thermal bath, so to model dissipative quantum systems persistently in far-from-equilibrium conditions, and then passing through different phases. This extends the operator algebra formalism applied to classical quantum mechanics interpretation of quantum thermodynamics that, because it must satisfy asymptotically the KMS-condition, might model only systems in a near-to-equilibrium condition. We can prove that in thermal QFT the non-commutative $q$-deformed Hopf Coalgebras/Algebras constitute two dual homomorphic categories, where the “reversal of the arrows” characterizing the categorical duality is significantly in relation here with the reversal of the energy arrow (energy balance). The $q$-deformation parameter is related with the Bogoliubov angle, and it is effectively a thermal parameter. The different values of $q$ identify univocally, and then label, the vacua appearing in the foliation process of the quantum vacuum. The physical and computational meaning of this categorical interpretation is clear. It formalizes the core principle of thermal QFT, consisting in the “doubling (system/thermal bath) of the states (phases) of the Hilbert space” (or “doubling of the degrees of freedom”), necessary for satisfying the Hamiltonian character (closeness) of the system. In this way, the minimum free-energy function can be used here as a selection function among states, so to justify a dynamic, “observer-independent”, choice of the orthonormal basis of the Hilbert space, and then, in quantum computing, the semantic character of the associated qubit. Effectively, because the topologies of the $C^*$-algebra associated to the Hilbert spaces are the same of the Stone spaces of the Stone Representation Theorem for Boolean algebras, in our case extended to the non-commutative case, the minimum free energy function corresponds to a Boolean evaluation function of its coalgebraic semantics. If, on the one hand, this confirms that the collection of thermal QFT coalgebras, each univocally labeled by its $q$-parameter, satisfies the powerful Final Coalgebra Theorem, so to model the correspondent quantum vacuum foliation as an “infinite state black-box machine” in the framework of “Universal Coalgebra” as general theory of systems; on the other hand, all this opens the way to a quantum optics implementation of this computational architecture, for reckoning with infinite data streams. The derivation of a Fibonacci series by the simple iterative application of our semantic qubit confirms the universality of this new quantum computational architecture. Finally, all this theoretically justifies why one of the first experimental confirmations of thermal QFT is in cognitive neurosciences for modeling living brain states as entangled with their environments (dissipative brain).

Bibliography


1 Dept. of Physics “E. R. Caianiello”, University of Salerno, and INFN –Salerno Group – Fisciano (SA)
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**Christoph Benzmüller**
Freie Universität Berlin, department of Mathematics and Computer Science
**Computational Metaphysics: The Virtues of Formal Computer Proofs Beyond Maths**

Formal computer proofs - irrespective of being developed interactively with modern proof assistants, fully automatically by automated theorem provers, or in a combination of both - are still rather unpopular amongst many mathematicians. Benzmüller will challenge this stance and point to recent success stories of computer-assisted proofs in maths and beyond. In particular, he will demonstrate how the rigorous assessment of rational arguments in philosophy can be fruitfully supported by modern theorem proving technology. A prominent example includes the “Ontological Argument for the Existence of God” for which even relevant new insights were recently revealed by automated theorem provers. The latter research activities have inspired the conception of a new, awarded lecture course on “Computational Metaphysics” at Freie Universität Berlin which brings together students from computer science, maths and philosophy.

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**Giuseppe Primiero**
Middlesex University, Department of Computer Science
**Handling Mobility Failures by Modal Types**

Typing errors are typically dealt with proof-theoretically by abortion procedures. In real distributed systems this corresponds to error detection and service restart. More efficient error resolution strategies for mobility failures in distributed computing can be defined by re-evaluation and re-addressing of resources in referentially transparent expressions. In this talk we present TypErr, a substructural modal type system to analyse failure of mobile code and appropriate resolution strategies that do not require abortion. The system enjoys local soundness and completeness results, restricted structural properties, reduction and expansion on failure states and a full state transition semantics.

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Let MPT0 be the 3-valued paraconsistent logic defined over a signature including two negations (a paraconsistent one and a classical one) introduced in [1], which is equivalent (up to language) to J3, LF1 and LPT, and let QMPT0 be its first-order extension. In this talk an adequate resolution calculus for QMPT0 is presented. Paraconsistent Logic Programs (PLP) based on QMPT0 are defined by means of program clauses in which the paraconsistent negation can occur explicitly. A characterization of the Least Partial Herbrand Model of a PLP is obtained in terms of the fixed points of monotonic operators, in a similar way to the classical case. Finally, soundness and completeness of a suitable SLI-resolution for QMPT0 is obtained. SLI-resolution is a resolution calculus introduced by J. Lobo, J. Minker and A. Rajasekar that extends to disjunctive programs the SLD-resolution for classical logical programming. Thus, the SLI-resolution constitutes a correct and complete decision method for logic programming based on QMPT0. This is a joint work with Kleidson E. Oliveira.

