Handbook of the Second World Congress and School on Universal Logic

UNILOG'07

August 16th - 22nd 2007
Xi'an - China
www.uni-log.org
www.uni-log.cn

UNILOG'07

Edited by
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Alexandre Costa-Leite and Yixin Zhong,
and Yingcang Ma

Meaning of the emblem

HHC

★ It is made up of U N I L O G Si **bolizes:**

★ **Wave in the sea**—Universal Logic is a general direction of present logics development;

★ **Abbreviation**—Universal Logic - **U L**

泛逻辑 - fan luo ji - **F L J**

★ **Component**—Universal Logic

= Rigid Logic + Flexible Logic

= Formal Logic + Dialectical Logic

= Standard Logic + Non-standard logic

步 步 高

信 息 基 础 是 逻 辑

逻 辑 众 多 望 统 一

统 一 过 程 宜 渐 进

渐 进 关 键 在 辩 证

Progressing step by step

The foundation of information is logic

The various logics should be unified

The progress of unifying should be gradual

The key to progress is dialectic

HHC

Schedule

School Aug. 16-19

Aug.15—Aug. 16 registration at the **LE GARDEN HOTEL**
Afternoon of Aug. 16—Morning of Aug. 19 Teaching
There are 24 tutors, 3 hours 30 minutes/tutor
There are 4 classrooms simultaneously
Afternoon of Aug. 19 free

Congress Aug. 20-22

Aug. 19 — registration at the LE GARDEN HOTEL
Morning of Aug. 20 Opening ceremony Invited speech
Afternoon of Aug. 20 Invited speech
Evening of Aug. 20 Dinner party
Aug. 21 Report on group there are 4 groups
Morning of Aug. 22 Invited speech
Afternoon of Aug. 22 Invited speech Keynote speech
Contest: How to translate a logic into another one?
Close ceremony
Evening of Aug. 22 Dinner party

Table Tennis Tournament

Evening of Aug. 18 and Evening of Aug. 21

Tour Aug. 23

致第二届世界泛逻辑大会贺诗

世界再论泛逻辑

百家逻辑求统一

逻辑刚柔宜辨证

智能催生新逻辑

中国人工智能学会名誉理事长　北京科技大学教授
涂序彦　2007年8月6日

Greetings for the Second World Congress on Universal Logics

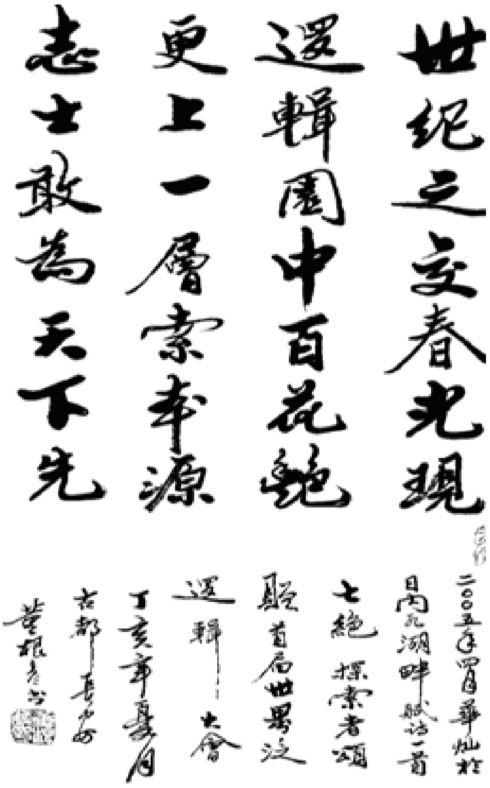
Universal Logics is discussed in world again

Various logics are seeking coordination

Hardness or softness of logic should be dialectical

Birth of new logic would be promoted by intelligence

Hon. president of Chinese Association for Artificial Intelligence
Professor of University of Science & Technology Beijing
Xuyan Tu 6, August, 2007



Song to explorers

Turning point of century of thousand-year, spring is coming
Logical field flowers shining and blooming
Go to the essence go to the fountain
All heroes brave being

To the First World Congress of Universal Logic
Huacan by Genevese Lake April 3, 2005
Translated by Chuanzi

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1 Organizers of UNILOG'07

1.1 Program Committee of UNILOG'07

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1.2 Organizing Committee of UNILOG'07

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1.3 Local Committee of UNILOG'07

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General Chair:

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General Co-chairs:

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Jian Qin	Shiyin Qin	Hua Wang
Difei Wang	Yuying Wang	Zhanao Xue
Xiaohong Zhang	Yumei Zhang	Yanquan Zhou

2 What is Universal Logic?

- In the same way that universal algebra is a general theory of algebraic structures, universal logic is a general theory of logical structures. During the 20th Century, numerous logics have been created: intuitionistic logic, modal logic, many-valued logic, relevant logic, paraconsistent logic, non monotonic logic, etc. Universal logic is not a new logic, it is a way of unifying this multiplicity of logics by developing general tools and concepts that can be applied to all logics;
- One aim of universal logic is to determine the domain of validity of such and such metatheorem (e.g. the completeness theorem) and to give general formulations of metatheorems. This is very useful for applications and helps to make the distinction between what is really essential to a particular logic and what is not, and thus gives a better understanding of this particular logic. Universal logic can also be seen as a toolkit for producing a specific logic required for a given situation, e.g. a paraconsistent deontic temporal logic;
- Universal logic helps to clarify basic concepts explaining what is an extension and what is a deviation of a given logic, what does it mean for a logic to be equivalent or translatable into another one. It allows to give precise definitions of notions often discussed by philosophers: truth-functionality, extensionality, logical form, etc;
- There is a new journal of logic dedicated to universal logic:

  Logica Universalis

  Published by Birkhäuser: www.birkhauser.ch/LU

3 Second World School on Universal Logic

3.1 Aim of the School

The school is intended to complement some very successful interdisciplinary summer schools which have been organized in Europe and the USA in recent years: The ESSLLI (European Summer School on Logic, Language and Information) in Europe and the NASSLLI (North American Summer School on Logic, Language and Information).

The difference is that our school will be more focused on logic, there will be less students (these events gather several hundreds of students) and a better interaction between advanced students and researchers through the combination of the school and the congress. Students attending the school are strongly encouraged to present a paper at the congress.

This school is on universal logic. Basically this means that tutorials will present general techniques useful for a comprehensive study of the numerous existing systems of logic and useful also for building and developping new ones.

For PhD students, postdoctoral students and young researchers interested in logic, artificial intelligence, mathematics, philosophy, linguistics and related fields, this will be a unique opportunity to get a solid background for their future researches.

3.2 Tutorials

3.2.1 Accessible categories of Logics
Peter Arndt

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Accessible and locally presentable categories are particular classes of categories which can be neatly characterized in (at least) three different ways: Through category theoretic properties, or as categories of models of certain types of sketches or first order theories. Given a category whose objects are logics and whose morphisms are some sort of translations, one can ask whether this category is accessible. An affirmative answer has at least two interesting aspects: First, one has at one's disposal a bunch of results on accessible categories (for example, in such a category, for each kind of colimit which exists, the corresponding kind of limit also exists and vice versa). Second, by the categorial characterization, each object in an accessible category is a colimit of a diagram of well-behaved, so-called presentable, objects, which gives an interesting point of view towards an important question of universal logic; namely whether every logic can be gained by fibring several simpler logics and whether there are fundamental building bricks (*prime logics*) for such a process: In an accessible category these are to be sought for among the presentable logics.

In this tutorial we will outline the basic idea of accessible categories and explain in more detail, and with examples, their significance for universal logic as indicated above. People who wish to follow this tutorial are highly recommended to also attend the lectures of Marcelo E. Coniglio on Category theory and Logic.

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P. Arndt, R. de Alvarenga Freire, O.O. Luciano and H.L. Mariano: A global glance on categories in logic. Logica Universalis, Vol.1, Nr.1, Birkhäuser 2007

3.2.2 Algebraic Structures for Non-classical logics Xiaohong Zhang

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This tutorial studies:

1. Residual lattices and non-commutative residual lattices;
2. Some algebraic structures inspired t-norm based fuzzy logic (MV, BL, MTL, L^*, UL^*);
3. Some algebraic structures inspired pseudo t-norm based fuzzy logic ($psMV$, $psBL$, $psMTL$, PUL^*, PL^*);
4. Hoops and fuzzy BCK-logic;
5. BCC-algebras and *BIK+*-logic, Quasi hoops and fuzzy *BIK+*-logic;
6. Fuzzy logic algebraic structures and quantum logic structures.

3.2.3 Algebraic Systems and Universal Logic Minxia Luo

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Universal logic principle was proposed by Professor Huacan He in 2001. It gave all models of binary 0-level universal operations and 1-level universal operations. We discuss some properties about these models of universal operations. In particular, we prove a lot of results for lattices and its relations with some kinds of algebras (MV-algebras, product algebras, BL-algebras).

3.2.4 Basic Laws of Logic Ross Brady

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The basic laws of logic are those that hold purely as a result of the meanings of the logical terms in them and are thus independent of the way the world is. By examining the definition and role of deductive logic, we make out the basic concepts upon which logic rests: meaning containment and a 4-valued (De Morgan) negation. From these, we determine a specific logic called **MC** (previously **DJd**) and also determine the role of the Law of Excluded Middle (*LEM*) and the Disjunctive Syllogism (*DS*), the key constituents of classical logic. We will argue that these two are contingent and not basic laws of logic. In the first session we will introduce **MC** and its quantificational extension **QMC**. We will also argue for the rational assumption of the DS and introduce the three levels of involvement of the *LEM*. The second session will examine the properties of **MC** and place it within the following classes of logics: M_1-metacomplete, depth relevant and paraconsistent. The third session will introduce a Fitch-style natural deduction system for **MC** and **QMC** and a Routley-Meyer semantics for **MC**.

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R.T. Brady. *Universal Logic*, CSLI Publs, Stanford, 2006.

3.2.5 Category Theory for Logics
Marcelo E. Coniglio

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Category Theory (CT) is a branch of abstract algebra which is appropriate to formalize and relate different theories in mathematics and computer science. The level of abstraction of CT allows to discover new relationships between different theories, showing that frequently several mathematical constructions are instances of a more general concept. Thus, CT is a powerful tool in conceptualizing and relating formal theories. Applications of CT to Philosophy (in particular, to Formal Ontology) are still incipient, although promissory. From Lawvere's development of the theory of functorial semantics in 1963, CT shows that it is also an important tool in formal logic. Within this framework, a logic theory corresponds to a category, an interpretation is functor, a model is a functor to SET (the category of sets and functions), and a model homomorphism corresponds to a natural transformation. The introduction of the concept of (elementary) topos by Lawvere and Tierney shows that CT has also an important role in Foundations of Mathematics. The concept of topos relates notions from topology, algebraic geometry and set theory, together with intuitionistic logic. A fixed topos can be seen as a given mathematical domain, where it is possible to develop concepts and constructions using its internal logic: (higher-order) intuitionistic type theory. In recent years, CT has also shown to be a useful tool for representation of abstract logics, by defining appropriate categories of languages in which the logics are based. Using the representations, different process of combination of logics such as fibring can also be defined and studied as categorial constructions. In this introductory tutorial we will give the basic notions of CT and we will show several applications to representation of abstract logics. We will start from the basic concepts from CT which permit to define the notion of topos. Finally, we will study applications of CT in the representation of abstract logics, starting with a discussion about how can be defined categories of languages. The fundamental notion of morphism between logics, or translation between logics, will be analyzed in detail.

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Category Theory:

R. Goldblatt. *Topoi: The categorial Analysis of Logic.* North-Holland, 1984 (second edition).

M. La Palme Reyes, G. Reyes and H. Zolfaghari. *Generic figures and their glueings: A constructive approach to functor categories.* Polimetrica, 2004.

S. Mac Lane and I. Moerdjik. *Sheaves in Geometry and Logic.* Springer, 1992.

Applications:

A few papers about categorial fibring from the **FibLog** project .

M.E. Coniglio. Towards a stronger notion of translation between logics. *Manuscrito 28*, no. 2: 231-262, 2005.

3.2.6 Combination of Logics Alexandre Costa-Leite

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Methods for combining logics have a lot of different applications in computer science, linguistics and philosophy. The purpose of this tutorial is to describe some methods for combining logics: fusions, products and fibring. We explain each method from the proof-theoretical and model-theoretical point of view in order to clarify its preservation properties. Some concrete combined systems are presented and some cases of applications are studied.

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D. Gabbay. (1999). *Fibring Logics*. Oxford University Press.

3.2.7 Dynamic Preference Logic
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General description: The notion of preference occurs across many areas, such as philosophy of action, decision theory, optimality theory, and game theory. Individual preferences can be used to predict behavior by rational agents. More abstract notions of preference also occur in conditional logic, non-monotonic logic and belief revision theory, whose semantics order worlds by relative similarity or plausibility. In the tutorial, we will present various languages to express preference. More importantly, preferences are not static, but they change triggered by incoming new information, or just changes in our own evaluation. We will present several approaches to model the dynamics of such changes.

Prerequisite: Basics of Modal Logic.

Introduction - epistemic dynamics: First we will review the basics of epistemic logic, both in its standard and its dynamic versions. A few typical examples will be presented to show the process of information update by exchanging information. The same methodology will be used to deal with preference change.

Betterness based preference change: The notion of preference will be introduced as an unary modality, using a semantic relation of *betterness* in Kripke models. After setting up the static logic, we will analyze what happens to the model when new information comes in, leading to a dynamic logic of preference change.

Constraint-based preference change: Next, we define preference in terms of a constraint sequence, a concept from optimality theory. In case agents only have incomplete information, beliefs are introduced as well. We propose three definitions to describe different procedures agents may follow to get a preference using beliefs. Changes of preference are explored w.r.t their sources: changes of the constraint sequence, and changes in beliefs.

Value-based preference change: Finally, a more quantitative approach will be taken to represent preference, using an evaluation function on worlds. In this richer setting, incoming new information may raise your evaluation value towards some options, but it can also reduce them. A semantics and matching logic will be presented to describe preference change in this manner.

Finally, we will present a comparison of the qualitative and quantitative approaches presented in our lectures, and discuss various translations between them.

The abstract models presented in this tutorial can be applied to many areas beyond preference *per se*. We will discuss a few instances in belief revision (plausibility change), deontic logic (commands and changing obligations), voting theory (preference aggregation), and game theory.

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3.2.8 Epsilon Calculi

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This series of tutorials covers the history of the development of various epsilon calculi, and their applications, starting with the introduction of epsilon terms by Hilbert and Bernays. In particular it describes the Epsilon Substitution Method and the First and Second Epsilon Theorems, the original Epsilon Calculus of Bourbaki, several Intuitionistic Epsilon Calculi, and systems that have been constructed to incorporate epsilon terms in modal, and general intensional structures. Standard semantics for epsilon terms are discussed, with application to Arithmetic, and it is shown how epsilon terms give distinctive theories of descriptions and identity, through providing complete individual terms for individuals, which are rigid across possible worlds. The Epsilon Calculus' problematic thereby extends that of the predicate calculus primarily through its applicability to anaphoric reference, both in extensional and also intensional constructions. There are higher-order applications, as well, some of which resolve paradoxes in contemporary logic through allowing for indeterminacy of reference.

Reading: *Epsilon Calculi* by Hartley Slater, in the *Logic Journal of the IGPL* (Interest Group in Pure Logic), October 2006.

3.2.9 Fuzzy Logics among Substructural Logics
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Fuzzy logic, originally motivated by certain engineering applications [Go68], has in the past decades evolved into a well-developed branch of many-valued logics [Go93, Ha98]. Metamathematical investigations of the wide variety of fuzzy logics have revealed deep connections with substructural logics (incl. general algebraic semantics of residuated lattices and the lack of structural rules for local fuzzy consequence relations). It turns out that fuzzy logics whose local consequence relation captures the transmission of partial truth (i.e., monoidal t-norm logic **MTL** [EG01] and their well-behaved extensions, expansions and fragments) can be characterized as intuitionistic contraction-free substructural logics with the property of prelinearity. A formal delimitation of the subject [BC06] has allowed applying general methods of substructural and many-valued logics [Ra74, Re00, DH01] to the whole class of prelinear (or fuzzy) weakly implicative logics [Ci06]. The general approach allows extending propositional fuzzy logics in a uniform way to their first-order [HC06] and higher-order [BC05] fuzzy logics. The tutorial will present the state of the art in the general metatheory of fuzzy logics and their relationship to larger classes of substructural logics.

The phenomenon of vagueness and fuzziness: sorites, degrees of truth, fuzziness vs. probability, logic of vagueness vs. philosophy of vagueness.

- Traditionally motivated fuzzy logics: t-norms and t-norm based logics (BL, Lukasiewicz, Goedel-Dummett, product, **MTL**, etc.), standard [0,1] semantics, Hilbert-style axiomatization, general semantics of residuated lattices, derived systems of fuzzy logic (SBL, SMTL, IMTL, PiMTL, weakly cancellative logics, hoop logics, fleas, uninorm logic, LPi, logics with truth constants, etc.), metamathematical properties (completeness, local deduction theorem, subdirect decomposition, complexity, etc.).

