Journée Logique à Marseille, le 2 decembre 2014

Salle de séminaire (no. 2) de la FRIIAM
Campus universitaire St-Charles

9h15–9h50	Thomas Studer (Université de Berne). *Proofs and Fixed Points.*
9h50–10h20	Luigi Santocanale (LIF, AMU). *Circular proof systems.*
10h20–10h50	Lionel Vaux (I2M, AMU). $M \in SN \Leftrightarrow T(M) \in F$. *Strong normalizability as a finiteness property via the Taylor expansion of lambda-terms.*
10h50–11h10	Pause café.
11h10–11h45	Philippe Balbiani (IRIT, CNRS). *Propositional dynamic logic with parallel composition, recovering and storing: axiomatization/completeness and decidability/complexity.*
11h45–12h15	Sévérine Fratani (LIF, AMU). *The Monadic Second Order Logic of Higher order pushdown stacks.*
12h15–12h45	Vincent Risch (LSIS, AMU). *X-logics based multivalued reasoning for argumentation.*
12h45–14h00	Déjeuner.
14h00–14h35	Giuseppe Greco (Université de Delft). *Correspondence theory as a proof theoretic tool.*
14h35–15h05	Myriam Quatrini (I2M, AMU). *Dialogues et preuves formelles.*
15h05–15h40	Silvio Ghilardi (Université de Milan). *Step-frame analysis (in single and multi-conclusion calculi).*
15h40–16h00	Pause café.
16h00–16h30	Nicola Olivetti (LSIS, AMU). *Internal sequent calculi for conditional logics.*
16h30–17h05	Hans van Ditmarsch (LORIA, CNRS). *Five Funny Bisimulations.*
17h05–18h00	Table ronde sur la recherche en logique à Marseille.

Résumés

Five Funny Bisimulations

Hans van Ditmarsch

LORIA, CNRS

In this survey we present various recent work proposing adjustments to the standard notion of bisimulation in order to have proper structural correspondents with epistemic, or epistemically motivated, modalities : contingency bisimulation, awareness bisimulation, plausibility bisimulation, refinement, and bisimulation for sabotage.

The Monadic Second Order Logic of Higher order pushdown stacks

Sévérine Fratani

LIF, AMU

Higher order pushdown stacks are storage structures introduced in the 70's and widely studied these last ten years. We propose here to study the properties of the Monadic Second Order Logic of these structures.

Unified Correspondence as a Proof-Theoretic Tool

Giuseppe Greco

University of Delft

Joint work with : Minghui Ma, Alessandra Palmigiano, Apostolos Tzimoulis, Zhiguang Zhao

This talk focuses on the formal connections which have recently been highlighted between correspondence phenomena, well known from the area of modal logic, and the theory of display calculi originated by Belnap.

These connections have been seminally observed and exploited by Marcus Kracht, in the context of his characterisation of the modal axioms (which he calls primitive formulas) which can be effectively transformed into 'good' structural rules of display calculi. In this context, a rule is 'good' if adding it to a display calculus preserves Belnap's cut-elimination theorem.

In recent years, correspondence theory has been uniformly extended from classical modal logic to diverse families of nonclassical logics, ranging from (bi-)intuitionistic (modal) logics, linear, relevant and other substructural logics, to hybrid logics and mu-calculi. This generalisation has given rise to a theory called unified correspondence, the most important technical tool of which is the algorithm ALBA.

We put ALBA to work to obtain a generalisation of Kracht's transformation procedure from axioms into 'good' rules. This generalisation concerns more than one aspect. Firstly, we define primitive formulas/inequalities in any logic the algebraic semantics of which is based on distributive lattices with operators. Secondly, in the context of each such logic, we significantly generalise the class of primitive formulas/inequalities, and we apply ALBA to obtain an effective transformation procedure for each member of this class.

Time permitting, we will discuss the connections between the ALBA-aided transformation procedure and other similar procedures existing in the literature, developed for instance by Negri, Ciabattoni and other authors.