Bibliography:

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Maria Eunice Quilici Gonzalez
Faculdade de Filosofia e Ciências, UNESP
Human autonomy and Big Data: Consequences of Turing’s Machinery and Intelligence thesis implemented in the XXI century

In his seminal paper Machinery and Intelligence, Turing proposes a synthetic method of analysis of cognition, claiming that thinking is computation, and that the proper way to explain the nature of cognition (and thinking processes in general) is to design a machine that can pass the imitation game (known as the Turing test). His hypotheses, developed in Cognitive Science and Robotics, have produced intricate models of cognition in the form of self-organizing machines and robots with increasing degrees of autonomy that mediate human communication in specific tasks. In the present work, we investigate possible philosophical consequences of the contemporary development of the synthetic method of analysis, in terms of aspects of human autonomy in the new informational society. Emphasis will be placed on consideration of the ethical implications of manipulation of large quantities of information tracking human daily activities (Big Data). Our hypothesis is that research concerning Big Data could provide the common sense that the Turing model lacks. In many cases, Big Data works very well, and it fools a lot of people (as an example, automated translation tools have improved significantly due to the use of Big Data strategies by Google). The problem that will guide the present analysis can be characterized as follows: Is there any (in)compatibility between human autonomous actions and the (un)authorized usage of Big Data? We argue that the paradigm of complexity offers a useful conceptual framework for analysis of this problem.

Keywords: Human autonomy, Organized complexity, Big Data, Turing’s synthetic method of analysis, Cognition.

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Itala D’Ottaviano
CLE and IFCH-Unicamp
Relation algebras: basic definitions, properties and Tarki’s open problems

After introducing some basic definitions and results on relation algebras, we will discuss the open problems presented by Alfred Tarski in 1975, during his visit at UNICAMP. As we have, during several years,
researched on the state of art of the subject analysed by Tarski, we will also present the book we have recently edited.

**Book – Alfred Tarski: Lectures at Unicamp in 1975**  
(Editors Leandro Suguitani, Jorge Petrucio Viana and Itala M. Loffredo D’Ottaviano, Unicamp, 2016)

In 1975, Alfred Tarski, invited by Ayda Arruda and Newton da Costa, visited the Institute of Mathematics, Statistics and Scientific Computing at Unicamp. In this bilingual text, we present an inedited transcription of the two lectures delivered by him on relation algebras, preceded by a brief introduction, with an update on some open problems mentioned by Tarski.

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Claudia Wanderley  
CLE-UNICAMP  
**Non Standard Epistemologies, Cultures and Languages**

Based on Michel Debrun's notion of philosophy, we present the process of elaboration of a notion called "local epistemology" to cope with the demand of the Paiter Surui People for an academic cooperation to build their own university based on their own knowledge. Inspired by UNESCO and UN values for indigenous peoples and also considering the Bill of Human Rights, we develop a perspective on local epistemology that might be interesting to work in post colonial situation, but more than that it is a basic understanding for occasions when it is necessary to work in the same ground with mainstream academic knowledge and originary peoples knowledge, without promoting any particular dominance. This work is basically a position statement about ethics, production and circulation of knowledge on academic life among different. In this sense it is a statement dedicated to the academics, to broaden our perception and our knowledge interaction possibilities. It shows possibilities to extend our understanding of knowledge production, being the first road-map to deal with these new intellectual partners and their demand.

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O objetivo de meu trabalho é investigar duas propostas que defendem que a significância cognitiva (ou valor informativo) de sentença co-referenciais é decorrente de conteúdos de ordem semântica de sentenças. Primeiramente examinarei a proposta defendida por Fine (2007), que defende que a significância cognitiva decorre de propriedades semânticas relacionais, um recurso explicativo adotado por Fine que não parece ser claro. Depois, apresentarei a proposta de Perry (2001), que apela a conteúdos meta-linguísticos para explicar o fenômeno da significância cognitiva, que ele denomina de conteúdos reflexivos, e buscarei mostrar como sua proposta apresenta vantagem explicativa em relação a primeira.

Referências
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Rodolfo Ertola Biraben
CLE-Unicamp
The discovery of the diamond

Strangely enough, in 1880 Charles S. Peirce wrote that every lattice is distributive. In 1890, Ernst Schröder dealt with this question in his massive Vorlesungen über die Algebra der Logik. However, he neither considered the pentagon nor the diamond. In 1891, Jacob Lüroth simplified Schröder’s argument. Again, however, he neither considered the pentagon nor the diamond. We give some details concerning this question. In particular, we comment on what we think to be the first paper stating that the diamond is a non-distributive lattice.

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Abner de Mattos Brito
Master student in Philosophy and Applied Mathematics, Unicamp
Logic and Formal Concept Analysis

Formal Concept Analysis (FCA) is to be regarded as a mathematization of the philosophical idea of concept. The word formal intends to precise the fact that we are talking about a concept formally defined as a mathematical theory.