- Transmission of partial truth: global fuzzy consequence relations, Rasiowa's implicative and Cintula's weakly implicative logics, the role of prelinearity, local fuzzy consequence relations, expansions by propositional connectives, special axioms, structural rules, characterizations of fuzzy logics among substructural logics, relationship to well-known substructural logics (linear, intuitionistic, BCK, etc.), universal methods for the class of fuzzy logics.

- First- and higher-order fuzzy logic: first-order lattice quantifiers, Tarski semantics, metamathematical properties (completeness, incompleteness, complexity, etc.), higher-order fuzzy logic, Henkin-style completeness, theories over fuzzy logics and their specific features, generalized quantifiers, higher-order substructural logics.

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3.2.10 From the Logics of the Book of Changes to the Mathematical Dialectical Logic
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1. The logical types of the logical system of the Book of Changes;
2. The relation of the mathematical dialectical logic and the logics of the Book of Changes;
3. The formalized deductive system DPA++ of the logics of the Book of Changes;
4. The application of the formalized deductive system of the logics of the Book of Changes.

3.2.11 Logics Based on Open-world Assumption - A kind of logics for cognition
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This lecture will analyze the logical characters of open-ended classes, and then introduce our work about the logical systems based on Open-world assumption (OWA).

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3.2.12 Logic Diagrams
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Though the introduction of visual devices in logic is old, such diagrams received relatively little attention from past logicians. Recent works, both in mathematics and philosophy, brought a new interest in visual logic. The aim of this tutorial is to familiarise the participants with the most widely used graphical methods in logic, and to understand their historical evolution and philosophical status. We will introduce essentially the spatial diagrams of Euler, Venn and Peirce. However, we will provide an initiation to some other methods, such as the linear methods (Lambert, Keynes) and the tabular methods (Marquand, Carroll). We will see not only how to conceive these diagrams, and what are their topological and semiotic features, but also how to use them to solve logical problems in the calculus of classes and propositions. More recent methods, essentially intended for the simplification of propositions and logic circuits, such as the Karnaugh map widely used in computer science, will also be explained. We will conclude with a general discussion of the status of these diagrams and the place they deserve in logic, compared to other linguistic representations.

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3.2.13 Logics of Plurality
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The correct logical analysis of plural terms such as *the trees* in *the trees are similar* or *the trees are green* is at the center of an important debate both in formal semantics and in philosophical logic. Two fundamentally distinct approaches can be distinguished, one on which *the trees* refers to a single collective entity, a plurality of trees, and one on which *the trees* refers plurally to the various individual trees. The first tradition is linked to the work of Link and related mereological approaches, the second to the work of Boolos and subsequent work in that tradition (Oliver, Yi, Rayo and others). This course will give an overview over the two kinds of approaches to the logical analysis of plural terms with its various developments and discusses the crucial linguistic empirical and conceptual motivations for the two kinds of approaches.

Session 1:

Reference to a plurality: The mereological approach

This session discusses the motivations and the development of the mereological approach such as that of Link and others. It presents a range of potential empirical and conceptual problems for that approach.

Session 2:

Plural Reference: The second-order approach

This session will discuss the seminal work of Boolos and subsequent developments such as the work of Oliver, Rayo, Yi. It focuses on the formal and conceptual aspects of that approach.

Session 3:

This session discusses potential extensions of the second approach, such as to to mass terms like *courage*, as in *courage is admirable*. It also discusses various ramifications of the plural reference approach and the challenges it faces from the point of view of natural language.

3.2.14 Mutually-inversistic logics–Introduction to mutually-inversistic logic **Xunwei Zhou**

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In Aristotelian logic, "all integers are rationals, all rationals are real numbers, therefore all integers are real numbers" is proved as follows: taking "all integers are rationals" as the minor premise, taking "all rationals are real numbers" as the major premise, using hypothetical syllogism as the inference rule, infers the conclusion "all integers are real numbers". This process is described by

All integers are rationals

All rationals are real numbers

All integers are real numbers

In mutually-inversisitc logic, it is proved as follows: taking $\{P \leq^{-1} Q\} \wedge \{Q \leq^{-1} R\} \leq^{-1} \{P \leq^{-1} R\}$ ($\leq^{-1}$ denotes mutually inverse implication) (hypothetical syllogism) as a logical theorem and as the major premise, taking $\{\text{integer}(x) \leq^{-1} \text{rational}(x)\} \wedge \{\text{rational}(x) \leq^{-1} \text{real\_number}(x)\}$ as the minor premise, using second level hypothetical inference as the inference rule, infers the conclusion $\text{integer}(x) \leq^{-1} \text{real\_number}(x)$. This process is described by

$\{P \leq^{-1} Q\} \wedge \{Q \leq^{-1} R\} \leq^{-1} \{P \leq^{-1} R\}$

$\{\text{integer}(x) \leq^{-1} \text{rational}(x)\} \wedge \{\text{rational}(x) \leq^{-1} \text{real\_number}(x)\}$

$\text{integer}(x)^{-1} \leq \text{real\_number}(x)$

The Aristotelian logic approach is more concise than the mutually-inversistic logic approach. But by the mutually-inversistic logic approach, theorem proving can be made automatic, while by the Aristotelian logic approach, theorem proving cannot.

Second level hypothetical inference has the following applications:

(1) second level resolution principle
(2) second level single quasi-Prolog
(3) bottom-up second level single quasi-expert systems
(4) declarative semantics of second level single quasi-Prolog
(5) second level recursion and second level iteration
(6) second level single quasi-relational database
(7) second level object-relational database
(8) mutually-inversistic planning
(9) second level semantic network
(10) top-down second level single quasi-expert systems
(11) second level information flow
(12) mutually-inversistic multi-agent planning
(13) second level ontology
(14) mutually-inversistic program verification
(15) automatic derivation of functional dependency of relational database
(16) mutually-inversistic operational semantics
(17) mutually-inversistic parser

3.2.15 Modal Operators
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Modal operator epistemology is a model of inquiry obtained by mixing alethic, tense and epistemic logics with a few concepts drawn from formal learning theory. It was developed to study in the acquisition and subsequent validity of limiting convergent knowledge [Hendricks 2001] and elsewhere.The term *modal operator epistemology* is derived from the idea that it takes multiple modal operators to model inquiry in a pertinent way. Because it is an agent or his method that eventually acquires knowledge modelling the active acquisition of knowledge involves epistemic logic; because knowledge is acquired over time, temporal logic is required; and because knowledge is forced over a set of relevant alternatives, alethic modalities are needed. This tutorial provides an overview of modal operator theory and discusses it's pertinence for handling classical issues in mainstream and formal epistemology alike.

Lecture Notes

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3.2.16 Orient Logic and Phase Theory
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1. Many deeper Discussions on the Concept of Universal Logic What is one? What is true? What is existence? What is "being"? What is measurement? What is route? What is history? and How to divide one? All of such basic concepts connect together closely. The more we think about these questions, the deeper that we can understand the essence of universal logic and the universe. I should give out an open question: the explanation of The Uncertainty Principle in physics now in new universal view.

2. Three layers of Universal logic and their connection with Orient logics I think there are three layers in the concept of universal logic. The first is the actual achievement of Universal logic, the second is the method of Universal logic and the third is the spirit of Universal logic. Universal logic is consistent with Orient logic on the third layer, they have the same aspiration. Such communication can help the absorption and transfer between west and east, the two thought systems.

3. Zhong Guan theory and Orient Logic Zhong Guan is an important sutra in Buddhism. This time I will focus on this theory as the representation of Orient Logic. There are exist, no exist, exist and non-exist, no exist and no non-exist four aspects in a thing. Such four aspects and the attitude to things are soul of this sutra. I am trying to formalize it. This will make breakthrough and integrity with traditional logics of two values. This should connect with the thought of Newton da Costa, the paraconsistent Logic where A and not A can be true together.

4. Phase Theory and the Essence of Language I have put out Phase Theory in the First Universal Logic Congress'05. I have finished the foundation of this theory. As an application, according to the phase concept and new definition of logic, I have given out the essence of language. It is a processing of expressing phases, the change of phases and new emergent phases.

In this tutorial we can talk about these approach above.

3.2.17 Principles of Universal Logics

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In this lecture, we will introduce the research compendium of universal logics and the basic principles and methods of standard propositional universal logics, which extends the research foundation of mathematical logic, and provide an uniform research platform for various non-standard logics.

1. The Research Compendium of Universal Logics

In the medium and late 20th century, many new requirements to mathematical logic had accelerated the flourishing growth of non-standard logics. Essentially, various arising and growing non-standard logics are trying to discuss the approaches and methods of dialectic logics' mathematization from different sides and levels. A primary research task of universal logics is to study the principles and approaches of flexible mathematical logics from a uniform view.

Any logic system should consist of 4 respectively associated and independent components (domains, connectives, quantifiers and patterns of reasoning); each part has its own varying rules which generate the syntax rules of logics. The particular logic will be generated as interpreting these syntax rules with particular semantic. That is to say, a logic generator can be constructed, with which a variety of idiographic logics can be generated, just like various different types of organism can be constructed with different DNA molecules in nature. All of the logic factors of rigid logic are fixed, the flexibility of mathematical logic means that flexible parameters and corresponding modification mechanism can be added into these logic elements. These framework flexible parameters and corresponding modification mechanism can be found and refined in the various Non-standard logics.

2. Influence of Relational Flexibility on Fuzzy Logic Operation Models

2.1 Local Judgment in Feature Space

2.2 Influence of Generalized Correlativity on Fuzzy Logic Operation Models

2.3 Influence of Generalized Self-correlativity on Fuzzy Logic Operation Models

3. Various Generation Rules of Universal Logics Operation Models

3.1 Rules of Generation Bases

3.2 Rules of Generation Generators

3.3 Extended-ordered Rules

3.4 Transformation Rules of Base Space

4. N-, T- and S-Generator Integrity Clusters

4.1 0-level T-Generator Integrity Cluster

4.2 N-Generator Integrity Cluster

4.3 1-level T-Generator Integrity Cluster

5 Various Operation Models of Universal Propositional Connective and their Properties
5.1 Universal NOT Propositional Connectives
5.2 Universal AND Propositional Connectives
5.3 Universal OR Propositional Connectives
5.4 Universal IMPLICATION Propositional Connectives
5.5 Universal EQUIVALENCE Propositional Connectives
5.6 Universal AVERAGE Propositional Connectives
5.7 Universal COMBINATION Propositional Connectives
6 Threshold of Quantifier and its Properties
7 Standard Universal Propositional Logics System and its Application
7.1 Formulas of Universal NOT Propositional Connective
7.2 Identically True IMPLICATION Formulas (Except h=0 and k=1)
7.3 Identically True EQUIVALENCE Formulas (Except h=0 and k=1)
7.4 Deductive Reasoning Rules of Propositional Universal Logics
7.5 Application and Implementation

3.2.18 Proof-Theoretic Semantics
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Proof-Theoretic Semantics (PTS) is an alternative of model-theoretic (or truth-condition) semantics. It is based on the idea that the central notion in terms of which meanings are assigned to expressions is that of proof rather than truth. In this sense PTS is inferential rather than denotational in spirit. Although the claim that meaning is use has been quite prominent in philosophy for more than half a century, the model-theoretic approach has always dominated formal semantics. This is, as I see it, due to the fact that for denotational semantics very sophisticated formal theories are available, going back to Tarski's definition of truth, whereas "meaning is use" has often been just a slogan without much formal underpinning. However, within general proof theory several formal approaches to PTS have been developed which promise to provide a 'real' alternative to the model-theoretic approach. They are all based on ideas Gentzen-style proof-theory, which are then turned into logico-philosophical principles. This tutorial provides in its first part, after some remarks on the historical background (Frege, Hertz, Gentzen, Lorenzen), the basic results of theories of weak and strong normalization (Prawitz, Tait, Martin-L, Girard) which are the basic technical tools of PTS. In its second part it develops and discusses the Dummett-Prawitz approach to PTS and their definition of proof-theoretic validity. It discusses various options of how to define the validity of proofs and relates them to corresponding notions of logical consequence. It puts particular emphasis on the "universal" aspects of these ideas, dealing with general proof structures and arbitrary proof reduction systems as models with respect to which validity is defined.

The third part is devoted to definitional and clausal approaches to PTS, partly developed by the instructor himself jointly with Lars Halln (Gothenburg). This approach puts the validity of rules and inference steps (rather than that ofwhole proofs) first. As compared with the Dummett-Prawitz approach, it is local rather than global, thus not requiring global properties of proofs like normalization or cut elimination to hold in every possible case. Technically it implies a shift from natural deduction to the sequent calculus as the basic model of reasoning. This allows in particular a more general way of dealing with assumptions and negation, including their substructural features. This approach is is not restricted to logical constants but uses clausal definitions in a universal sense as the basis of reasoning, which means that it goes far beyond logic in the narrower sense. Interesting applications are theories of equality, circular reasoning, universal theories of denial and negation, and extensions logic programming. Whether cut is eliminable in the various theories discussed is always an interesting problem, though not crucial for the approach to be meaningful.

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3.2.19 Quantitative Logic

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This talk will deal with the elementary theory of quantitative logic, which is divided into the following parts and sub-parts.

1. Introduction

In this section we will give a brief introduction to the origin of quantitative logic, and will discuss some relationships between quantitative logic, possibility logic, and computational logic.

2. Propositional logic and its completeness

3. Several standard complete propositional logics:

Classical propositional logic, Lukasiewicz prepositional fuzzy logic and its n-valued extension, and R_0 propositional fuzzy logic and its n-valued extension.

4. Elementary theory of quantitative logic

4.1. Satisfiability degree of a logic formula

4.1.1 . Satisfiability degree of a formula in n-valued propositional logic

4.1.2 . Satisfiability degree of a formula in continuous-valued propositional logic

4.2. Similarity degree of formulae

4.3. Logic metric space

4.4. Approximate reasoning

4.4.1 . Deduction theorem in the above-mentioned logics

4.4.2 . Divergence degree of a formal theory

4.4.3 . Approximate reasoning

4.5.Consistency degree of a formal theory

4.5.1 . Basic ideas

4.5.2 . Consistency degree of a finite theory

4.5.3 . Consistency degree of a general theory

4.5.4 . The concept of consistency degree is a reasonable candidate for measuring

5. Results in quantitative predicate logic

3.2.20 Spacetime, blackholes: a logic approach
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Sometimes the latest scientific breakthroughs are difficult to understand for the nonspecialist. An example is presented by the latest headlines involving black holes, timewarps and the new high precision cosmology. We will show how logic can be used to make these theories accessible via assuming a modest familiarity with logic. As Robin Hirsch wrote, throughout its history, logic benefited from those applications which were called upon by science being in upheaval (trouble, confusion, revolution). We will show how relativity theory (hence spacetime) can be built up from simple easy-to-understand building blocks via logic. No familiarity with physics is presupposed. We will also provide a logical analysis of the mentioned theories (e.g spacetime) showing which assumptions are needed for what conclusions. Flexibility of the so obtained theories will be pursued.

3.2.21 Structuralist Logic
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The first meeting will be devoted to an elementary introduction to the structuralist conception of logic that has its historical roots in the work of P. Hertz and G. Gentzen. We shall develop the notion of an implication relation that generalizes the notion of implication and the corresponding notion of an implication structure will become the central concept of logical structuralism. Given this generality we will show how to define the logical operators for arbitrary implication structures. We shall explore both the extent and the particular features of the variety of implication relations and the variety of those logical systems that these implication structures provide. The second meeting will define the concept of truth-value assignments to the members of arbitrary implication structures, even when sometimes those members may not have truth-values. We shall prove some completeness theorems which justify the idea that these are genuine truth-value assignments, and we shall explore the problem of determining when the logical operators are extensional and when extensionality fails. We shall also introduce the notion of a modal operator on an implication structure using two simple conditions on implication relations, and prove certain results that show when such modals exist on a structure, and when they do not. It will also be shown that all modal operators thus defined, are non-extensional. In the third meeting we shall show how the structuralist approach enables one to define an accessibility relation between Tarskian theories of an implication structure and obtain all the Kripkean systematizations of familiar modal systems without the use of possible world semantics. Finally given the variety of logical structures that structuralism generates, we shall consider how one should understand this pluralism and how one should respond to those views which maintain that there is only one correct logic that cannot be revised.