A formal context is dened as an ordered triple \( C = (O, A, I) \) in which \( O \) is a set of objects, \( A \) is a set of attributes and \( I \subseteq O \times A \) is a binary relation such that, within the context \( C \), an object \( o \) has an attribute \( a \) if and only if \( (o, a) \in I \) (we shall write \( oIa \) for \( (o, a) \in I \)).

We also define two maps, \( \wedge : 2^O \to 2^A \) and \( \wedge : 2^A \to 2^O \) (and we write \( O' \) and \( A'^* \) rather than \( '(O) \) and \( *(A) \) respectively) so that \( O' \) is the set of all attributes common to every object in \( O \), and \( A'^* \) is the set of all objects having every attribute in \( A \), that is: \( O' = \{ a \in A : o \wedge a \text{ for all } o \in O \} \), and \( A'^* = \{ o \in O : o \wedge a \text{ for all } a \in A \} \).

A formal concept is an ordered pair \( \mathcal{C} = (O, A) \) such that \( O' = A \) and \( A'^* = O \). That is, we have a concept whenever a given set of objects \( O \) has a given set of attributes \( A \) and no other object has all the attributes of \( A \). \( O \) is called the extent of the concept \( C \), and \( A \) is its intent. The following useful properties hold:

1. \( O_1 \subseteq O_2 \Rightarrow O'_2 \subseteq O'_1 \) (analogously, \( A_1 \subseteq A_2 \Rightarrow A'^*_2 \subseteq A'^*_1 \));
2. \( O \subseteq O'^* \) (for sets of attributes, \( A \subseteq A'^* \));
3. \( O' = O'^* \) (\( A'^* = A'^* \));
4. \( O \subseteq A'^* \Leftrightarrow A \subseteq O' \Leftrightarrow A \times B \subseteq I \)
We can now define a hierarchy (order) $\preceq$ of concepts as follows: if $\mathbf{c}_1 = (O_1, A_1)$ and $\mathbf{c}_2 = (O_2, A_2)$ are concepts then $\mathbf{c}_1 \preceq \mathbf{c}_2$ if and only if $O_1 \subseteq O_2$ (or equivalently iff $A_2 \subseteq A_1$ by property 1. and the definition of formal concept). It follows that if $\mathfrak{B}(\mathbb{C})$ is the set of all (formal) concepts of a given (formal) context $\mathbb{C}$, then $\mathcal{L}_\mathbb{C} \equiv (\mathfrak{B}(\mathbb{C}), \preceq)$ is a lattice.

Notice that if $A_1$ and $A_2$ are sets of attributes such that $A_1 \subseteq A_2$ then by property 1. above every object in $A_1$ has each property held by all objects of $A_2$. Thus we can think of implications between attributes.

Our research is to be developed at a master's level aiming at acquiring familiarity with FCA (as presented in [1]) as well as studying the rst-order formalization proposed by Chaudron and Maille [2].

References

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Leandro Bortolotto Camargo
Master student in Philosophy, Unicamp
On the fregean distinction between concept and object and its semantic repercussion

In Begriffsschrift (1879), Frege, by replacing the grammatical notions of subject and predicate with the logical notions of argument and function, took a fundamental step towards a more precise regimentation of sentences so as to make it explicit what in such sentences plays a role in determining the validity of arguments in which they appear. In the aforementioned work, such logical distinction refers solely to the linguistic level of sentences and their components. Notwithstanding, in his later works, particularly in Funktion und Begriff (1892), the distinction is deepened into a radical semantic split of such linguistic expressions – a split which would also reflect an ontological distinction –, namely, the split between saturated entities, which came to be referred to as objects and designated by proper names, and insaturated entities, which came to be referred to as concepts and designated by predicates. Later on, by introducing the distinction between sense and reference, more explicitly dealt with and developed in Über Sinn und Bedeutung (1892), the issue concerning the semantic content of proper names and, above all, of functional expressions (in particular, of predicates), becomes particularly complex. It is thus necessary to tackle the question of what is, precisely, the semantic content of proper names and of functional expressions, both regarding their respective references and regarding their respective senses, as well as to examine how this fits into the fundamental distinction between objects and concepts, which directs the whole of Frege's philosophical enterprise.

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Guilherme dos Santos Carneiro
Undergraduate student in Philosophy, Unicamp
Some philosophical and formal notions of conceptual

Concepts are fundamental to the rational communication through language. In the philosophical process, concepts are used either as instruments or as objects of inquiry, and play a very important role in the expression and organization of knowledge. On the other hand, the notion of concept was formally treated in a mathematical theory called Formal Concept Analysis (FCA), which deals basically with data analysis and knowledge processing. Our research aims the study of the similarities between the philosophical and the mathematical approaches involved in the notion of concept, discussing some of the many aspects present in works of Plato, Aristotle, Porphyry of Tyre, Aquinas, Kant and Frege, related to the formal notion of concept established by the Formal Concept Analysis. Despite the differences between the philosophical notions, it is possible to see that philosophers generally agree that concepts are elements of thoughts having at least two characteristics: i) they are applicable to certain objects (i.e., its extension) and ii) they express the properties that all the objects satisfying them have in common (i.e., its intension). Formal Concept Analysis has its foundations in Lattice
and Order theories, and works with a formalization of the notion of concept, defined in terms of a set of objects (i.e., its extent), a set of attributes (i.e., its intent) and a binary relation between them. These concepts are determined and represented in a systematic form of data named formal context, in which their relations of implication and dependency are exhibited. Given that the philosophical and formal notions have some similarities, since FCA was developed upon well-established philosophical background, we present a study and comparison between these notions, seeking an interdisciplinary approach.

Pedro Carrasqueira  
PhD student in Philosophy, Unicamp  
**Logic, games, and the pragmatics of inconsistency**

From a pragmatic point of view, paraconsistency is puzzling. A paraconsistent logic is one in which the principle of inference known as ex contradiction sequitur quodlibet (ECSQ) is not valid [2, 5]. The principle, as its traditional Latin name states, is the rule of inference according to which from a contradiction one may infer any proposition whatsoever. In normal discursive situations, by asserting a sentence we commit to the truth of the proposition it expresses. In such situations, we also oppose to a claim by somehow attempting to show that our interlocutor’s commitment to a proposition they claimed is not successful. Of course, commitment to the truth of a proposition is successful only if the proposition is actually true, and opposition to it only if it is not. Furthermore, in normal discursive situations we initiate our opposition to a claim by denying it; and this usually amounts to asserting a sentence which expresses the negation of the proposition claimed. Indeed, this is arguably the primary use of negation in natural discourse, and it is certainly the orthodox view on how denial and negation relate [4]. However, if denial is simply negation, and if denial expresses opposition, then it follows that it would be impossible to oppose to a claim if the proposition it expresses and its negation were not contraries. But, given the classical account of validity (according to which an inference or argument is valid if and only if its conclusion is true in every case in which its premises are true [1]), in any logic in which a proposition and its negation are contraries ECSQ will be valid.

In our research we tackled this puzzle by using game theory to provide formal pragmatics for the propositional logic of paradox (LP) and the logic of formal inconsistency (LFI) known as mbC (both paraconsistent logics which take the classical account of validity to be correct), comparing them to formal pragmatics for classical propositional logic (CL) itself. This led to an account of precisely how opposition, denial and negation relate in the use of those logics, and thus of what LP’s and LFI’s brands of paraconsistency entail regarding the pragmatics of negation. As regards to CL, the game-theoretical formal pragmatics appropriate for such a study turned out to be simply a modified version of its so-called game semantics [3], which we then generalized as two-players, two-roles, win-lose semantic games for both LP and mbC. Our research, therefore, also resulted in further understanding the underlying assumptions of game semantics for CL in its relation to CL’s pragmatics.

References

Daniel Credico de Coimbra  
Undergraduate student in Philosophy, Unicamp  
**Paraconsistent Belief Revision: Informational Economy and Applications in Science**

Unless one accepts that reality may contain irresolvable contradictions, a quite unpopular position in metaphysics, one will hold that non-contradictory epistemic states are ultimately desirable in truth-oriented inquiry. Yet, Whitehead once rightly said that, “in formal logic, a contradiction is the signal of a defeat; but in the evolution of knowledge it marks the first step towards a victory.” In this talk I wish to argue rational
belief change often only occurs as a product of counter-evidence accumulation, which makes contradictory states necessary temporal stages of rational inquiry.

If informational economy is understood similarly to monetary economy, as minimizing loss and maximizing gain, standard models of belief revision who fail to harvest such learning power of contradictory statements will thereby fall short of fulfilling information-economical desiderata. If I’m correct about the expediency of contradictory states, there is a strong chance paraconsistent models are to be preferred over others when one desires to model scientific rationality. Such models have been worked out in formal detail in the literature, chiefly by TESTA, CONIGLIO, & RIBEIRO (2015, 2017).

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André Contiero
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Thainá Coltro Demartini
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Essentialism, Modality and The Direct Reference Theory

This project's goal is divided in two parts. The first part is to search for what Kripke's thesis about the notion of essence and essential properties are. The second one is to analyze Salmon's and Fine's arguments against Kripke's theory. The main issue is: Does Kripke (in his theory) derive the essentialism from his semantical theory alone? It looks like this is a possible interpretation of his arguments, since Kripke uses his direct reference theory - the core of his semantical theory - to argue on/about what the essential properties of an object or natural kind are. This fact raises the question: What (if any) notion of essence is implied by Kripke's semantic theory? The analysis of Kripke's theory and its implications in a broader context play a role in the discussion about the possibility of reducing the metaphysical notion of essence into language issues. Salmon and Fine argue against this idea. For them, Kripke's notion of essence can neither be explained only through his direct reference theory nor be understood through modal terms alone. Hence our study is to reconstruct the arguments of these three philosophers, analyzing the real consequences of Kripke's theory and the validity of the criticisms directed to his theory, and also to take part in the broader discussion about the limits between semantical and metaphysical fields.