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3.2.22 The Paraconsistent thought in Ancient China

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There was extremely rich thought of paraconsistent in ancient China. Priest and Lu Telie believed, Eastern philosophy has generally been more tolerant of inconsistency, more amenable to paraconsistent approaches than Western (Priest G., Routley R., Norman J., Paraconsistent Logic: Essays on the Inconsistent. Munich: Philosophia Verlag,1989,p5.) However, the paraconsistent thought in ancient China is not through a set of theses that can be simply pointed to as evidence of paraconsistent approaches, but in the way contradictions are tolerated and used to illustrate points. For instance, the Laotse's Tao contains the definite elements of paraconsistency. The book Laotse contains massive paradox propositions. Laotse Said, "Do nothing and everything is done". But a theory may contain paradoxes, or apparent contradiction, without necessarily containing any unresolved or apparent contradictions. For example, Meinong's object theory just contains obvious paradox, that is to say,"There are things of which it is true that there are no such things". However there are at least consistent subtheories of the theory of object, that is to say, Meinong's object theory is not the theory of without any meaning. It is obvious to the Taoists , the law of Non-contradiction was constantly being flaunted. In fact, Mohists, Sophisms and the "School of Forms and Names" have some claim to be accounted early paraconsistents. Hence the extraordinary influence of the traces of dialectical or dynamic logic in the ancient Chinese thinkers. For instance, Hui Shih who was known as the "Dialecticians" or the "School of Forms and Names" , Realized the contradictory nature of the world and the universe to a certain extent. The book "Chunang-TzuThe world" said, "Hui Shih knows all kinds of things, his works can load five big vehicles". Although the many works of Hui Shi have been lost, some of the paradoxes he propounded have been recorded in the Chunang-Tsu. In the book, the sixth paradox there presented is "The South has no limit and has a limit", which has the apparent form p and nonp.

It is most noteworthy that there was a philosopher named Deng Xi of ancient China BC 6. He is the thought founder of the "School of Forms and Names" at pre-Qin dynasty, "The theory of which both will do" is Deng Xi's important theory content. It is said that, Deng Xi was an extremely famous "attorney" at that time. When others asked him to help to bring a lawsuit, He received money. A lawsuit story said, a wealthy person was drown to death in Zheng country at that time, but the Dead's corpse was obtained by other people. The rich person wanted to redeem this corpse, but the man who obtained the corpse asked a price too high. Thus, the rich person entreated Deng Xi. Deng Xi said to him that, "You need not worry, he cannot sell to others." The man who obtained the corpse very worried after he knew this, so, he also entreated Deng Xi. Deng Xi also said to him that, "You need not worry, because he can not buy the corpse at other place."

Deng Xi had simultaneously approved three pairs of mutually contradiction proposition here: the rich person should buy the corpse but also to be possible not to buy, both buy and not buy will do; The man who obtained the corpse should sell out the corpse but also to be possible not to sell, both sell and not sell will do; Not only say that one should buy and the other have to sell, but also say that one may not buy and the other to be possible not to sell, as soon as buy and sell with as soon as not buy or not sell. With the symbolic representation. Deng Xi proposes "The theory of which both will do" here, Simultaneously approves the two mutual deny proposition, but does not therefore approves all propositions. The main cause that Deng Xi's thought in the history was usually accused as "sophistry" is that the denunciators look at any question through standing in the consistent standpoint. But, if we can stand in the standpoint of paraconsistent logic, Deng Xi has had the paraconsistent manner to the thing situation.At the last years of the Chinese Eastern Han Dynasty, a scholar whose name was Si Mahui, both his morals and literature tutelagey are ver good. At that time, Jing Zhou's ruler -Liu Biao's heart was narrow. Because feared that Liu Biao harmed him, Si Mahui all uses to express answer "well" no matter who say something to him. Once, somebody's son died and told him, Si Mahui also said that, "Very good!" So, Si Mahui's wife really could not bear and blamed him to say that, "Others think you are a good person, therefore tell you, how had hears others to die the son, instead applauds!" Si Mahui didn't not argue, He said to his wife that, "What you said extremely are also good!" Therefore, people gave Si Mahui a very appropriate nickname called "good guy" for him according to this custom.

Certainly, we say today that somebody is "good guy", which obviously is a derogatory term, refers the man who stays on good terms with everyone, does not have any struggle with other, fails to consider right or wrong, only strives for to live in peace with each other. Other's son has died, obviously is "not good", but Si Ma hui said actually "very well". Isn't this short of the morals? But, Si Mahui actually is a good man. Isn't this contradictory? Therefore, when his wife criticized him, Si Mahui also said that his wife's criticism was "well extremely", that is to say, what Si Mahui said "very good" is not good. Why Si Mahui said like this, he had his goal which reflected his different manner at that time dealing with these issues. Because Si Mahui did not think all things were good, or right. Therefore, we can also say what Si Mahui adopted at that time is actually one kind of paraconsistent manners. But the underlying logic of this kind of paraconsistent manners is the paraconsistent logic.

The Sophisms of ancint China once proposed many theses that were accused as "sophistry", like "The fire is not hot", "The eyes can not see", "The gauge can not draw circle", "A chicken has three feet", "Every cattle and sheep has five feet", "Series can be solvable", "A turtle is longer than a snake", and so on. From the standpoint of paraconsistent logic, these theses are all extremely natural.

3.2.23 Translations between Logics
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The method of studying inter-relations between logical systems by the analysis of translations between them was originally introduced by Kolmogoroff, in 1925. The first known translations' involving classical logic, intuitionistic logic and modal logic were presented by Kolmogoroff, Glivenko in 1929, Lewis and Langford in 1932, Gödel in two papers of 1933, and Gentzen in 1933. Kolmogoroff, Gentzen and one of Gödel's papers were developed mainly in order to show relative consistency of the classical logic with respect to the intuitionistic one. Meanwhile, in spite of these papers dealing with inter-relations between the studied systems, they are not interested in the meaning of the term translation between logics. Several terms are used by the authors, such as translations, interpretations, transformations among others. Since then, translations between logics have been used to different purposes. Prawitz and Malmnäs (1968) is the first paper in which a general definition for the concept of translation between logical systems is introduced. Wójcicki (1988) and Epstein (1990) are the first works with a general systematic study on translations between logics, both studying inter-relations between propositional calculi in terms of translations. Da Silva, D'Ottaviano and Sette (1999) propose a more general definition for the concepts of logic and of translation between logics, in order to single out what seems to be in fact the essential feature of a logical translation, that is, the preservation of consequence relation. In this paper, logics are characterized, in a very general sense, as pairs constituted by a set and a consequence operator, and translations between logics as consequence relation preserving maps. In this Tutorial, we will begin by a historical survey of the use of translations for the study of inter-relations between logical systems, and will discuss and compare the different approaches to the use of the term translation'. We will present an initial segment of a theory of translations and will also investigate some connections between translations involving logics and uniformly continuous functions between spaces of their theories. We also intend to analyse the stronger notion of translation between logics introduced in Coniglio (2005). We will study an important subclass of translations that preserve and conserve consequence relations, the conservative translations, introduced and investigated in Feitosa (1997) and in Feitosa and D'Ottaviano (2001). We will prove that the class constituted by logics and conservative translations determines a co-complete subcategory of the bi-complete category whose objects are the logics and whose morphisms are the translations between them. We will present some conservative translations involving classical logic, intuitionistic logics, modal logics, the many-valued logics of Lukasiewicz and Post and several known paraconsistent logics (see D'Ottaviano and Feitosa 1999, D'Ottaviano and Feitosa 2000). Based on Scheer and D'Ottaviano (2006), we will also initiate the study of a theory of conservative translations involving cumulative non-monotonic logics. By dealing with the Lindenbaum-Tarski algebraic structures associated to the logics, we will study the problem, several times mentioned in the literature, of the existence of conservative translations from intuitionistic logic and from Lukasiewicz infinite-valued logic into classical logic (see Cignoli, D'Ottaviano and Mundici 2000). Finally, based on the concept of conservative translation, we will investigate a possible general definition for the concept of duality between logics, and will discuss the concepts of combining and fibring logics.

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3.2.24 Universal Theory of Negation
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What is the very meaning of negation, if any? Or, to put it in other terms: how to mean negation? Is there non-revisable properties of negation that any logical system should share? To understand negation as a logical constant leads one to a broader philosophical question, that is: don't some minimal properties inhere to every logical constant that go beyond their definition within a closed formal system? Just as Hilbert said that geometrical notions don't have any fix meaning outside the axiom system in which they are defined, from a formalist view any logical constant is an empty or meaningless symbol outside the closed system in which it can be defined. Beyond such a formalist view of logic, we'll consider the notions of form and content through an overview of distinctive sorts of negations. These can be divided into two main sorts of negation for A, such that non-A can express among others:

1. Classical negation (in symbols: A), consistent and complete

2. Non-classical negation, as:

a. Intuitionistic negation (in symbols: A), consistent and paracomplete

b. Paraconsistent negation (in symbols:*A, paraconsistent and complete

3. Variants: relevant negation, illocutionary negation, fuzzy negation, and so on.

How are these three negations negations?

The tutorial will be developed in three steps:

A. Negation in history (Antics, Middle Age and Modern aspects)

B. Negation in context (logic, mathematics, natural languages, religions)

C. Negation and Dichotomy

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4 Second World Congress on Universal Logic

4.1 Aim of the Congress

This is the second edition of a congress dedicated to universal logic. Many conferences are organized on specific techniques (combination of logics, labelled deductive systems, tableaux, etc.) or on some specific classes of logics (non-monotonic logics, many-valued logics, paraconsistent logics, etc.). The idea of this event is to put together these various activities in order to promote interaction and to provide access of these different fields to the non specialist.

- The essence and universal features of logic will be discussed. Research on the ways of unifying all the existing and possible logics will be carried on. The exchange of the logic thought between the west and the east is considered as fundamental to deepen the understanding and development of universal logic. This congress will take place just after the *International Congress of Logic, Methodology and Philosophy of Science* which will happen in Beijing from August 9 to August 15. This is the 13th in a series of big meetings known as LMPS originated by Alfred Tarski in 1960, and the first time that it is organized in East Asia, a symbol also in the development of a logical connection between the East and the West.
- This event is intended to be a major event in logic, providing a platform for future research guidelines. Such an event is of interest for all people dealing with logic in one way or another: pure logicians, mathematicians, computer scientists, AI researchers, linguists, psychologists, philosophers, etc.

4.2 Call for Papers

The deadline to submit a paper (2 pages abstract) to the congress is March 15th, 2007 (Notification: April 15th, 2007). Participants of the School are also strongly encouraged to submit a paper (send to: alexandre.costa-leite@unine.ch). All papers dealing with general aspects of logic are welcome, in particular those falling into the following categories:

Scope of validity / domain of application of fundamental theorems
Interpolation (Craig)
Definability (Beth)

Deduction
Compactness
Completeness
Cut-elimination
Incompleteness
Undecidability
Lindenbaum extension

General tools and techniques for logics
Theory of the consequence operator
Abstract logic
Multiple-conclusion logic
Labelled deductive systems
Kripke structures
Many-valued matrices
Tableaux
Game semantics
Category theory
Universal algebra
Combination of logic
Bivaluations

Study of some classes of logics
Non monotonic logics
Modal logics
Substructural logics
Paraconsistent and paracomplete logics
Linear logics
Relevant logics
Abstract model theory
Fuzzy logics

History and Philosophy
Principles, axioms, laws of logic
Leibniz and logic as lingua universalis
Pluralism in logic
Square of oppositions
Truth and fallacies

Dialectic
Taoism
Buddhist logic

4.3 Invited Speakers

4.3.1 Lirong Ai, Huacan He, Pengtao Jia, Wei Lin A Preliminary Study on the logic essentials of evolutionary algorithms

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Computational intelligence is a flourishing research field in recent years, which consists of many research branches such as evolutionary computing, neural computing, fuzzy computing, artificial life, immunity computing, etc. Nowadays, these research directions only simulate a certain nature or life phenomenon to imitate intelligence separately from their own point of view, and each does things in their own way. In various model evolution of computational computing, does it exist the common formal rules? and if it does exist, does it implies evolutionary logic rules? In 1988, inspired by genetic algorithms, A.W.Burks proposed an evolutionary logic system to display the dynamic way of knowledge evolution. The most important characteristic of evolutionary logic is that, it divert the logic emphasis from argumentation to development trends, so that it may reflect the dynamic prospect of knowledge increase. This paper tries to study the essentials and its logic principles of evolutionary computing, so as to establish a ground base for the study of logic principles of computational intelligence in a uniform viewpoint and from a higher level. Among various computing models of computational intelligence, speaking in its natural form, some models are very close to algorithm languages, some are very close to automata, some are close to logic. We know that algorithm, automata and logic are equivalence, computational intelligence imitate intelligence by simulating natural or life phenomena, the essential of these phenomena is a continuously changing course with dynamic evolution, which is very suitable to be described uniformly by universal logics[1], since the characteristic of our universal logics is its continuously adjustability.

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4.3.2 Jean-Yves Béziau
Universal Logic and Modern Logic

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In this talk I will discuss the main lines of research of universal logic and discuss its connection with the history and development of modern logic, that can be divided in three periods: the first dominated by questions related to the foundations of mathematics, the second when many different systems of logic were constructed in connection with artificial intelligence, linguistics, information theory, natural reasoning, etc., and the third period when people started to develop general frameworks and tools for the study of this huge variety of logic systems.

I will explain the basic ideas beyond universal logic. I will emphasize that it is a general theory of logics in the same way that universal algebra is a general theory of algebras and that universal logic is not a particular system of logic, applying to all situations. I will show that in fact it is impossible to develop such kind of universal system. I will argue that the relation between universal logic and the different logic systems can be understood in a way similar to what happens in linguistics. Linguistics is not a specific and universal language, but the study of how languages work and what a language is.

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4.3.3 Walter Carnielli
Many Valued Logic in Algebraic Form: Roots of Universal logic in the Legacy of Boole and Leibniz

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It is well-known that Gottfried Willhem Leibniz admitted equations with no explicit (usual) arithmetical contents such as x+ x = x, and even referred to *blind thinking* as pure reasoning reduced to arithmetical calculation; he also proposed a method to assign numbers to concepts in such a way as to obtain a complete representation for Aristotelian syllogistic. Similar ideas were independently pursued by George Boole, with the available tools of his time for probability and differential calculus.

I discuss here how proof-theory and semantics for several non-classical logics, specially many-valued logics, can be approached from an elementary algebraic perspective by means of polynomial series over appropriate fields. I which to show how this form of representation, which I have dubbed "polynomizing" elsewhere, can be seen as a holistic tool for Universal Logic and lead to the recovering of some of the above-mentioned ideas with roots in Leibniz and Boole, in this way contributing as a unifying perspective to integrate logic, algebra and the differential calculus.

4.3.4 Petr Cintula / Petr Hajek
First-Order Fuzzy Logics: Recent Developments

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In the last few decades many formal systems of (symbolic, mathematical) fuzzy logics have been developed in the style of the monograph [4]. Since the main differences between fuzzy and classical logics lie at the propositional level, first-order fuzzy logics have developed more slowly (compared to the propositional ones). In this text we have two goals: first, promote interest in fuzzy predicate logics, second, present our results in a general way, dealing with broad classes of logics rather than with particular logics.

After short survey of basic dentition and theorems we present recent results (this will be based on a survey paper [8]), mainly dealing with: * Conservative expansions of theories and their model-theoretic characterizations, [7] * (Finite) strong completeness w.r.t. special classes of algebras, its algebraic characterization, and/or its constructive disproving (in some cases), [1] * Game-theoretic semantics, [3] * First-order variants of some fragments of propositional fuzzy logics, [2] * Witnessed models (i.e., models where, for each quantized formula, its value is actually achieved in some element) [7, 5] * New results in arithmetical hierarchy (in particular in witnessed models, and fragments) [5, 6]

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4.3.5 Razvan Diaconescu
Institution theory and Buddhist thinking

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The theory of *institutions* [1] is a categorical universal model theory, which originates from mathematical studies of software specification, and which formalises the intuitive notion of logical system, including syntax, semantics, and the satisfaction between them.It provides the most complete form of abstract model theory, free of commitementto any particular logic. Since it fulfills the ideals of universal logic, institution theoretic abstract model theory [2] can be regarded as a form of 'universal model theory'. The institution theoretic view on logic and model theory is strongly related to the Shunyata doctrine of Mahayana Buddhism, in this case applied to the logic phenomena.

In this talk we give an overview of institution theoretic universal model theory and explain its relationship to the doctrine of Shunyata.

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4.3.6 Valentin Goranko
Power and Filter Extensions of Structures: Universal-Algebraic and Logical Aspects

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The functions and relations of a structure of any (finitary) signature can be uniformly uplifted respectively to the sets of subsets, filters, and ultrafilters over its universe, thus leading to the universal constructions of power-structures, filter, and ultrafilter extensions of structures. The fundamental universal-algebraic concepts of substructures, morphisms, congruences, and products are then naturally uplifted from structures to their respective extensions. Furthermore, the first-order theories of the latter interpret suitable fragments of the second-order theories of the underlying stuctures.

In this talk I will present some general results on these extensions and will discuss the universal-algebraic and logical aspects of their relationships between each other and with the underlying stuctures, as well as some applications.

4.3.7 Huacan He Dialectical Contradictions and Universal Logics –The Spectrum Phenomenon in Flexible Logic

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1. Universal Logics is the key fundamental theory of various information processing Chemistry describes the basic laws of material structure changing and chemical combination, it is a key fundamental theory of material (and chemical industry) science; Physics describes the basic laws that the material motion and energy changing, it is the key fundamental theory of the energy (and motion) science; Universal Logics describes the basic laws of information processing and intelligence, it is a key fundamental theory of the intelligence (and information processing) science; Universal Logics study the essence and universal law of logics; The unification of logic is a general direction of present logics development; There are two basic research ways in Universal Logics: method of abstract algebra - to ask intersection of axiom set of logics; method of function union -to ask union of operation model of logics; There are two basic components in Universal Logics: Rigid logic and flexible logic; Rigid logic has been an intact theoretical system, which repelled all sorts of contradictions and uncertainties among them; The basic research method of Universal Logics is to relax the condition of restraining progressively on the basis of rigid logic, to unionize some dialectical contradictions. The 1 2 3 4 of studying on Universal Logics

2. The theoretical system of standard flexible propositional logic With the example of standard flexible propositional Logic we will see the way in Universal Logics to deal with various contradictions. The base model of logic operations of flexible propositional Logic—-deal with the true-false contradiction; The 0-level model of logic operations of flexible propositional Logic–deal with the true-false contradiction and enemy-friend contradiction; The 0-level model of logic operations of flexible propositional Logic–deal with the true-false contradiction and enemy-friend contradiction and wide-tight contradiction;

3. some new knowledge to the logics law It is a one-sided view in traditional view point that there is no contradiction existing in mathematics and

logic. Contradictions is existing objectively and the power of thing's changing and variation. Contradictions have types of dialectic contradictions and logical contradictions. Formal system should be able to contain dialectic contractions and exclude logical contradictions. Logical contradiction also has its positive significance in formal system. Logic can forgive dialectical contradiction while getting rid of logic contradiction The uncertainty with external things is the reflection of its inherent contradiction Studying uncertain reasoning in flexible logic, there is phenomenon of tables in flexible logic Logic and weak logic

4.3.8 Wilfrid Hodges
The mathematical core of Tarski's truth definition

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Tarski's truth definition is a special case of a simpler and more general result stating that any language with a well-behaved syntax and an assignment of truth values to sentences has a truth definition of the same broad form as Tarski's. We state this more general result precisely, and we show how Tarski's truth definition illustrates it. The viewpoint needed for this general result became available only in the second half of the last century, though with hindsight one can see how Tarski's work (and related earlier work of Husserl and Frege) helped to create this viewpoint.

4.3.9 Zuoquan Lin
Bi-default Logic

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The bi-default logic was proposed as the extended default logic for handling inconsistent and conflicting situations in which the existence of extensions of a default theory is guaranteed. That is by the bi-default theory, the set of facts of a default theory can be inconsistent without leading to triviality of the extension; and the set of defaults of a default theory can be conflicting without leading to none of the extension. To do so, two transformations of formulas, positive transformation and negative transformation respectively, are introduced to split two accounts of the truths of every formula. Semantically, the bi-default logic

can be defined by the four valued interpretations. Most likely, the bi-default theory inherits from the consequence of classical two valued logic and contains the default theory as special case in consistent and coherent situations. By the way, the bi-default theory can be applied to improve the reasoning ability of paraconsistent four valued logic

4.3.10 Istvan Nemeti and Ildikó Sain
What is logic? Why and how?

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We claim that while logic includes the study of the various logics (logical systems), it includes more. Logic is the backbone of rationality underlying our sciences. E.g it includes theory formation, the methodology for putting theories together. A particular example is definability theory extended to many-sorted logic and definability of new sorts (new universes). Starting from this perspective, we zoom on the definition of logics with semantics (like first-order logic with its model theoretic semantics), the general theory of such logics (universal logic), algebraic methods for analyzing such logics, e.g Tarskian algebraic logic and its new renaissance via some new metamorphosis. We will also reflect on some connections with new revolutions in science, e.g spacetime theory, black holes and cosmology.

4.3.11 Francesco Paoli
Substructural logics vs classical logic

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In this talk, we argue that the fine-grained analysis of propositional connexion which characterises substructural logics, as opposed to classical logic, is a reason for considering such logics as plausible candidates for the formal investigation of vast fragments of ordinary discourse, not just as smooth logics (Aberdein and Read, 200+) of merely technical interest.

1) Are substructural logics alternative to classical logic? A criterion of genuine rivalry between logics presented by means of sequent calculi - is suggested

according to which Quine's meaning variance attack can be defused at least as regards the substructural logic LL (roughly corresponding to linear logic without exponentials and without additive constants). In a nutshell, genuine rivalry between propositional logics having the same similarity type is possible whenever corresponding connectives share the same operational rules in the respective calculi, yet the presence of different structural rules yields different sets of provable sequents and thus permits a disagreement across logics (Paoli, 2003).

2) Are substructural logics philosophically useful? The distinction between lattice and group connectives, typical of substructural logics, suggests plausible solutions to well-known philosophical puzzles such as McGee's paradox or the lottery paradox (Paoli, 2005).

3) Can we use substructural logics to model implication? An argument can be advanced to the effect that the substructural logic LL is the most promising logic of relevant implication. In particular, we contend that a plausible logic of relevant implication should lack both contraction and lattice distribution (Paoli, 200+).

4) Can we use substructural logics to model defeasible conditionals? We introduce and motivate a conditional logic based on the logic LL. Its hallmark is the presence of three logical levels (each one of which contains its own conditional connective), linked to one another by means of appropriate distribution principles. Such a theory affords a solution to a long-standing open problem in conditional logic: in fact, we retain suitable versions of both Substitution of Provable Equivalents and Simplification of Disjunctive Antecedents, while still keeping out such debatable principles as Transitivity, Monotonicity, and Contraposition.

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4.3.12 Zhongzhi Shi
Dynamic description logic

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In this presentation dynamic description logic (DDL) is discussed, which integrates the action formalism with the description logic system effectively. In DDL actions are specified by the formulas of description logic, and these actions could be used iteratively on the formation of concepts and formulas of the description logic system. Therefore, DDL owns much stronger description ability in that it can not only represent the ordinary static knowledge, as same as what the traditional description logic systems do, but also can represent the knowledge with dynamic meaning, e.g., the individuals contained in a concept could changed according to certain action. Furthermore, based on the knowledge, DDL can also specify actions formally. In addition, the DDL provides decidable reasoning services, not only for the reasoning problems related to a description logic system, but also for these related to action formalism. Two classes of applications for the DDL are discussed. One is about the semantic Web and semantic Web service, in which DDL can be used on the ontology description, used for the specification and composition of semantic Web services. The other is about the agent computing, in which DDL can be used for the description of cognitive model and reasoning in multi-agent collaborative environment.

4.3.13 Heinrich Wansing* and Yaroslav Shramko**
Harmonious many-valued propositional logics

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In many-valued logic, sometimes a distinction is made not only between designated and undesignated (not designated) truth values, but between designated, undesignated, and antidesignated truth values. But even if the set of truth values is, in fact, tri-partitioned, usually only a single semantic consequence relation is defined that preserves the possession of a designated value from the premises to the conclusions of an inference. We shall argue that if the set of anti-designated values does not constitute the complement of the set of designated values, it is natural to define two entailment relations, a positive one that preserves possessing a designated value from the premises to the conclusions of an inference, and a negative one that preserves possessing an antidesignated value from the conclusions to the premises. Once this distinction has been drawn, it is quite natural to reflect it in the logical object language and to contemplate many-valued logics whose language is split into a positive and a matching negative logical vocabulary. If the positive and the negative entailment relations do not coincide, the interpretations of matching pairs of connectives are distinct, and nevertheless the positive entailment relation restricted to the positive vocabulary is isomorphic to the negative entailment relation restricted to the negative vocabulary, then such a many-valued logic is called harmonious. We shall present examples of harmonious finitely-valued logics. These examples are not ad hoc, but emerge naturally in the context of generalizing Nuel Belnap's ideas on how a single computer should think to how interconnected computers should reason.

4.3.14 Jan Woleński
What is Universality of Logic?

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One can distinguish the following understandings of universality of logic:

(a) logic is universal, because it is universally applicable;

(b) logic is universal, because it is topic-neutral;

(c) logic is universal, because its principles are universally valid;

(d) logic is universal, because it provides abstract languages for studying various structures.

The paper shows that (a) (b) are equivalent and different from (d). In particular, it is impossible to reconcile all meanings of the phrase *logic is universal*. First-order logic is universal in the sense of (a) (c), but not in the sense of (d). All distinguished understandings of universality of logic can be presented by exact metalogical tools.

4.3.15 Stan Surma
From Standard to Nonstandard Metalogics

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This paper is, essentially, a progress report on work involving conceptualisations of metalogic and metamathematics, alternative to the standard proof-theoretic or model-theoretic conceptualisation. Apparently, the best known abstract setting for the latter is A. Tarski's consequence theory later re-named as a closure operator theory. In what follows we deal with closure operators (hereafter symbolized as Cn), closure systems (Th), consistency properties (Cons), extension or Lindenbaum operators (Ln), systems of maximal sets (Max) and omission or separation operators (Sep). For ease of use let X, Y be members of the set $\{Cn, Th, Cons, Ln, Max, Sep\}$. To start, we develop a bit of a general X-based metalogic where no reference to any specific logical constant is necessary. At this stage the object-language is treated just as a non-empty set of completely unstructured sentences. Logical constants are specified at the next stage where we need to formally identify which sentences are made up of which simpler sentences. We begin by specifying a sentential connective ♯, a 0-order logical constant. Using the method of slightly modified Galois connections we prove that (X, ♯)-based metalogic is equivalent to (Y, ♯)-based metalogic. Next we show how (X,♯)-based metalogic can be used to generate logic Lgc(X, ♯) and justify that Lgc(X, ♯) is precisely the ordinary or classical 0-order logic. In this context we also discuss the problem of how to modify conditions imposed on X in order to make logic Lgc(X, ♯), it generates, to be, say, the intuitionistic logic, Johansson minimal logc or Lukasiewicz 3-valued logic. Finally, we upgrade the object-language to the 1st order level. A slight modification of the language is defined here as a language with the witness property. This, it will be seen, facilitates discussion of quantifier-dependent aspects within the framework of (X, ♯,Q(W))-based metalogic where Q(W) refers to quantifiers and correlated with them their witnesses. More specifically, we prove within this framework that (X, ♯,Q(W))-based and (Y,♯,Q(W))-based metalogics are pairwise equivalent. And we also upgrade the earlier generated logic Lgc(X, ♯) to the logic Lgc(X, ♯,Q(W)) of the 1st order level.

4.3.16 Xuyan Tu
Universal Logics, Coordinatics & Coordinative Logics

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1 The Research, Development and applications of "Coordinatics" are introduced.

2 The Relationship of "Universal Logics" and "Coordinatics" is discussed, the "Coordinatics" needs the logic foundation from "Universal Logics", And the "Universal Logics" needs the coordinative methodology from "Coordinatics" .

3 The problem of "Coordinative Logics" is proposed, Based on the combination of "Universal Logics" and "Coordinatics", To generate a new "Coordinative Logics" is suggested.

4.3.17 Zongkuan Zhao
From Classical Logic to Mathematical Dialectic Logic

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1. Mathematical dialectic logic is a science that studies the formal structure and the laws of complementary-structure propositions that designate the entire positive and negative attributes of things.

2. Mathematical dialectic logic is a consistent extension of the classic mathematic logic. Mathematical dialectic logic expands the application domain of modern mathematical logic from classic mathematic logic, applying only to the domain of propositions referring to single-attribute of things, to the domain of propositions referring to the entire attributes of things.

3. The theory on complementary attribute sets, dialectic proposition logic, and dialectic predicate logic and its logic calculus systems introduced in Introduction to Mathematical Dialectic Logic use, as their logic background, the logic methodologies and the modern formal logic methodologies found in ancient Chinese Yijing logic and Daode Jing logic, in western contemporary and modern Hegel Logic, and in Karl Marx' Capitalism; they further use the modern science and technology and contemporary complex science and technologies as their technical background; they also have the philosophic background of dialectic logic philosophy and materialist dialectics.

4. Mathematical dialectic logic provides for predicate forms referring to entire attributes of things, intension correlative proposition connectives, and entirety universal quantifier, and therefore it overcomes the limitations of classic logic, being applicable only to the domain of propositions referring to single attribute of things, of having substantive implications that are counter-intuitive, and of having no ordinary deciding methods for universal propositions.

5. Mathematical dialectic logic strictly differentiates between dialectic contradiction propositions and logic contradiction propositions, in terms of meaning, grammar and application. The sublate paradox method built up on this basis can resolve paradoxes in a sensible way that fully meets the three preconditions Russel proposed for the satisfactory resolution of paradoxes.

4.3.18 Secret Speaker

In the UNILOG'05, Saul Kripke was the secret speaker. Who will (s)he be in UNILOG'07?

4.4 Contest: How to translate a logic into another one?

4.4.1 The Problem

There are many logical systems and it is very interesting to compare them, especially by translating one system into another. This can be done in different ways: proof-theoretically, model-theoretically or at an abstract level, by translations between logical structures. A translation can be more or less stronger, from a function just transporting the consequence relation, a kind of homomorphism, up to a conservative translation similar to an embedding preserving the structure of the language. One can wonder which translation is the good one to claim that a logic is a sublogic of another one. There have been many proposals, but up to now, yet no satisfactory one. Some problems related to translations have been put forward through the translation paradox. This is related also to some deep philosophical issues: in which sense a logic can be said weaker, stronger or safer than another, through a translation? Intuitionistic logic at first appears as a kind of sublogic of classical logic, but it has been shown that classical logic can be translated into intuitionistic logic, and not the contrary, so one may think that intuitionistic logic is strictly stronger than classical logic. However Wojcicki has shown that classical logic cannot be reconstructed within intuitionistic logic - his concept of reconstructibilty being a stronger concept of translation. Gödel's translation of classical logic into intuitionistic logic shows that intuitionism is not in a sense safer than classical logic, but maybe this has to be relativised due to Wojcicki's result. For this contest, any paper shedding new light both from a mathematical and a philosophical viewpoint on this issue of translation, is welcome.

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All participants of the school and the congress are welcome to take part in the contest. Short papers (up to 10 pages) can be submitted before March 31th, 2007. The best ones will be selected for presentation at a special session during the congress and a jury will then decide which, if any, is the winner.

4.4.2 The Competitors

Translating from one Logic to Another

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New dimensions on translations between logics

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After a brief promenade on the several notions of translations that appear in the literature, we concentrate on three paradigms of translations between logics: *(conservative) translations*, *transfers* and *contextual translations*. Though independent, such approaches are here compared and assessed against questions about the meaning of a translation and about comparative strength and extensibility of a logic with respect to another.

What is a Logic Translation?

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Logic has been characterized as the study of sound reasoning, of what follows from what. The study of logic translations hence has to consider their interaction with the notion of logical consequence (formalized as consequence relation), which we here treat in a completely abstract way. We introduce notions of translations both between consequence relations as well as between satisfaction systems. A central question concerning such translations is their interaction with logical structure, such as logical connectives, and logical properties.

Compiler correctness and the translation of logics

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Translations arise not only between natural languages and between logics. Most frequently they are used in computer science, where compilers translate programs written in some high level programming language into a machine code. There insights can be found on what is a correct translation. In this contribution those insights will be applied to the field of translating between logics. It gives us another definition of translation than the standard one (known as 'conservative translation'). The well known Goedel translation (from Int into PropLog) is not covered by the standard notion, but is quite all right for the new definition. Our definition allows for a translation from PropLog into Kleene's K3, illustrating that with our definition a translation into a logic with an empty theory, is no problem, whereas that was not possible under the standard definition. Finally we discuss Beziau's translation paradox, and show, based upon computer science examples, that it is no paradox at all.

Three levels of translation into many-sorted logic
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We assume the opinion by which *translation into classical logic* is a reliable methodology of Universal Logic in the task of comparing different logics. What we add in this paper, following *Extensions of first-order logic* (Cambridge University Press, 1996) by M. Manzano, is some evidence for adopting the slightly different paradigm of "tranlation into many-sorted (MS) classical logic." Reasons for this preference are convincing: (i) MS-logic is more natural when studying several sorts of objects at the same time, (ii) deductions in MS-logic turn out to be shorter than their one-sorted counterparts, (iii) it was proven by J.L. Hook that a MS-theory could be interpretable in another MS-theory without their corresponding one-sorted translations being interpretable in one another, (iv) it was shown by S. Feferman that MS-logic interpolation theorems are stronger (not only in that their are more general) than their one-sorted counterparts. Finally, our own methodology, splitted into three levels of translation from any given logic into the formalism of MS-logic, is discussed in some detail.

4.4.3 The Jury

The members of the jury are: Arnon Avron (Tel Aviv University - Israel), Valentin Goranko (University of the Witwatersrand - South Africa) and Heinrich Wansing (Technical University of Dresden - Germany).