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Evandro Gomes
State University of Maringá
Joint work with Itala D’Ottaviano
Necessary and sufficient conditions concerning the notion of semantic contribution to the history of logic

What the historian seeks to identify and analyze in the sources of the history of logic is the notion of logical contribution. This notion was analyzed by Vega Reñon (1997, p. 40–45), whose conceptual framework we summarize here. This author characterizes the definition of logical contribution in an intuitively recursive way. Let $T$ be a text. In principle, $T$ is logically significant if $T$ has to do with the presuppositions, questions, or applications in the field of knowledge covered by logic in a certain historical landmark $M$. Consequently,

(i) if $T_L$ is a logically significant text, then $T_L$ is a logical contribution with respect to the notions, problems, methods, or results that have characterized the cultivation of logic as a discipline at some moment of its historical course;

(ii) $T_L^p$ is a potential logical contribution in a determined historical landmark $M$, if $T_L^p$ can be recognized by practitioners of logic in $M$ as a logical contribution;
(iii) \( T_L^c \) is an effective logical contribution in a determined historical mark \( M \), if \( T_L^c \) can be recognized or assumed by practitioners of logic in \( M \) as a logical contribution;

(iv) \( T_L^M \) is an historical contribution in the broad sense (a memorable contribution), if there is some historical landmark \( M \) from which \( T_L^c \) comes to be seen as either a potential or effective logical contribution;

(v) \( T_L^m \) is an historical contribution in the strict sense, if there is a historical mark \( M \) in which \( T_L^c \) was an effective logical contribution \( T_L^e \).

We propose that these notions can be adapted to the historiography of every logic or family of logical systems. For instance, in the case of the paraconsistent logics, we can specify the notion of logical contribution, and introduce by analogy the notion of contribution to the history of paraconsistent logic \( T_L^p \).

To the historiographical categories presented so far, which give prominence to historical contextual elements, may be added other conceptual categories that are applicable and quite appropriate to the comparative historical study of logical systems. Categories such as syntactic and semantic contribution to the history of logic may be also required by an historiographical point of view as internal criteria. These categories permit the determination of clear chains of theoretical formation and make evident the interdependencies and intercorrelations of authors among themselves and among their logical contributions and their communities. Of course, these categories can also be refined with the objective of better assessing the historical development of a logical theory, a logic, or an entire branch of logical systems.

We consider a contribution to the history of logic syntactic or semantic depending on the degree of conscious motivation demonstrated by an author at the moment of the proposal of his/her contribution to the field of logic. Intentionality is thus a decisive factor in determining if a contribution to the history of logic is purely syntactic or also semantic. These notions can be stated more precisely as follows:

1. A syntactic or accidental contribution to the history of logic (or a purely formal one) occurs when an author proposes a logical innovation (in either the narrow or the strict sense) in accordance with interpretations proper to the historical mark \( M \) within which it appears, and he or she does not offer an explicit interpretation of it or has little or no consciousness of what he or she has just proposed.

2. A semantic or intentional contribution to the history of logic occurs when a logical innovation (in either the narrow or the strict sense), in accordance with interpretations proper to the historical mark \( M \) within which it appears, is introduced with an explicit motivation and with full awareness on the part of its contributor.

These new categories permit objective analysis, including analysis of possible priority disputes in the history of logic, and also establish clear criteria which historically enumerate different logical systems, whether or not they are mutually dependent in a branch of the development of logic. In addition, such intentional character must be readily recognized in the relevant historical landmark \( M \) in the community of practitioners of logic at the time.

For example, the history of paraconsistent logic, founded on these categories, is supported by the historiographic premise according to which effective logical contributions \( T_L^p \) must be conscious or recognized within their historical-theoretical landmark – that is, within the state-of-the-art in the community of practitioners at the time (Gomes & D’Ottaviano, 2017, p. 31-45). For this reason, in order to consider a
paraconsequent logician in the strict sense to be a precursor or pioneer as a founder of the theoretical field of
paraconsequent logic, it is necessary that his/her contributions be intentional or semantic and that they be
chronologically appropriate. In light of the reasons given above, purely chronological criteria appear to be
simplistic and inefficient. If such criteria were enough to determine priority in the discovery of
paraconsequentis, its inauguration would be placed far back in the history of formal Western logic. And just as
it would be improper to attribute to Aristotle the notable role of the founder of paraconsistency, it would
likewise be improper to do so with regard to authors such as Peter of Spain, William of Ockham, and others.
Although parts of their logical theories may at present be considered paraconsistent in the broad sense, these
thinkers did not perceive the unusual and non-classical character that their theories implied. A similar
situation is found in the cases of Kolmogorov, Johansson, Nelson, and in the cases of other thinkers of our
own era. These authors cannot, under the view we have adopted here, be considered founders of
paraconsequentis, even though their logical theories can today be interpreted and considered as paraconsistent
in the broad or even in the strict sense. In terms of the historiographical premises here assumed, the
contributions of Stanislaw Jaśkowski (1906–1965) and Newton da Costa (1929–) are situated on another
level. Motivated by problems arising from the presence of contradictions in specific rational contexts, they
proposed and developed logical systems capable of dealing with contradictions or inconsistencies without the
trivialization of the theories implied by these systems, completely fulfilling the requirements of historical
postulates (1) and (2) above.