4.4.4 The Prize

The prize *Universal Logic 2007* will be offered by Birkhäuser, which is sponsoring the contest.

5 Contributed Talks

5.1 Scope of validity / domain of application of fundamental theorems

5.1.1 Musa Akrami
From Formal Ontology to Universal Logic

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I think about ontology as the science of the most general features of beings and the most general relations among them, on the one hand, and logic as the science of most general statements of all (natural or artificial) languages and the most general relations among them from an inferential point of view, on the other hand. Language, in its both natural and artificial forms, reflects the relations between some real (objective / subjective) or fictional entities through the words connected to each other in some statements, having their own relations in the framework of a formal logical system of inference. Logic, as a system of inference through reasoning, finds or gives the rules of such an inferential relation among different appropriate sentences of a language. The truth of the sentences is the result of their contents or their being inferred from some previous true sentences, whereas only their forms share in inferential processes. This may be the meaning of logic in its narrower sense. It is possible to see logic in a broader sense as the science of all kinds of relations among all kinds of entities, acts and processes stating some objective or subjective or artificial or conventional reality. These entities and acts and processes are not individual but idealized ones or their universals that may be instantiated at all times and in all places. Such a looking at language makes the net-like collection of true statements independent of the knower and the judger. In formal ontology we search for the properties of those structures of the reality that are formally similar. So we may find some formal truths applying to all things and / or properties and / or processes in different areas of objective / subjective / fictional reality. Now, if the reality is one as the unity of more or less interconnected and interactive beings of all physical, nonphysical and artificial types, the system of inference too may be one as the unity of more or less interconnected statements of all natural and artificial types. The universal system of inference may be divided into several relatively separate subsystems (having a more or less degree of connection) just as the unified reality has divided into several relatively separate fields (having a more or less degree of connection and interaction). Different natural sciences deal with different fields of the natural reality. Given that there are some nonphysical fields of reality (from, e.g., artificial to spiritual) there may be some nonphysical sciences dealing with those nonphysical fields. Because of some weak or strong connections and interactions among all fields of (physical and nonphysical) reality as the parts of the spectrum of the unified reality (from some possible relatively independence to some weak or strong dependence), all sciences must and can have some connections and interactions with each other directly or indirectly, individually or via some interdisciplinary science, in the network of some multidisciplinary science or in the space of some (coming) unified science or super-science. Such an approach towards ontology and logic sets up some correspondence between them. This correspondence is not a simplistic one in the framework of some picture theory. Logic as the science of inferential relations among true statements (and encompassing some more or less related studies too) is done by mental agents through some complicated processes that cognitive science must elucidate without being trapped by some superficial psychologism. According to such a model for corresponding realities and sciences within the unified reality and the unified science, I hope to build the unified logic or super-logic that encompasses all separate small systems of inference (within both natural and artificial languages) unifying ultimately all of them in one unified super-system of inference.

5.1.2 Arnon Avron and Anna Zamansky Many-valued non-deterministic semantics for first-order Logics of Formal (In)consistency

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A *paraconsistent logic* is a logic which allows non-trivial inconsistent theories. One of the oldest and best known approaches to the problem of designing useful paraconsistent logics is da Costa's approach, which seeks to allow the use of classical logic whenever it is safe to do so, but behaves completely differently when contradictions are involved. da Costa's approach has led to the family of Logics of Formal (In)consistency (**LFIs**). A natural semantic framework for propositional **LFIs** can be provided using many-valued structures, called non-deterministic matrices (Nmatrices). This framework has a number of attractive properties: it is modular, effective and (in the case of finite Nmatrices) enjoys the benefits of decidability and compactness. In this talk we extend the non-deterministic semantic framework to the full first-order level, thereby providing non-deterministic semantics for a large family of first-order **LFIs**, including da Costa's C_1^*. We show that the semantic framework remains modular and effective, and apply its effectiveness to prove an important proof-theoretical property of the studied **LFIs**.

Cut-elimination in Canonical Gentzen-type systems with (n,k)-ary quantifiers
An (n,k)-ary quantifier is a generalized logical connective, binding k variables and connecting n formulas. Canonical systems with (n,k)-ary quantifiers form a natural class of Gentzen-type systems which in addition to the standard axioms and structural rules have only logical rules in which exactly one occurrence of a quantifier is introduced. In this talk we provide non-deterministic semantics for these systems and investigate their cut-elimination property. We show that there is a strong connection between a constructive syntactic criterion of coherence in such systems, their non-deterministic semantics and cut-elimination.

5.1.3 Francesca Boccuni
Plural quantification and a predicative foundation for Frege's Grundgesetze

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PG *(Predicative Grundgesetze)* is a monadic second order logical system which uses a plural interpretation of second order variables X,Y,Z and a substiutional interpretation of predicative variables F, G ,H to provide a predicative foundation for Fregean *Grudgesetze*, through the notion of *arbitrary act of reference*. **PG**'s axioms are: a *Strong Comprehension Principle* $\exists Y \forall x(x\eta Y \equiv \mathbf{A})$, where **A** is a formula of **PG** that doesn't contain Y free; a *Weak Comprehension Principle* $\exists F \forall x(Fx \equiv \mathbf{A})$ where **A** doesn't contain F free, any free plural variable, and any bound predicative variable. Basic Law V too is an axiom of **PG**: $\{x : Fx\} = \{x : Gx\} \equiv \forall x(Fx \equiv Gx)$. Far from being inconsistent, Basic Law V guarantees the existence of infinite individuals in the Domain and it's basic for deriving Peano's axioms.

5.1.4 Mirjana Borisavljevic
Normalization in Extended Natural Deduction

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The extended natural deduction system **NE** and the standard system of sequents S, which cover intuitionistic predicate logic, will be presented. The main characteristic of the system **NE** is that elimination rules for all connectives and quantifiers are of the same form as the elimination rule for and 9 from the standard natural deduction. Using the connections between the extended natural deduction system **NE** and the system of sequents S, the normalization theorem for the system **NE** will be a consequence of the cut-elimination theorem for the system S.

5.1.5 Dan Buehrer
So That's Why P=NP! It's So Simple!

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This paper will prove that P=NP for any minimal finite constructivist program, which is basically a finite state automaton for computing with types. Computing with data types involves a finite state automaton whose edges correspond to 2nd-order functions from input types to output types. The formulas which represent the data types of a state can be put into a sorted disjunctive normal form, and the containment of one formula by another is a decidable problem. A class IS-A hierarchy and its associated class algebra can be built based on these containments. An example of a finite state automaton for solving the subset sum NP-complete problem will be presented.

5.1.6 Boris Chendov
General Theory of Logical Systems (GTLS) - initial elements

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5.1.7 Christian Damböck
A framework for logics: rigidity, finitism and an encyclopedia of logics

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A logic L (in the usual algebraic sense) is rigid, if there exists a set F of L-formulas so that the logic can be reduced to the propositional logic that is defined over the set F of propositional constants, in an obvious way. If this reduction is recursive and the basic set F is finite, I call the rigid logic finitistic. The main advantage of rigid languages is that we can describe them in terms of set theory. In other words: rigid languages are not a construction of pure logics or meta-mathematics, respectively, but they are a proper construction of mathematics. The rigid framework is intended as a unifying account that should allow us to develop an encyclopedia of philosophical logics, in a more straightforward way than we will be able to in rather syntactically oriented frameworks (frameworks that are based on the notion of a deductive system).

5.1.8 Walter Dean
Are procedures logical objects?

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In this paper I will attempt to directly pose a question which has a largely unrecognized foundational significance to logic and formal semantics: are effective mathematical procedures (i.e. what are referred to as individual algorithms in contemporary computer science) properly regarded as abstract objects in their own right? It is apparent that a positive answer to this question reflects the conventional wisdom not only within computer science, but also of a variety of other fields which attempt to employ its methods and concepts (e.g., philosophy of mind and language, cognitive science, intuitionism and proof theoretic semantics). This view is evident, for instance, in our willingness to refer to algorithms by proper names (e.g. Euclid's algorithm, Strassen's algorithm, the Gentzen cut elimination algorithm, etc.), to quantify over them (e.g. "There exists a polynomial time primality algorithm," "A proof of $F \rightarrow G$ is a procedure for transforming proofs of F into proofs of G") and to assent to various statements of procedural identity and non-identity (e.g. "Mergesort and Heapsort are distinct sorting algorithms").

5.1.9 Tzu-Keng Fu
A Note on *The Metatheory of the Classical Propositional Calculus is not Axiomatizable*

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This paper is a note on Ian Mason's result (1985) which concerns the problem of undecidability of the metatheory of propositional logic. This result is also mentioned by van Benthem and Doets (1994). We offers three methods of proving decidability problems proposed by Michael O. Rabin to prove $Th(\langle P, \vdash \rangle)$ is decidable, $Th(\langle L, \subset \rangle)$ is decidable, and $Th(\langle PROP \rangle)$ is undecidable, respectively. Many details in Mason's original paper is not explicit, our work is to articulate them such that readers interested in can realize easily.

5.1.10 Katarzyna Gan-Krzywoszynska
On extensions of diachronic logic

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The aim of my paper is to present progressive structures in dynamics of knowledge as an extension of Prof. Roman Suszko's diachronic logic. Progressive structures can be seen as a toolkit for philosophical study in some aspects of dynamics of knowledge, especially scientific knowledge. They can be considered also as models of rationality - they help to describe and analyze historical and sociological aspects of dynamics of knowledge by means of formal methods. Definitions of dynamic structure and of progressive structure are introduced. Dynamic structure is of the form: $S =< O, R, h >$, where O is a set of transformations of epistemological oppositions, h is hierarchy of values of the structure S, and R is a relation over O. The hierarchy of values h of a structure S is an ordered triple of the form: $h =< V, I, C >$, where V is a non-empty set of values, I is an equivalence relation in h, and C is a relation between the classes of abstraction of relation I.

5.1.11 Zhitao He
Discussion on the Essence and Common Characters of Logics

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It is a circulating process that from concretization to abstract, from abstract to abstract, from abstract to concretization, from concretization to concretization, and from concretization to abstract. In the process the principle of things can be realized continuously, which promotes the level of cognition of people. Since the achievements of the research on standard logic have enabled logicians to study the issues of logic based on pure mathematics, so the characters of logic are discussed based on algebra system, which can help to resolve most of the issues in logic. The mathematical characters of it is clear enough but the physical significance of it is still unclear and is inflexible to the new principles found, so nowadays with the emerging of various non-standard logics, a new mathematical abstraction from the new founded systems and characters of logic is required. The author of paper tries to discuss the essence and common characters of logics system from the view point of reasoning, then to provide ideas and foundation for new mathematical abstraction. First, the author notes that Logics is not merely a basic rule of thinking, and the basic rule of all information processing, logics is the key basic theory of information science; Secondly, from the view point of information essence, author discusses the first kind of basic characters of logics: Identity Law $P \vee P = P$, $P \wedge P = P$, and the representations in various non-standard logics; then, from the view point of the essence of judgement and reasoning, author discusses the second kind of basic characters: Contradiction Law $\sim P \wedge P = 0$, Excluded Middle Law

$\sim P \vee P = 1$, Involution Law $\sim\sim P = P$and MP Rule $P, P \rightarrow Q \Rightarrow Q$, and the representations in various non-standard logics; lastly, author discusses the differentiation standard of logic and weak logic based on these common characters.

5.1.12 Paul Healey
Partially Intelligible Probabilities

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Building on Brouwer's proof against excluded-middle, I will present a negative result for Church's definition for the concept of a function; it is my aim to show that there appears to be sufficient reasons to show that Hegel's dialectical method (where it is interpreted for objective value: the resolutions of two notions of effective calculability is possible), is not vulnerable to a relativized notion of truth for a theory of events. In the light of this evidence, it will be shown that there appears to be sufficient reasons why IL can be interpreted and developed into a full blown theory of events; ILe to counter Kolmogorov's theory of Probability and hence show that he was wrong about the Intuitionists understanding of excluded-middle.

5.1.13 Jui-Lin Lee
Classical model existence theorem in predicate logics

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We prove that in predicate logics there are some classically sound Hilbert systems which satisfy the so-called strong completeness theorem (every $\perp$-consistent set has a classical model) but are weaker than FOL. This proof is based on the following three facts: (1) For any consistent set of prenex-normal-form sentences, there is a Herbrand-Henkin style extension (by adding witnesses) such that the remaining step of constructing a classical model can be done in the quantifier-free, propositional level. (2) In propositional logics CME holds in some weak logics. (3) Converting a sentence into prenex-normal-form can be done in logics weaker than FOL.

5.1.14 Domenico Lenzi
On a particular axiomatization of Propositional Calculus with the negation and the implication as the unique connectives

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5.1.15 Shiyou Lian
Principle of the Logical Truth Definition and Computation of Implication Compound Proposition

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In mathematical logic, the logical truth of implication compound proposition p'q has always been obtained by the operation definition of implication connective ', although the latter has long and always been questioned and controverted in the academic field for more than a hundred years. The paper analyzes the logical truth of p'q starting from its daily logical semantics and finds: The logical semantics of p'q is permanently true-true implication relation and its mathematical essence is a binary relation on set $\{0, 1\}$, so the truth values of p'q should be spoken relative to the actual truths of p and q, and the truth correspondence relation formed this way just constitutes a truth function on $\{0, 1\}$, so the truth values of p'q can also be viewed as being obtained through the functional computation of the actual truths of p and q. Such is the principle of the logical truth definition and computation of p'q. This principle shows that the logical truth of p'q is just determined by its logical semantics as a whole rather than by connective ' alone; implication connective can only be a propositional operation rather than a truth-operation, and if ' is treated as a truth-operation, the expression p'q will show ambiguity, and cause confusions and misunderstandings; the ambiguity of expression p'q is just the source of the controversy about implication connective.

5.1.16 Ahti-Veikko Pietarin
The Major Transitions in Peirce's Logical Studies

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Three major transitions in Peirce's logic can be identified: the indexical, which presupposes a substitutional interpretation of quantifiers, the symbolic, which presupposes an objectual and game-theoretic interpretation, and the iconic, which presupposes a diagrammatic interpretation. These transitions constitute some of the most fundamental steps in the history of modern logic towards a unifying account of the general theory of logic. Likewise, they take the descriptive, representational and inferential aspects equally into consideration and establish conclusively the senses in which logic is to be conceived as the science of formal semeiotic.

5.1.17 Wagner Sanz
Natural Deduction Systems Preserving Falsity

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In our communication we present natural deduction systems preserving falsity. This new systems will provide us means of reviewing a criticism made several years ago by Prior, directed against the semantical definition of logical constants by introduction and elimination rules.

5.1.18 Peter Schroeder-Heister
Assertion and Denial in Proof-Theoretic Semantics

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Proof-theoretic semantics is an attempt to define logical consequence and, more generally, analytic reasoning in terms of proof rather than truth. By its very nature - in emphasizing proof rather than refutation - it is assertion-driven. This is reflected by the fact that in such frameworks negation is defined indirectly by reduction to absurdity rather than by a notion in its own right. Corresponding to ideas developed in extended logic programming, I propose a clausal logic of assertions and denials, in which clauses have the form

$$(\sim)A \Leftarrow (\sim)B_1, ..., (\sim)B_n$$

Here (∼) is a rejection operator which indicates the denial of a proposition and which may only occur in outermost position, i.e. cannot be iterated. The parentheses indicate that the rejection operator may be either present or missing. Dealing with generalized reasoning systems of this kind leads to novel symmetry or harmony principles which go beyond the well-known harmony principles for natural deduction or sequent systems. This is due to the fact that by means of dualization, given ('primary') assertion rules lead to associated ('secondary') denial rules and vice versa.

5.1.19 Xunwei Zhou
First level predicate calculus of mutually-inversistic logic unifies induction and deduction

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First level predicate calculus of mutually-inversistic logic consists of explicit inductive composition, implicit inductive composition, and decomposition. Explicit inductive composition goes as follows: from man(Aristotle) being true and mortal(Aristotle) being true to establish man(Aristotle) -1 mortal(Aristotle) being true, where -1 denotes mutually inverse implication. Implicit inductive composition goes as follows: let man(x) be true, if we can infer mortal(x) is true, then we establish man(x) -1 mortal(x) to be true. Decomposition goes as follows: from man(x) -1 mortal(x) being true and man(Socrates) being true we can infer mortal(Socrates) being true. Explicit inductive composition belongs to induction. Implicit inductive composition and decomposition belong to deduction.

5.2 General tools and techniques for logics

5.2.1 Semiha Akinci
On possibility and propensity

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This paper makes an effort to extend Kripke semantics by introducing notions concerning time. Kripke's relation Rk, defined between possible worlds (hereafter, PW's) is an equivalence relation: it partitions the collection Wp of PW's into mutually accessible equivalence classes. As such it is ill-suited to represent successive phases of the actual world, since temporal succession would be an asymmetric relation: temporal phases are not reversible. But possibility excluding change, as mere difference, is not all that interesting. One needs to accommodate queries concerning how things can or may change, from specific initial conditions to subsequent possible conditions, into ones' construal of possibility; one needs to think about avenues of change. Change is a unidirectional process, involving temporality essentially. So an equivalence relation is not well-suited as the primary relation among possible worlds, as long as change is to be allowed for.

5.2.2 Diderik Batens
Static vs. Dynamic proofs

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A proof-theoretic approach to defeasible logics requires the introduction dynamic proofs. These deserve some careful conceptual analysis. I shall first define (a specific type of annotated) static proofs. An interesting result is that logics that have static proofs can be shown to be compact, reflexive, transitive, and monotonic, and to have a positive test. Next dynamic proofs and their stages are introduced in terms of a set of rules and a marking definition. Static proofs turn out to be a special case. Dynamic proofs define an unstable derivability relation (derivability at a stage) as well as a stable one (final derivability). I shall present the definition of the latter and clarify its game theoretic interpretation.

5.2.3 Carlos Caleiro and Ricardo Goncalves On the algebraization of global and probabilistic exogenous logics

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The exogenous semantic approach for enriching a given base logic was introduced by Mateus e Sernadas in order to obtain an exogenous quantum logic that extends classical propositional logic (CPL). The key idea is to take superposition of classical valuations as the models of the quantum logic. In this enrichment we can distinguish two important intermediate steps, globalization and probabilization. In this work we propose an algebraic study of Exogenous Global Propositional Logic (EGPL) and Exogenous Probabilistic Propositional Logic (EPPL). Since both EGPL and EPPL have rich languages, we will start by introducing a many-sorted approach to algebraizability. In this framework EGPL can be introduced as two-sorted logic (the sorts of local formulas and of global formulas) and EPPL as a three-sorted logic (the sorts of local formulas, of global formulas and of real-valued terms).

We show that EGPL over a base logic $\mathcal{L}$, EGPL($\mathcal{L}$), is always algebraizable. Moreover, when $\mathcal{L}$ is also algebraizable, we can recover the algebraic counterpart of $\mathcal{L}$ using behavioral reasoning. We also show that EPPL(CPL) is algebraizable and present an equivalent algebraic semantics for it.

5.2.4 Carlos Caleiro* and Manuel Martins** and Ricardo Goncalves* Behavioral algebraization

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The theory of Abstract Algebraic Logic (AAL) aims at drawing a strong bridge between logic and universal algebra. It can be seen as a generalization of the well known Lindenbaum-Tarski method. Although the enormous success of the theory we can point out some drawbacks. An evident one is the inability of the theory to deal with logics with a many-sorted language.

Even if one restricts to the study of propositional based logics, there are some logics that simply fall out of the scope of this theory. One paradigmatic example is the case of the so-called non-truth-functional logics that lack of congruence of some of its connectives, a key ingredient in the algebraization process.

The quest for a more general framework to the deal with these kinds of logics is the subject of our work.

In this talk we will present a generalization of AAL obtained by substituting the role of unsorted equational logic with (many-sorted) behavioral logic. The incorporation of behavioral reasoning in the algebraization process will allow to amenably deal with connectives that are not congruent, while the many sorted framework will allow to reflect the many sorted character of a given logic to its algebraic counterpart.

We illustrate theses ideas by exploring some examples, namely, paraconsistent logic C1 of da Costa and Exogenous Global and Probabilistic Propositional Logic.

5.2.5 Joachim Derichs
Reforming model theory

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The talk presents a new and improved definition of a model, different from Tarski's. After a brief philosophical introduction the practical implications of the new definition are laid out.

5.2.6 Amelie Gheerbrant
Modal semantics for second-order logic

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We propose a family of modal semantics for second order logic which are equivalent neither to standard nor to generalized semantics. Generalized (or so called "Henkin") semantics is obtained from standard semantics by changing the notion of second order variable. Here we keep this notion exactly as it is in the standard case, but we change the notion of second order constant. We first introduce C, which we previously showed in a joint work with Marcin Mostowski to be exactly of degree 0'. It has only the expressive power of a relatively weak fragment of standard SO. We then increase its expressive power up to full standard SO, as we did in some other previous paper. Finally, we arrive at the intended logics using the notions of n-elementary equivalence, elementary equivalence and potential isomorphism. We show in particular Lowenheim Skolem for some of these logics.

5.2.7 Edward Haeusler and Luiz Carlos Pereira
Structural Reductions and the Identity Problem

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In the present paper we address the question "What mathematical structures lie underneath logics with indexed syntax and semantics on the level of abstraction given by specifications and model classes?". Our answer to this question is given by an indexed general definition of Logics that takes indices as the guideline for building every linguistically relevant concept in the language. The proposed concept of an Indexed Frame appears as an abstraction of the concept of Institution and provides, especially, an elegant and natural account of the "institution condition". The relevance of the chosen level of abstraction is also validated by the fact that most applications of Institutions in the theory of formal specifications focus on specifications and model classes. We show that other well-known definitions of Abstract Logical Frameworks, as π-Institutions, Entailment Systems, and thus General Logics can be also reflected by Indexed Frames. Co-triples, co-Kleisli and co-Eilenberg Categories arise naturally from our approach as well-known logical categories, namely, Entailments and Theories respectively. Further investigations, under an indexed setting, on the category of adjunctions arising from a co-triple, are also taken when relating Model and Theory indexed functors.

5.2.8 Valery Khakhanian
A Functional Algebraic Model Equivalent to so called Special Realizability

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In one of his works A.Dragalin [1] suggested a new very general approach to construct models for non-standard logics (for intuitionistic logic at first),which are called "functional pseudoboolean algebraic models" (FPAM). Such models agree very good with intuitionistic logic and with intuitionistic arithmetic. Many realizability's models are FPAM (for example, the numerical realizability of Kleene-Nelson, the realizability of Beeson, the realizability of Lifschitz and others). In my shot topic I will suggest the FPAM for so called spesial realizability (see also [1]). Such realizability lets to construct the model for principle P: $(\neg\varphi \to \exists x\psi(x)) \to \exists x(\neg\varphi \to \psi(x))$, for the theory HA+CT+P, so called antitraditional constructivism.

References

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5.2.9 Srecko Kovac
Agents, intensions, and paraconsistency

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We focus on some structurally similar patterns of paraconsistent reasoning, such as Jaśkowski's discussive logic and local reasoning of Fagin and Halpern. We show that such logics are based on similar tree-like structures that result from the sequencing of quantifiers over possible worlds, sets of possible worlds, sets of sets of possible worlds, and so on (the logic of branching time is a special case). Agents can be regarded as interacting or non-interacting groups or societies that include other agents as their subsets or members.

A fine-tuning of paraconsistent reasoning by introducing intensional terms is sketched. Explosiveness of "conjoined contradictions" can be relativized with respect to the *de dicto* and *de re* sense of beliefs.

5.2.10 Micha Krynicki* and Jose Maria Turull-Torres** Ehrenfeucht-Frasse games on trees

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Ehrenfeucht-Fraisse (EF) games have been introduced as a means of characterizing the relation of elementary equivalence between structures in first order logic (FO). In the usual EF games the rules are determined by a linear ordering of a fixed length or, equivalently, by a special kind of tree – a chain of a fixed length –, where each node of that tree corresponds to a quantification operation. Here we consider EF games whose rules are determined by arbitrary trees, such that their nodes correspond either to quantification operations or to connective operations. By playing games on trees, we can refine the class of sentences which are considered in a given game, since a tree represents a particular class of sentences. We use these games to characterize the relation of equivalence restricted to sentences which have a bounded number of connectives. We define and study several variations of tree games, for first and second order logic (SO). To illustrate the use of our games we use them to prove lower bounds in the connective size for several FO properties, and also for the SO parity property. Finally, we give a precise characterization of the logic whose elementary equivalence is characterized by a given tree game.

5.2.11 Ingolf Max Dimensions of Opposition: Representing the Square by Two-dimensional Operators, and Some Linguistic Applications

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5.2.12 Daniele Porello
Categorical Basis of Metaphysics

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This work explores the application of categorical notions to the approach proposed by Dummett in "The Logical Basis of Methaphysics". The general idea of Dummett's work is, roughly speaking, that the difference between metaphysical positions is to be investigated in the peculiar logic applied when arguing. The proposal here advanced represents the logics behind different positions, by means of category theory. In particular, I present how topos-theoretic considerations refine the main assumption behind the distinction between realism and anti-realism, suggesting the following different interpretation: Dummett claims that bivalence is the point distinguishing between realism and anti-realism, I will present some consideration in favour of extensionality (and well-pointedness), as a more general property stressing the concept of independence of the object form the subject in realist positions.

5.2.13 Andrei Rodin
Logical formas versus Translational Categories

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I specify a precise sense of being "formal" and then develop a notion of categorical logic as distinguished from that of formal logic. I show that categorical logic understood in the usual technical sense largely fits this description.

5.2.14 Weiguo Shen
The relativity of the denumerable question about real numbers

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5.2.15 Edelcio de Souza
Consequence operators and partitions

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Let $\mathbb{P}$ be a family of subsets of X. We call $\mathbb{P}$ a *partition* on X if and only if the following properties are satisfied: (1) $\cup\mathbb{P} = X$; and (2) If $P_1, P_2 \in \mathbb{P}$ and $P_1 \neq P_2$, then $P_1 \cap P_2 = \emptyset$. Let $\mathbb{P}$ be a partition on X and consider a subset A of X. We call A a $\mathbb{P}$-*set* of X if and only if there exists a subfamily $\mathbb{P}' \subseteq \mathbb{P}$ such that $A = \cup\mathbb{P}'$, i.e., A is an union of elements of $\mathbb{P}$. The set of all $\mathbb{P}$-sets of X is denoted by $\mathbb{P}(X)$. If $\mathbb{P}$ is a partition on X, we define an operation $Cn_{\mathbb{P}}$ on $\wp(X)$ given by $A \mapsto Cn_{\mathbb{P}}(A) := \cap\{P \in \mathbb{P}(X) : A \subseteq P\}$, i.e., $Cn_{\mathbb{P}}(A)$ is the smallest $\mathbb{P}$-set that contains A. Thus, $Cn_{\mathbb{P}}$ is a consequence operator on X, i.e., for all $A, B \subseteq X$, it holds that: (1) $A \subseteq Cn(A)$; (2) $Cn(A) = Cn(Cn(A))$; and (3) if $A \subseteq B$, then $Cn(A) \subseteq Cn(B)$. We intend to study what kind of consequence operators can be described by partitions.

5.2.16 Christian Strasser and Diderik Batens
Equivalent Deterministic and Indeterministic Semantics for Basic Paralogics and an Easy Semantic Approach to Corrective Adaptive Logics

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This paper focuses on two related aims. (1) Most of the oldest propositional paraconsistent logics (as well as some other logics) had an indeterministic semantics. In this paper we offer a method to transform the models of a large family of two-valued indeterministic semantics (for propositional as well as for predicative logics) to models of a deterministic semantics. It is warranted that every model verifies the same formulas as its transformation. (2) A family of such semantic systems can also be transformed into 3/4-valued systems. This transformation too warrants that the transformed models verify the same formulas as the original ones. Moreover the 3/4-valued semantic systems lead to a very simple approach to corrective adaptive logics.

5.2.17 C. J. van Alten
A Universal Finite Model Construction

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An algebraic construction will be presented that may be used to prove a finite model property for many logics. It is applicable to algebraic models whose underlying structure consists of an order $\leq$, binary operations $\rightarrow$ and $\circ$ that form a residuated pair (i.e., $a \circ c \leq b$ iff $c \leq a \rightarrow b$) and may also have one or more diamond-like modal operators. Algebras of the above type include modal algebras, Heyting algebras, residuated lattices and many more. If B is a finite subset of an (infinite) algebra whose closure under $\circ$ and the modal operators is either well-quasi-ordered or reverse well-quasi-ordered, then we prove that a finite model may be constructed from B.

5.2.18 Peter Verdee
Computational aspects of adaptive logics using Minimal Abnormality strategy

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In this talk I discuss computational aspects of a large set of adaptive logics. Deciding whether a certain formula is an adaptive logic consequence of a premise set may be Π^1_1-hard, if the Minimal Abnormality strategy is used. Nevertheless, a partial proof procedure is devisable for these logics. I present such a proof procedure, which will result in a decisive proof or a non decisive but useful proof after a reasonable time in many realistic contexts. The procedure and the proofs generated by the procedure will show how a complex consequence relation, together with a good proof procedure, can still serve as an excellent tool to explicate the reasoning processes of limited human minds.

5.2.19 Jacek Waldmajer
On Structures and Cognitive Tuples

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In scientific research, structures and their elements are the subject of cognition. Both the former and the latter are often made use of in researching structures that are still unknown. The present paper addresses the following questions: 1) when is the structure being cognized adequate?, 2) in what way can an unknown structure be cognized adequately by means of known structures? and 3) how to determine the conditions for this adequacy? Providing a precise answer to the above questions requires applying an appropriate formal-logical apparatus. The latter is formulated within two proposed axiomatic theories: the theory of cognitive tuples T and the theory of structures TS, built over the former. Within TS, the notion of a set and certain properties of sets, are defined in accordance with ZF theory. The theory TS has its interpretation in the ZF set theory and as such is consistent.

5.3 Study of some classes of logics

5.3.1 Ross Brady
Negation in Metacomplete Relevant Logics

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We will attempt to determine what negation means in the context of the universal logic DJd (now called MC) of [UL] and of some surrounding relevant logics. These surrounding logics are all metacomplete relevant logics, either of Slaney's M1 or M2 varieties (see his [2] and [3] for details). None of these logics have the Law of Excluded Middle as a theorem, as they are metacomplete, and none have the Disjunctive Syllogism, as a derived rule, as they are paraconsistent. We will determine a common metavaluational structure for the theorems of each of these logics and show from these structures that "negations essentially come in pairs".

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5.3.2 Erica Calardo
Admissible rules in the multi modal logic of knowledge and time LTK

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The greatest class of rules that can be applied to a certain logic is that of admissible consecutions. Such a class contains all those rules under which the logic itself is closed. Concerning the case of multi-modal logics, however, not much is known about admissible inference rules. In our research, we would like to extend the investigation to a multi-modal propositional logic, LTK (Linear Time and Knowledge), which combines tense and knowledge modalities. This logic is semantically defined as the set of all $\mathcal{LTK}$-valid formulae, where $\mathcal{LTK}$-frames a e multi-modal Kripke-frames combining a linear and discrete representation of the flow of time with special $S5$-like modalities, defined at each time cluster and representing knowledge. Our latest result is that ltk has a finite basis for admissible inference rules.

5.3.3 Itala M. Loffredo D'Ottaviano* and Hercules de Araújo Feitosa**
Is there a translation from intuitionistic logic into classical logic?

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The historial "translations" of Kolmogorov (1925), Gödel (1933) and Gentzen (1933) interpret the classical propositional calculus (**CPC**) into the intuitionistic propositional calculus (**IPC**). In this work, based on some previous papers, we study the problem of the existence of a conservative translation from intuitionistic logic (**IPC**) into classical logic (**CPC**). By using the respective algebraic semantics associated to **CPC** and **IPC**, we prove that if the language of **CPC** has an infinite and denumerable set of propositional variables then, differently of what has been supposed in the literature, there is a conservative translation from **IPC** into **CPC** – our proof is non-constructive.

5.3.4 Guo-ping Du* and Zhu Wu-jia** and Shen Jie***
Unary Universal Logic

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This paper constructs an extended system of classical propositional logic which is called unary universal logic in classical propositional logic system, by adding a one-place operator and introducing the definitions of two one-place operators. In this extended system, there are constructive negation operator which complies with the law of contradiction but not the law of excluded middle, paraconsistent negation operator which complies with the law of excluded middle but not the law of contradiction, and dialectical negation operator which complies with neither the law of contradiction nor the law of excluded middle

5.3.5 Ying Gao
Operational Semantics for Relevant Logics with or without Distribution

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This work investigates operational semantics for various relevant logics with or without distribution after Fine's work in *Models for Entailment*. We use different types of states to model conjunction and disjunction, respectively. Canonically, these two types of states are defined as *theories* and *anti-counter-theories*.

Evaluation rules for each connective with both types of states are properly defined in order to keep *Hereditary Condition.* We show that an n-placed connective f can be modeled by $n+1$-placed operations defined on both types of states. For logics with distribution, one operation is sufficient to interpret f; but in the non-distributive case, $n+1$ different operations should be used together to work successfully.