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Henrique Inonhe
Undergraduate student in Music, Unicamp

Formalization of Mathematics Through Proof Assistants

The formalization of mathematics consists in writing mathematical proofs in a precise formal
language such that each step in reasoning is represented by an inference rule (which is a syntactic
transformation rule in the language), in such a way that not only the correctness of proofs can be checked
mechanically but also their construction can be automated with the aid of computers. Aside the fact that with
the formalization of mathematics the process of checking the correctness of proofs becomes a trivial task,
there is another advantage regarding the presentation of formalized proofs, for the reader of such proofs can
choose the level of abstraction desired while reading it, that is, he can choose not only in how much detail
the proof will be shown but also he can trace back the theorems (and their respective proofs) used in the
main proof, up to the very axioms of the theory.

Even though there are several proof assistants with different inner workings, logical frameworks and
proof systems the process of formalization is still cumbersome and very far from the current mathematical
practice, resembling much more programming than mathematics itself.

My current research focuses on finding out what is the current state of the art for proof assistants, the
obstacles in making the formalization process less cumbersome and closer to the current mathematical
practice and possible solutions for these problems, so that proof assistants become a tool that will serve both
the purpose of ensuring logical correctness of proofs and the purpose of facilitating their understanding.

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Vitor Mafra
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Cultura e Auto Organização: o estudo de caso do Arena do Rap

Partindo do conceito de auto-organização na filosofia, elaborado por Michel Debrun, este projeto de pesquisa visa analisar os elementos constitutivos e partícipes do evento Arena do Rap para averiguar dentro da perspectiva de sistemas complexos, se os mesmos são característicos de um processo auto-organizado. Trata-se do primeiro projeto que temos conhecimento a investigar sistematicamente uma prática cultural e filosófica dentro da perspectiva de auto-organização. Concomitantemente, partindo da noção de praxis de Gramsci (como compreendida por Debrun em sua livre docência), aproveito este estudo de caso para me introduzir, por meio desta iniciação científica, no debate epistemológico relativo à formação dos filósofos acadêmicos e orgânicos. Meu interesse é analisar em contraponto a formação filosófica dos agentes da cultura Hip-Hop, e particularmente como decorre a produção e o compartilhamento do conhecimento no espaço do evento Arena do Rap.

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Filipe Martone
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Semantics and the metaphysics of language

What sort of object is a natural language? In this talk, I argue in favor of what we might call the grandma’s view answer to that question. In this view, a natural language is a thing like Chinese, English, Guarani or Swahili. It is (at least) a collection of words, pronunciations and meanings with a grammar; it is something public and shared that has a history, that may or may not be spoken today, that may or may not have a writing system, etc. In short, in the grandma’s view natural languages are in some sense out there in the external world. They are to be counted among the things that exist, and therefore should be included in our ontology. Much of the work in the philosophy of language (especially in the externalist tradition) and in formal semantics assumes something like the grandma’s view. For instance, many theories say things like “‘Campinas’ refers to/means Campinas”, which describes a relation between a linguistic entity – a public word – and a non-linguistic entity. However, linguists and philosophers in the Chomskyan tradition (including Chomsky himself) challenge the grandma’s view. For them, there are insuperable problems with this notion of external languages (or E-languages, as they call them), so we should abandon them in favor of what they call I-Languages: internal and individualistic. Public languages either are mere fictions or too messy to have a place in serious investigations about language.

The problem of the metaphysics of language is fundamental. It involves questions about the very subject matter of philosophy of language and semantics, about communication and meaning, as well as many other issues. In this talk I present an outline of the problem and show how it affects traditional views of meaning and semantics in general. For example, Chomskyan claim that the employment of notions like truth, reference and truth-conditions in the study of meaning are misguided. I then offer some arguments in favor of the the grandma’s view by discussing some ideas contained in David Wiggins’ paper, Languages as Social Objects.