5.3.6 Jia'an Guo * Wansen Wang** Research on Flexibility of Fuzzy Logic Relation Based on Universal Logics

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5.3.7 Yingfei Hu and Yanquan Zhou The Application of Universal Logic in Collocation

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To describe the collocation in facts of language, most researchers de-pend on own random collect or judgement to language sense before the appea-rance of corpus. This always can not guarantee its generality and representativ-e, the results of its research have definite localization. With the development of collocation, the application of new method in corpus research results in the improvement of research efficiency. There are two major approaches to collocational study in corpus linguistics, corpus-based approaches and corpus-driven approach. According to index corp-us in collocation, researchers inspect and generalize word combination in conve-ntional collocation frame. Corpus-driven approach has no conventional subjecti-ve concept and depend on automatic process to gain notable collocation throug-h picking up and taking statistics keywords' all collocation. All the research and description are inducted by corpus. In this paper, a research on the collocation of "People Daily" is performed based on multiple functions, such as searches, word class marker, compositor, filtrate and corpus-statistic. Firstly, a high frequency word "environment" is pi-cked out from the collocation. Then, a statistic of the left-collocate of "enviro-nment" is performed by corpus-driven method. The words and expressions which are in high collocation frequency with "environment" are obtained by arranging the statistic results in descending order. After that, MI statistic and universal conjunction formula in universal logic are utilized to verify the colloc-ation intensity between collocation words and node word. The formula to calc-ulate MI is $I(a,b) = \log_2 \frac{W*F(a,b)}{F(a)*F(b)}$, in which, $W$is the overall word capacity of collocation; $F(a)$ is the observation frequency of morphology a; $F(b)$ is the observation frequency of morphology b; $F(a,b)$ is the commonness frequency of both a and b in collocation. The formula of MI calculates the appearance probability information of one word by observing the appearance frequency of the other word.

The merit of MI measure is that it can identify complex word, fixed phrase, technoly glossary etc, but it can not express the extent to forecast and attraction exactly between collocation and node word. the introduce of universal logic can slove the problem well. on the assumption that $\text{Proba}(X)$, $\text{Proba}(Y)$, $\text{Proba}(X{\cup}Y)$ are known, how to describe the correlation of $\text{Proba}(X)$, $\text{Proba}(Y)$ and $\text{Proba}(X{\cup}Y)$ is always a research hotspot. The universal logic proposed by he huacan, a professor of Computer College of Northwest Ploytechnical University can solve the problem well. In this thesis, we applied series universal logic. It define the proposition's general correlation on domain. The continuous change of general correlation can be denoted by Generalized correlation coeffi-cient $h \in [0,1], h = 1$ denotes the max correlation state, $h = 0.75$ denotes the indepe-ndence correlation state. $h = 0.5$ denotes the repulsion state. $h = 0.25$ denotes the deadlock state. $h = 0$ denotes opposition state. At the same time generalized corr-elation coefficient can control the universal and operation $A(x,y,h)$ and or oper-ation $O(x,y,h)$. through the observation of Generalized correlation coefficient condition, $h \in [0.5,1]$, universal and operation range of $[\max(0, \{\text{Proba}\}(X) + \text{Proba}(Y) - 1), \min(\text{Proba}(X), \text{Proba}(Y))]$. It is equal to the probability of two events and operation. Not only the generalized correlation coefficient can control the unive-rsal and operation result when the two word probability is known, but also can describe the correlation when the word X and Y probability and simultanei-ty probability is known. In this thesis, we utilize generalized correlation coeffi-cient which can describe the relation of $\text{Proba}(X)$, $\text{Proba}(Y)$ and $\text{Proba}(X \cup Y)$ and gain the extent to forecast and attraction exactly beteeen collocation and node word throug the formulation $T(x,y,h) = (\max(0^m, x^m + y^m - 1))^{1/m}.T(x,y,h)$ is the probability of Proba$(X \cup Y).m = (3-4h)/4h(1-h); h = ((1+m) - ((1+m)^2 - 3m)^{1/2})/(2m), h \in [0,1], m \in R$.

In this thesis, we make an experiment by choosing the left-collocate of "environment". According to using characteristic of this word, we search the left-collocate of "environment" and rank them by descending. We get ten words which appear most, then calculate the value of MI and h through these two methods. The result of the experiment indicate that the value of MI higher doesn't means it is higher that left-collocate and the node word appear at the same time, which depends the ratio of frequence between the two words' simultaneity probability and the product of their own probability, while the value of h can show the correlation degree between the left-collocate and node word, when the value increases from 0.75 to 1, the correlation degree also increases accordingly.

5.3.8 Yi Jin and Junyong Yan and Kaizhong Zuo
Hardware Design of Reconstructed Ternary Logic Optical Calculator

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A design specification has been established based on decrease-radix design principle, using the specification, theoretical light diagrams for seventeen ternary logic operations were designed again, these light diagrams are potential to be reconstructed in hardware . A reconstructed hardware design scheme about ternary logic optical calculator is presented in this paper. This reconstructed optical calculator can complete six ternary logic calculators: $\vee^1, \rightarrow^1, \rightarrow^6, \leftrightarrow^6$, ©^{2} and ℗^{1}.

5.3.9 Hans Lycke
Inconsistency adaptive Relevant Logics

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In this paper, I will show how the insights from inconsistency-adaptive logics (IAL) can be put to work for standard relevant logics (RL). This results in inconsistency-adaptive relevant logics (IARL), relevant logics that allow the unproblematic applications of the inference rule Disjunctive Syllogism. In this way, IARL come closer to actual reasoning processes. Nevertheless, they remain relevant logics, which means that they don't validate the derivation of irrelevant consequences.

5.3.10 Casey McGinnis
The Perils of Paralogic: Eel-wriggling and the Four-cornered Approach to Paraconsistency and Paracompleteness

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A common way of constructing a logic that is paraconsistent and paracomplete is the "four-cornered" approach, which allows for the possibilities that a sentence is (1) uniquely true, (2) uniquely false, (3) both true and false, or (4) neither true nor false. I consider a generalization of this approach that is inspired by "eel-wriggling," a rhetorical/logical phenomenon described by some early Buddhist logicians. This generalization may present a philosophical problem for advocates of the four-cornered approach. Some hypotheses relevant to this issue are suggested as propositions that would be interesting to prove or disprove.

5.3.11 Joke Meheus
A Universal Logic Approach to Conflict-Tolerant Deontic Logics

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The aim of this paper is to present a unifying framework for the study of deontic logics that can handle various forms of deontic conflicts. There are three main strategies to invalidate 'deontic explosions' of the form $OA, O\neg A \vdash OB$: to reject *Ex Falso Quodlibet*, to reject or restrict the Aggregation Principle and to reject or restrict 'modal inheritance'. I shall present a general procedure to characterize the logics obtained by each of the three strategies. I shall show that the general procedure has several advantages: (i) it provides a uniform framework that makes it easier to compare the different systems, (ii) the design of a decision method for the various logics becomes straightforward, (iii) it largely facilitates the design of new systems that can handle other forms of deontic conflicts, and (iv) it becomes straightforward to design (adaptive) enrichments of the existing logics. These enrichments have the advantage that they avoid deontic explosion, but at the same time are as rich as Standard Deontic Logic for deontic formulas that behave consistently.

5.3.12 Alessio Moretti
Non-linear Modal Graphs: the Simplest Bifurcation Inside n-Opposition Theory

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n-opposition theory, the branch of modal logic exploring the geometry of oppositions, has so far mostly dealt with linear modal graphs (like the one of S5), for which we have strong results, allowing to translate the systems of modal logic constructed upon these graphs into logical-geometrical n-dimensional solids. But many standard modal graphs (like the one of S4) are non-linear (they have bifurcations and/or isolated points). For instance, deontic logic usually has at least one isolated point (*reality* is not implied by *obligation*, and does not imply *permission*), whereas epistemic and tense logic admit bifurcations (*Knowing that p* both implies p and *believing that p*). In this paper we investigate the simplest case of bifurcation of a modal graph. This leads to a logical-geometrical solid of dimension 5, which can be applied to P.A.S. Veloso and S.R.M. Veloso's logic for *many* and *few*.

5.3.13 Gemma Robles* and Jos M. Méndez* and Francisco Salto** The basic constructive logics for four different concepts of consistency

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In addition to negation-consistency and absolute consistency, we consider two weak senses of consistency. The first one is equivalent to the absence of the negation of a theorem and the second to the absence of the argument of a negative formula that is a theorem. We define the basic constructive logics adequate to these four different concepts of consistency in the ternary relational semantics with and without a set of designated points. Then, we show how to extend these basic logics within the spectrum delimited by intuitionistic logic. All logics in this paper are paraconsistent logics. And they are paraconsistent, we note, in respect of four different precise concepts of consistency.

5.3.14 Satoru Suzuki Measurement-Theoretic Semantics of Dynamic Epistemic Evidential Decision Logic

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Dynamic epistemic logic is an extension of epistemic logic that can be used to reason about knowledge changes. Kooi combined probabilities with dynamic epistemic logic. On another occasion, I proposed dynamic epistemic evidential decision logic (DEEDL) where utilities are combined with probabilistic dynamic epistemic logic. In this talk, I propose weak paraconsistent dynamic epistemic evidential decision logic (WPDEEDL) where DEEDL is reconstructed in term s of weak paraconsistency, and provide WPDEEDL with a new version of measurement-theoretic semantics. WPDEEDL is weak paraconsistent in the sense that its model has a classical truth assignment and a paraconsistent preference assignment

5.3.15 Vladimir Vasyukov
Combined Logics, Possible-Translations Semantics and Exponentials of Logical Systems

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Combined logics were introduced by V.A. Smirnov to adopt ideas of N.A. Vasiliev. An algebraic semantic of combined logics exploits the construction of algebraic bundle with fiber, e.g. for da Costa combined logic the respective bundle would be a pair constituted by some Boolean algebra (base) and da Costa algebra (fiber) together with two embedding functions (fibration and indexing). By means of those we can develop the possible-translations semantic following the general scheme of possible-translation semantics introduced by W. Carnielli. If we replace in the last construction the local forcing relation with the consequence relation then we arrive at the coexponential of da Costa logic to classical one and then at the exponential of classical logic to da Costa logic (the terms "coexponential" and "exponential" were caused by the role which such logical system constructions plays in the category Log of logical systems and translations between them).

5.3.16 A.G.Vladimirov
Effecivity properties of intuitionistic set theory

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Let us consider two-sorted intuitionistic set theory ZFI2 with sort 0 for natural numbers and sort 1 for sets. We shall show that well-known Church rule with parameters of sort 1 is admissible in ZFI2 in some rather strong sense, and get from this point the admissibility of Markov rule with all parameters in ZFI2, and also DP and numerical EP with set parameters for it in the same sense.

5.3.17 Uwe Wolter and Edward Hermann Haeusler and Alfio Martini General Indexed Logics

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In the present paper we address the question "What mathematical structures lie underneath logics with indexed syntax and semantics on the level of abstraction given by specifications and model classes?". Our answer to this question is given by an indexed general definition of Logics that takes indices as the guideline for building every linguistically relevant concept in the language. The proposed concept of an Indexed Frame appears as an abstraction of the concept of Institution and provides, especially, an elegant and natural account of the "institution condition". The relevance of the chosen level of abstraction is also validated by the fact that most applications of Institutions in the theory of formal specifications focus on specifications and model classes. We show that other well-known definitions of Abstract Logical Frameworks, as π-Institutions, Entailment Systems, and thus General Logics can be also reflected by Indexed Frames. Co-triples, co-Kleisli and co-Eilenberg Categories arise naturally from our approach as well-known logical categories, namely, Entailments and Theories respectively. Further investigations, under an indexed setting, on the category of adjunctions arising from a co-triple, are also taken when relating Model and Theory indexed functors.

5.3.18 Zhan-ao Xue and Yingcang Ma and Huacan He Studies on the Flexible Interval-logic and its Algebraic Structure

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Universal Logics (UL, for short), introduced by Professor Hua-can He in the 1990s, is a new kind of logic to deal with uncertain reasoning. The conceptions of generalized correlation and generalized self-correlation were introduced into UL to describe the flexible correlation of objectives, and the framework of flexible logics was established in UL. The operation models of UL can be obtained based on various generalized correlation coefficient h and generalized self-correlation k. The flexibility of logic is one of the key points of UL, which includes flexible value, flexible relation, flexible degree, flexible pattern, and flexible dimension. Actually, the study of interval-valued fuzzy logics is new directions and challenges, there have been lots of papers about interval-valued logics and its abroad applications. However, flexibility of the interval-valued logics is still researched in their works. In this paper, we will place emphasis on the flexibility of the interval-valued logics. Firstly, we will review basic principles of universal logics. Secondly, from the point of view of interval structure, interval- operations of the Universal Logics including interval-valued complement (interval-complement, for short), interval-valued intersection (interval-intersection, for short), interval-valued union (interval-union, for short) and interval-valued implication (interval-implication, for short) are redefined based on the radical models. Thirdly, regularity and monotonicity of interval- implication are investigated; the interval-intersection and interval-implication are proved to be an adjoint pair. Moreover, operation models are firstly given in the special points of h, and the true valued table of the interval-implication is firstly given in the special points of h. It is very important to the further study of flexibility of the interval-logics. Finally, we will research into bi-order algebraic system corresponding algebraic structure of the flexible interval-valued logics.

5.3.19 Junyong Yan and Yi Jin and Kaizhong Zuo Decrease-Radix Design of Ternary Logic Optical Calculator

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There are only seventeen different ternary logic operations in total possible operations, included in Universal Logics Principle (ULP)[1] which written by Prof. HE Hua-can etc. In 2002, Prof. JIN Yi put forward the principle of Ternary Optical Computer (TOC), and worked out theoretical light diagrams first that aim to complete the said seventeen logic operations[2]. These light diagrams, however, were jumbled and redundancy in architecture for lack of corresponding design theory and method. So the design quality can't be assured and a calculator may have different light diagrams if it was designed by different person. For this reason there were the greatest difficulty in industrial realization of light diagram, simplification and Rec- onstruction of hardware, and research on prototype for TOC.

In order to get rid of these difficulties, we discussed these problems seriously in 2006 and first made a theoretical breakthrough in no-carry TOC processor design, then decrease- radix design principle was proposed, the soul of the principle was: A n-value calculator(Be denoted by $P_h(n)$) has n-value input and output, and basic calculator unit(Be denoted by $A_h(n)$) which has a n-value input and a two-value output, so the construction of $A_h(n)$ is simpler than that of $P_h(n)$, and it can be realized easily, if the construction of DH-er is simple, from dividing theorem, then any complicated $P_h(n)$ can be DH by serial simple $A_h(n)$ using simple DH-ers.

Using the specification, theoretical light diagrams for seventeen ternary logic operations were designed again in this paper, and the result compared with previous design were displayed.

Two conclusions can be founded in this paper as following:

1) The monolayer liquid crystals are easier to realize than two overlapped ones, so Compared with previous plans this designs are simpler, easier to realize in hardware.

2) The fact that one basic calculator unit can be used by different calculators establishes the basis for reconstruction of calculators.

5.3.20 Haifei Yu
Summarization of New Quantum Logic

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It has been 70 years since quantum logic was born. However, the relation between quantum logic and experience, solution of quantum paradoxes and practical application of quantum logic leave a lot to be desired. Introducing new propositional variables and connotative connectives to extend classical logic and construct new quantum logical axiom systems QPA is a good approach to solve the questions above from quantum physics ontology by mathematical dialectical logic.

5.3.21 Elia Zardini
A Model of Tolerance

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The talk will present a family of logics ("tolerant logics") designed to deal with the sorites paradox in such a way as to enable us to deny the validity of the paradoxical reasoning rather than the full truth of its (intuitively true) major premise. We will focus on the zeroth-order fragments of tolerant logics. The main idea is to place some restrictions on the transitivity of the consequence relation. This is achieved in a lattice-theoretical semantics by letting the set of designated values for the premises be a (possibly proper) subset of the set of designated values for the conclusions. The basic semantic construction will be developed with further and further constraints in order to define stronger and stronger logics. A model in the strongest logic for the premises and the negation of the conclusion of the sorites paradox will finally be given.

5.3.22 Richard Zuber
Some Boolean Closures of Quantifiers

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5.4 History and Philosophy

5.4.1 Maria Eunice Quilici Gonzalez* and Mariana Claudia Broens** and Fabricio Lofrredo D'Ottaviano**
Chance, logic and spontaneity: notes on the role of information in self-organizing systems

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5.4.2 Henri Galinon
Turning the tables: inference and truth

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Is *true* a logical property as deflationists contend ? We build on classical works in philosophical proof theory to provide some support to this thesis.

5.4.3 Amanda Hicks
Motivations for Studying the Independence of Axiom Sets

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Historically, different conceptions of the role of axioms have contributed to different motivations for studying their independence. This paper discusses four conceptions of the role of axioms as found in certain works by Husserl, Hilbert, Huntington, and Tarski. The conceptions discussed are of axioms as (1) propositions known with certainty on non-deductive grounds, (2) expressions of laws that unify facts about the domain of investigation, (3) propositions that characterize a particular subject matter, and (4) propositions taken arbitrarily as premises for deductions. It then relates each of these conceptions to different motivations for studying independence. The second conception can be understood as providing residual motivation even for mathematicians and philosophers who do not explicitly regard axioms in this light.