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Bruno R. Mendonça
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An externalist approach on semantic information and the scandal of deduction

We show that, if we just replace classical logic by a variant semantic framework that better describes the epistemological basis of our semantic competence in the use of first order languages, we can re-establish the traditional theory of semantic information (hereafter TSI, originally pro- posed by Bar-Hillel and Carnap [1953]) by blocking a well-known problem with which it is related. TSI’s general purpose is to provide criteria for measuring the amount of information carried by sentences and its general motive is the idea that informativeness varies in function of the number of models that considered sentence has: the more models it has, the less informative it is. In this sense, TSI implies the so-called scandal of deduction (hereafter SoD), a problematic thesis according to which logical truths have null amount of information. This is a dramatic
situation for TSI since it does not make room for the “ampliativeness” of formal knowledge. In reaction, recent work (e.g., Floridi [2004]) has been proposing the abandonment of TSI despite its good insights on the nature of semantic information. In contrast, we propose a more conservative solution by replacing classical logic by an alternative system known as urn semantics [Rantala, 1979]. Urn semantics, by characterizing a systematic way of relativizing quantifiers for parts of a given structure, changes the satisfiability conditions of quantified formulas, enabling us to build models for some classically unsatisfiable sentences, a property that blocks SoD. This strategy finds motivation in works on semantic externalism which claim that our semantic competence is more or less independent of our epistemological stance on truth-conditions. So, we argue that urn semantics nicely formalizes this externalist account of semantic competence and, consequently, is an adequate semantic background for TSI.

Keywords: Semantic information; Scandal of deduction; Semantic externalism; Urn semantics.

References

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Aspects of Bernard Lonergan’s macroeconomic theory

The philosopher Bernard Lonergan has made major contributions in Epistemology, Logic and Theology as well as in Economics. He understands that Economic Sciences, like any other science is based on the investigation of schemes of recurrence, although in contrast to Natural Sciences, Human Sciences like Economics involves the complexity of dealing with human intentionality. Even though the human factor comes into play, it does not imply that the object of study is chaotic, much to the contrary it involves rhythmic flows investigated in Lonergan’s Circulation Analysis. Therein, he proposes a macroeconomic theory, where Shumpeter’s notion of economic growth driven by innovation is emphasized and the centrality of the distinction between the production of consumers goods and the production of producers goods plays a major role. Moreover, the interaction between the two types of production results in trade cycles which if understood by society in its different phases can cause the emergence of a pure cycle, where in spite of fluctuations it would be possible to sustain continuous growth.

Nicola Claudio Salvatore
Postdoctoral researcher, IFCH-Unicamp
Aquinas and Frege(Ans) on essence and existence

In this paper, I aim to compare and contrast Aquinas ‘and Frege(An)’s views on essence and existence, in order to see if and to what extent Frege ‘-inspired criticisms do represent a problem for Aquinas ‘account. According to Aquinas, the essence of a thing is just that which makes it the sort of thing it is, “that through which something is a certain kind of being” (DEE 1). Moreover, as per Aquinas essence is also that through which a thing is intelligible or capable of being grasped intellectually. Hence to grasp humanity is to grasp the essence of human beings – that which makes them human – and thus to understand what a human being is; to grasp triangularity is to grasp the essence of triangles – that which makes them triangles – and thus to understand what a triangle is; and so forth. That raises the question, though, of what kind of distinction – purely logical, virtual, formal, or real – there is to be drawn between a contingent thing’s essence and its existence. Aquinas and Thomists following him, who deny that a real distinction entails separability, insist that the distinction between essence and existence is a real one. Anthony Kenny (1980, Chapter 2; 2002) has been harshly critical of Aquinas’s doctrine of the real distinction; Kenny distinguishes
between two notions of existence (2002, p. 42). The first is “specific existence,” which is expressed by the Fregean existential quantifier. Specific existence, that is to say, is what is captured in statements of the form “There is an x such that...” It has to do with whether or not there is an instance of a certain species. Specific existence on this view is thus a second order predicate of concepts – rather than a first-order predicate of individual objects -- and “There is an x such that x is F” is true of a concept F when F is exemplified. Kenny’s second notion of existence is “individual existence,” which corresponds to Frege’s notion of Wirklichkeit and is what is captured in statements like “The Great Pyramid still exists, but the Library of Alexandria does not.” Individual existence, that is to say, is just that which the Library of Alexandria lost when it was destroyed, but which the Great Pyramid still has. It has to do with what is true of an individual rather than a species. Now Aquinas says that essence and existence are identical in God but really distinct in everything else. But in Kenny’s view this cannot be true on either notion of existence. In this paper, I aim to show that Kenny’s Frege-inspired criticism against Aquinas’ doctrine of the real distinction are misguided, drawing on the works of Davies (1997), Klima (2004) and Miller (1996); furthermore, drawing on the work of Knasas (2003) I aim to show that regarding existence as a first level predicate does not affect in any way Aquinas’ doctrine of the real distinction between essence and existence; this is so because the subject of statements attributing existence or non existence to a thing are grasped in an existence neutral way, hence do not function logically in the same way other attributive statements do.

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Gesiel Borges da Silva
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The logical problem of evil: axiomatic approaches and contemporary issues

This work aims to present some contemporary approaches within current debates about the Problem of Evil in its logical counterpart. The logical version of this ancient problem is put forward by philosophers which argue that it is logically inconsistent to affirm both the existence of a perfect, omnipotent Creator and of evil in general, concluding that theism is not logically consistent or rational (Mackie, 1971). In this work, we deal with two relevant proposals, namely, Plantinga’s Free Will Defence and the Leibniz-Thomistic inspired Nieznanski’s Axiomatic Approach to Theodicy. Plantinga (1974, 1977) deals with a particular question raised about inconsistency of propositions commonly attributed to theism, and then, he treats extensively many atheistic objections with a approach based in modalities and semantic of possible words in natural language, to conclude that the main objection is a misunderstanding and therefore theism is not irrational. Plantinga’s approach is widely considered to achieve its goals, despite other aspects of the problem are still to be solved (Beebe, 2003). By the other hand, Nieznanski (2007, 2008) develops a complete formal system (according to KT and S4 modalities), based in the well-known Leibniz’s Th odicy, by which he formalizes God’s attributes and its relations to an axiology of values. Then, he precises and denies religious fatalism (which tends to defend that evil is caused by God’s active will and design) and brings an effective axiomatic calculus result which supports that evil is a result of “fortuitousness within the laws of nature” well established by God’s will, whose real intention would be to deliver freedom of choice to the humankind. This axiomatic approach aims to conclude that some classical theistic proposals which suport God have reasons to allow evil in the world is logically consistent and thus theism (or, at least, this form of theism) would be rational. Part of this work is to present Nieznanski’s system, developed in an article in Polish (2007) and extended later (2008). Some distinctions between this approach (a Theodicy ) and Plantinga’s one (a Defence ) will be made, and general appointments about the contributions of these approaches to the whole of the logical problem are to be delivered.
Skepticism is arguably one of the most challenging epistemological issues. From Augustine to contemporary epistemology, passing through Descartes, there have been several attempts at refuting skeptical arguments. Among the various contemporary anti-skeptical strategies, we can find some elements in Lonergan’s epistemology to deal with it, on the basis of a judgment of fact. The skepticism in question is the one that denies the very possibility of knowledge (as in the New Academy’s version). In this work I argue that the lonerganian thesis of “the self-affirmation of the knower”, being a judgment of fact, provides an argument that contradicts this kind of skepticism, showing his inconsistency (in fact, the self-affirmation seems a kind of “cogito”, but in this presentation we do not have time to develop this idea). Furthermore, some remarks about type theory and this argument will be addressed.

Leonardo Gomes de Soutello Vieira
PhD student in Philosophy, Unicamp
Brief discussion on Black’s spheres example

In this presentation I will expose some points of my doctorate project, namely, the (I) attack of Max Black on the Principle of Identity of Indiscernibles (∀x∀y(∀F(Fx↔Fy)→x=y)) and (II) my views on why his attack is not legit. Black believes that he have found a possible scenario where this principle does not rule. Many philosophers agree with him, but many disagree and I am one among the latter group. I believe his counter-example of the principle is bogus, because the conditions in which he states it are metaphysically incoherent. My reasons to believe that are intimately linked with the way we conceive space and the epistemological features of properties.

Rafael Albiero Vieira
Undergraduate student in Philosophy, Unicamp
A resposta de Donnellan ao contingente a priori kripkeano

Kripke, em Naming and Necessity, abalou uma tese muito bem estabelecida na intuição de que só podemos conhecer verdades contíngentes através da observação sensorial da natureza quando mostrou que existem casos de verdades que são conhecidas de maneira contingente e a priori. Um dos filósofos que se mostrou contra essa ideia foi Donnellan, em “The contingent a priori and rigid designators”. Para Donnellan, os exemplos kripkeanos não são filosoficamente interessantes porque falham em capturar ingredientes básicos que caracterizam um conhecimento como sendo genuíno. Esta breve apresentação tem o objetivo de expor a teoria kripkeana de nomes e descrições, bem como a apresentação de seus exemplos do contingente
a priori. Logo em seguida, pretendo apresentar a resposta de Donnellan aos exemplos kripkeanos, como também alguns contra exemplos.

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In this tutorial, I will demonstrate a generic approach to automate a wide range of non-classical logics (propositional and quantified) using theorem proving systems for classical higher-order logic (HOL). Our particular focus in this tutorial will be on (quantified) modal and deontic logics. We will present shallow semantical embeddings of such logics in meta-logic HOL. One motivation thereby is to turn off-the-shelf proof assistants for HOL, such as Isabelle/HOL, into proof assistants for these object logics in such a way that both intuitive interactive proof as well as proof automation are supported. Additionally, TPTP compliant automated theorem proving systems (such as LEO-II) can be used for reasoning in the embedded object logics, either directly or indirectly from systems like Isabelle/HOL via the Sledgehammer tool.
Book launch
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