5.4.4 Ole Thomassen Hjortland
Inferentialism and disagreement about logic

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Inferentialism is the idea that the meaning of logical constants are fully determined by (some of) the inferential rules that govern their use. Recently, it has been argued by Timothy Williamson (Williamson 2006) that the inferentialist has a problem with disagreement about logic. If disagreement about logic is disagreement about which are the valid rules of inference, then there seems to be little hope to avoid the conclusion that disagreement about logic is merely terminological disagreement. Since the inferentialist typically attaches different meanings to logical constants with different rules, disagreement about logic would simply reflect a disagreement about the meaning of the logical constants in question. Thus, *prima facie*, inferentialism threatens to undermine the possibility of genuine disagreement about logic. The paper gives a critical discussion of some inferentialist attempts to deal with disagreement, and briefly develops an alternative along Quinean lines.

5.4.5 Ming Hsiung
Liar Paradoxes and Coloring Problems

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The sentences of Liar Paradoxes are married with the relational semantics. It is observed that such paradoxical sentences, unlike those contradictory ones, do not necessarily contain a contradiction on frames. By the technique of coloring in graph theory, it is proved that the well-known Liar Sentence contains a contradiction on and only on the frames with odd cycles, and the Liar Sentence is strictly less contradictory than the binary Liar System (i.e. the well-known "Postcard Paradox").

5.4.6 Zhanji Huang
Simple Resolution of The "Liar-like" paradoxes

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Both Eubulides' "liar paradox" and Heraclitus' "this and that" paradox challenge Aristotle's "non-contradiction" law ("non" law). We point out that the former fails and the latter succeeds. We revise "this and that" with "this or that" for "pragmatic purposes", and point out that Heraclitus commits the "contradictory definition" fallacy, so that Heraclitus and Aristotle have "equal-shares"!

1. Challenging the "non-contradiction law" . The Strengthened Liar Paradox: This sentence is untrue (P) . Assume: P true. From what P asserts (or P's semantic meaning), it follows that P is untrue. Thus P is proved to be untrue. Assume : P untrue. From what P asserts, it follows that P is true. Thus P is proved to be true. To sum up, the whole argument proves a contradiction "P∧ ∼ P" to be true. This greatly challenges our common sense: the law of non-contradiction. This is quite different from merely deriving a contradiction, which we (language users) commit contradiction fallacy. How to resolve it?

2. "Genuine contradiction" resolution. Apparently, "This sentence is untrue "(P) is not self-contradictory. But when we explicate P's semantic meaning, " p" is the result. In other words, when the "self-reference + denial" of P is fully expressed, the "simple P "(implicit contradiction) unveiled into "complex 'P∧ ∼P"' (explicit contradiction.) since argument P contains contradiction, it's conclusion (a contradiction proved) cannot hold. Paradox P is resolved (in logician's low-standard.)

3. "Complex proposition" resolution. Now we try to resolve (in dialectician's high-standard) the liar-paradox P: In the second part of argument P, while we assume the "simple P untrue" (which remains an implicit contradiction) is to commit the "complex proposition " fallacy . But in fact ,we should assume the "complex 'P∧ ∼P' untrue"(which equivalent to a tautology "P∨ ∼P")and we can prove nothing. Thus, the second part of P (and also the whole argument P) cannot hold, for committing "complex proposition" fallacy. Similar to the above fallacious argument is the "smoker paradox": "John is no longer being a smoker" (Q) Assume : Q true , it follows "John has been a smoker (R). Assume : Q untrue , R also follows . No matter whether Q or ∼Qwe prove R , Yet observation proves "John has never been a smoker". (∧ ∼R): logic and observation together proved "R∧ ∼R". How to resolve it ? After careful analysis , it shows that Q presupposed R , and can be expressed as "R∧ ∼!" Then , we should assume the complex "'R ∧Q' untrue " instead of the simple "Q untrue", and R will no longer follow . The paradox is resolved by pointing out its "complex proposition"fallacy.

5.4.7 Doris Kiekhöven
Leibniz model: Developing an universal language from the first terms, principles and definitions

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The most common principles should be defined by synthesis (induction) as the result from experience, thinking and reasoning. The model is as the consequence based on categorical logic (terminological logic, intensional logic). The consistency of terms and propositions is a presupposition of the model. The task is the proof of a proposition, a term, a compound scientific problem or simple an argument of discussion. The analysis have to find out the answer by classical or modal logic. The principle of individuation is one of the main principle. The close matching of principles of physics, mathematics and human acting, deciding and behaviour is the essence of the theory. The aim is the codifying by proper programming languages.

5.4.8 Javier Legris
Formalism and Universality in the Origins of Symbolic Logic: the cases of Frege and Schröder

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In the complex situation in which symbolic logic emerged during the 19th Century different ideas coexisted about what is formal. At the same time, several formal languages were conceived in order to construct unifying theories for mathematics. These languages were meant to be universal: the language should be able to represent every notion. Both aspects, formalism and universality, were deeply interconnected. In this paper, I will compare the cases of Frege's conceptual script and Schrders algebra of relatives. They represent opposite conceptions of both formalism and universality with different ontological presuppositions: A theory can be formal as far as it represents logical objects, on one side, and properties or structures, on the other side.

5.4.9 María Manzano* and Enrique Alonso** Leon Henkin: In Memorian

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Leon Henkin was born in 1921 in New York city, district of Brooklyn, son of immigrant Russian Jews. He died November 1st 2006. We believe he was an extraordinary logician, an excellent and devoted teacher, an exceptional person of great heart who did not elude social compromise, not only a firm believer in equality but an active individual hoping to achieve it.

Henkin's influential papers in the domain of foundations of mathematical logic begin with two on completeness of formal systems, where he fashioned a new method that was applied afterwards to many logical systems, including the non-classical ones.

5.4.10 Robert K. Meyer A Boolean Key to the (relevant) universe?

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The Relevantist has hitherto been held an enemy of Boolean logic, and especially of the Boolean negation ¬. (Cf. [1] and [2], especially the treatment of Entailment and the Disjunctive Syllogism in [2], pp. .) In fairness, one does not quite know what to do with the disdain for Boolean ¬ in [2], since its authors go on to admit that there may well be NO relevantists at all. Moreover the display logic introduced for the system **R** by Belnap in [2] looks forward to mixing the Boolean negation ¬ with the DeMorgan negation ∼ that came as *original equipment* for **R** and other relevant logics.

Be those things as they may, the present paper *embraces* Boolean ¬, seeing it as a reasonable *completion*-philosophically as well as technically-of the relevant story hitherto told. There are many reasons for this. One is simply that, although the teeth of Boole are not quite as firmly inserted into the throat of Logic as in the last century, this is still a classical period in the history of our subject. Not only do the famous "laws" (of non-contradiction, excluded middle, etc.) retain the allegiance of most logicians, but more centrally the *techniques* developed for the analysis of truth-functional logic are central also in the research of the avowed foes of that logic. From Gentzen's *cut* to Tarski's *models*, the business of ringing the changes on classical conceptions is definitely as alive and well among the relevant as it has ever been for the irrelevant.

We have, however, more immediate fish to fry. One of the consequences of the *relevant model theory* developed in [3, 4, etc.] is what we have come to call (e. g. in [5]) the *key to the Universe*. This is the remarkable correspondence between the *semantical postulates* appropriate to various relevant logics and the matching Curry-style *combinators* on the famous Curry-Howard isomorphism. Indeed, not only are the Curry correspondences *reflected* in [4]; they are actually improved, along the lines that later led Barendregt, Coppo and Dezani to propose in [6] a model of the λ-calculus in (what they called) *filters* over *intersection types*.

For, logically speaking, these *filters* are nothing but relevant *theories*, closed under conjunction and the provable entailment of the minimal positive relevant logic of [4]. And the axioms of any particular (relevant or irrelevant) logic **L** give rise to associated structural properties of an induced calculus of **L**-theories. It is these structural properties that undergird the appropriate semantical postulates for **L**.

This much, indeed, has been long known-for over three decades, in fact, since Routley and Meyer's original ternary relational semantics for relevant logics. But we did *not*, at the outset, quite realize *all* that we knew, or should have known. In a nutshell, the minimal relevant logic $\boldsymbol{B} \wedge \boldsymbol{T}$ of $\rightarrow$, $\wedge$, and the Church constant **T** gives rise to exactly the right class of theories to model Church's λ and Curry's **CL**. But it is not so clear what to do about disjunction $\vee$; it has been even less clear what is to be done with Boolean $\neg$.

Enter the immediate predecessor [7] of the present paper. Building on work of Frisch, Castagna, Dezani, Benzaken et al., we showed in [7] that *prime* theories will do for **B+T** what theories in general did for $\boldsymbol{B} \wedge \boldsymbol{T}$. We show here that those arguments generalize. Indeed, when Boolean is present, the *prime* theories are what we here call ultra theories-theories consistent and complete with respect to the Boolean negation $\neg$.

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5.4.11 Amirouche Moktefi
Lewis Carroll's logic diagrams

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Logic diagrams constitute the central object of Lewis Carroll's logical writings published during his lifetime. He first published them in The Game of Logic (1886), before explaining their use more extensively ten years later in the first part of Symbolic Logic. The object of this paper is to discuss Lewis Carroll's diagrams in their historical context, and to compare them with the other 'rival' diagrams that flourished at the time like Venn diagrams, Marquand tables and Alexander Macfarlane's logical spectrum. I will first present Carroll's diagrams, explain their use and discuss their genesis. Then I will discuss two main points on which there is dispute among historians of logic: the representation of the universe of discourse and the construction of diagrams for more than three terms.

5.4.12 Walter Moser
Logic, life and love

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5.4.13 Constantin Pavloff
Philosophical view beyond Tarski's conception of truth

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Behind the philosophical idea of 'truth' there stands an understanding that there always is a gap between 'direct observations' and 'reality'. Because of this philosophical theories of truth deal with bridging of incommensurable language games, and are aimed at logic of definition of the primitive terms meaning of one game in terms of the other. Philosophical logic is a logic of a search for answers to the following questions: what does it mean to be "adequate?", what does it mean to be an "elementary notion"?, what does it mean to be "meaningful", "intelligible"?, what does it mean to be "logical"?, etc.

5.4.14 Denis I. Saveliev
Choice and Regularity: Common Consequences in Logics

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It is well-known that the Axiom of Choice and the Axiom of Regularity, although are independent of each other, but have a likeness: both they concern a well-foundedness and have many remarkable common consequences in logics, as representations classes by sets or the Reflection Principle. We propose a new axiom, the Axiom of Best-Foundedness, that is consistent with both negations of Choice and Regularity but implies all these consequences. The axiom has a number of natural reformulations. Besides, we show that Best-Foundedness is exactly that is missing in Global Choice to be Global Well-Ordering. Further we study relationships between these consequences in detail by proving consistency results. We develope a method of model construction via authomorphism filters, which is a going far generalization of permutation models technique. Particularly, we show that adjoining of Choice, Regularity, and Extensionality to set theory without them is safe over Best-Foundedness and a Skolem function for equiextensionality. This is a step in author's programme for establishing of truth of new axioms and safety of old ones.

5.4.15 Michael von Boguslawski
The Beginning of the Study of Modern Logic in Finland

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Logic in Finland could be seen as originating in Eino Kaila (1890 - 1958), who imported logic to Finland through his strong connections with the Wiener Kreis during the 1930's. The 1930's mark specifically the period in Finnish philosophy when a receptive tradition gave way for a more creative setting, very much due to Kaila's personal efforts. His effect on the development of logic in Finland can best be appreciated through the widespread recognition that his three main students, Oiva Ketonen, Erik Stenius, and Georg Henrik von Wright have received. They all became professors of philosophy at the University of Helsinki. This paper concentrates on Kaila's work and life around the 1930's and on his students early scientific work on logic.

5.4.16 Urszula Wybraniec-Skardowska and Zbigniew Bonikowski
Vagueness, Vague Sets and Logic

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The paper proposes a new approach to the problem of vagueness from logical, set-theoretical, algebraic and computer science perspective. The paper yields logical foundations to a theory of vague notions (vague terms), and their denotations (vague sets). The notion of the vague set is defined as some family of sets approximated by the so-called lower and upper limits. The family is simultaneously regarded as a family of all scopes of sharp terms representing the vague term from the point of view of an agent discovering a definite fragment of reality. Some algebraic operations on vague sets are defined; also their Boolean algebraic properties are justified. Some important conditions about the memberships relation for vague sets are established. A view on the problem of logic of vague sentences based on vague sets is also discussed. The considerations intend to take into account a classical, 'conservative' approach and suggest finding a logic of vague sentences as a non-classical logic in which all counterparts of laws of classical logic are tautologies.

5.4.17 A. Zahabi
Avicenna's Logical Innovations in Classical Logic

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Although Avicenna has confirmed Aristotelian logical system and even admired it, but he hasn't followed Aristotle totally. Ibn Sina's creative thoughts in classical logic not only caused innovations in Aristotelian logic, but also influenced deeply on the later logicians, especially the Muslim ones. In a way the current Aristotelian logic by thinkers after Avicenna is a reformed system due to Avicenna's efforts. Ibn Sina- especially in his book "Isharat wa Tanbihat "- not only started a new writing of logic in Iranian-Islamic civilization, but also caused many changes in Aristotelian logic. Furthermore, he showed a new classification of logic by presentation of bipartite kind. By comparison to Aristotelian logic, we can put his changes in three different categories: 1- Additive changes 2- Deductible changes 3-Arrangement changes The most important examples include: Increasing category of terms especially "Implications" Presentation new concepts of some expressions like a very modern definition of proposition Expanding modalities of proposition and innovating of conjunctive conditional syllogism Decreasing of copious arguments about "Poetic" and "Rhetoric" Omitting of the"Ten categories" and replacing discussion of "Converse" from "Tobica" to "Peri Ermeneias".

5.4.18 Chuan Zhao
The Ways of Orient Logic

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This article discusses the ways of orient logics. First I will give some foundational concepts and some principles. Then talk about the deep logical phenomena in orient phylosophy. I will analysis *The Book of Change* and give formal explaination to the main idea of Tao. Then I will compare the view of

ZhongGuang theory in Buddhism with the views of west logic system. Finally I will talk about *the Heart Of Prajna Paramita Sutra*. I have studied the inner essence of logic in orient philosophy. I found that there are many formal phases-changing structures in these thoughts. I should integrate the ways of calculation in orient philosophy with normal mathematics. With the help of the concepts in Algebra, Formal Semantics, Fractal, Rough set theorem, category etc, I try to formalize orient logic in the mathematical style. This is difficult but valuable to the translation between science and orient philosophy. If there is not such attempt it should be great waste to the whole human spirit. They are two kinds of thinking manner. I should let them shake hands with each other. The call of universal logic has integrated all of my study and though to answer it. I am just the translator to the profound orient philosophy. On the same time, classical logics will find the seats and characters of orient logic in the full-aspects view and they should form a full logic system. Heidegger wants to let west philosophy and east philosophy meet and talk. Now we can begin to practice such a hard attempt.

5.4.19 Hong Zhou
Reference Presupposition and Non-Existence Claims

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I begin by arguing that non-existence claims does not motivate the study of languages without existential presupposition for proper names. I first distinguish externalist semantic theories (e.g. Davidson) from phenomenological ones (Stalnaker), and argue that the former, by virtue of being static, are not suitable for dealing with non-existence claims. Next, I describe and defend a dynamic conception of logical space - serving as background to common-ground - that allows one to describe, within the framework of phenomenological semantics, the purport of non-existence claims as a special kind of update. The update consists not in the modification of common-ground, but in the change of the logical space itself. After describing some other kinds of logical-space-changing claims (identity claims linking proper names and claims using indefinites) I sketch the outline of a radically dynamic semantics where the common-ground as well as the underlying logical space are subject to change.

6 Social Program

6.1 Terracota Warriors

Xi'an is the ancient capital of China. It was a capital of 12 dynasties from 1046 BC to 907 AC. Xi'an is about a thousand kilometers South-West of Beijing. Close to Xi'an have been found in 1974 the famous terracotta warriors from 2200 years ago. There will be a tour to *Terracota Warriors*.

6.2 Table Tennis Tournament

Somes countries are famous all over the world for their favourite sport: soccer in Brazil, ski in Finland or Austria, hockey in Canada ... and table tennis in China. Because table tennis is the sport number 1 in China, we propose during UNILOG'07 an internal tournament between participants. Some people from the European community of logic and philosophy are already converted players and fans of *ping pong*; but who can say in the world that (s)he is a good player before encountering a native Chinese?! Sport is the best way to connect people during one play, one physical and mental fight ...

Tables, rackets and balls will be available on the spot, please just bring shorts and T-Shirts with you. However, those who already possess good material will be allowed to use it (especially for personal rackets).

You can find hereby the basic rules of table tennis:

http://www.tabletennis.gr/rules.asp

For any information about the tournament, please contact Dr. Fabien Schang: schang.fabien@voila.fr

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