Step frame analysis in single- and multi-conclusion calculi

Silvio Ghilardi*

Università degli Studi di Milano, Milano, Italy

(This contribution is joint work with Nick Bezhanishvili). We introduce semantic and algorithmic methods for establishing a variant of the analytic subformula property (called the bounded proof property, bpp) [3, 4] for modal propositional logics. Our methodology originated from tools and techniques developed on one side within the algebraic/coalgebraic literature dealing with free algebra constructions [1, 6–8] and on the other side from classical correspondence theory in modal logic. The main result states that the bpp and fmp (the finite model property) can be characterized as dual embeddability properties of finite two-sorted frames (called 'step frames') into standard Kripke frames.

The methodology has been recently extended to multi-conclusion rules [5] in order to cope with some canonical axiomatizations of universal classes. This extension allowed to establish both the bpp and fmp for the class of stable modal logics [2], i.e., for those logics whose corresponding frames are closed under homomorphic images.

References

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*Supported by the PRIN 2010-2011 project "Logical Methods for Information Management" funded by the Italian Ministry of Education, University and Research (MIUR).

Internal Sequent Calculi for conditional logics

Nicola Olivetti

LSIS, AMU

Conditional logics have been proposed by Lewis, Stalnaker, Nute, Chellas and Burgess, among others, to formalise a kind of hypothetical implication that cannot be adequatly by imaterial mplication of classical logic. Conditional logic have been used to model several types of reasoning in Articifial Intelligence and Eplstemology (representing counterfactuals reasoning about belief, change, prototypical properties and rules with exceptions).

The proof theory of conditional logics is not as developed as the one of other extensions of classical logics, first of all modal logics of which they are a sort of generalisation. It is particularly difficult to obtain *analytic* and *internal* proof system for them. In the quest of calculi of this kind, I shall present recently introduced *nested sequent calculi*, which seem particularly natural for conditional logics, at least for the basic ones. Finally I shall discuss some open problems, in particular the challenge of obtaining natural internal calculi for *strong* conditional logics, such as Lewis' logics of counterfactuals.

Dialogues et preuves formelles

Myriam Quatrini

I2M, AMU

I will briefly introduce Ludics : a Theory of Logic that J.-Y. Girard formulated in 2001. And I will present the natural language dialogue modeling that we develop on Ludics.

X-logics based multivalued reasoning for argumentation

Vincent Risch

LSIS, AMU

In the context of a general argumentation framework based on X-logics, the aim of this work is to construct a simple calculus for handling the attitudes that an agent may adopt in the presence of a given formula in order to further produce new arguments. Coming from the para- consistent character of X-logics, there are (a total of) four attitudes that can be defined for such an agent. By interpreting them as the truth values of a multi-valued logics, a non-deterministic matrix can be defined for it, from which a n-sequent calculus can be derived. A reduction to two-sided sequents after the method of Avron, Ben-Naim, and Konikowska is proposed, and its proximity with the Most General Source Proces- sor Logic (MSPL) is discussed.

Circular proof systems

Luigi Santocanale

LIF, AMU

The calculus of circular proofs presents a simple logic, obtained by adding least and greatest fixed-point operators to the additives of linear logic. After recalling the calculus and its origins, I'll illustrate the difficulties that arise when trying to generalize the circular machinary to more classical fixed-point logics such as the modal mu-calculus. Ground on these observations, I'll justify my aim of studying circular proof systems for multiplicative (and additive) linear logic.

Proofs and Fixed Points

Thomas Studer

Université de Berne

Syntactic cut-elimination is a notorious problem for modal fixed point logics such as temporal logics, the logic of common knowledge, or the modal mu-calculus. A result by Alberucci and Jäger suggests that the cut-rule cannot be eliminated in a traditional Gentzen-style sequent calculus for the logic of common knowledge. The situation changes if one considers semi-formal systems that include an omega-rule. We know cut-free sequent systems for the logic of common knowledge and also for the modal mu-calculus that are based on omega-rules. However, the cut-rules cannot be eliminated syntactically in those systems since the usual cut-elimination procedures do not work.

In order to solve this problem, Brünnler and Studer develop a cut-elimination procedure for a semi-formal nested sequent calculus for the logic of common knowledge. Together with the embeddings of the traditional shallow system into the nested system and vice versa, they obtain a syntactic cut-elimination procedure for a traditional semi-formal system for common knowledge. Further, they are able to extend their method to the continuous fragment of the modal mu-calculus but they also show that it cannot be extended to the whole modal mu-calculus.

Mints and Studer investigate a system for the modal mu-calculus that includes a Buchholz rule. Hence collapsing techniques can be applied to this system, which yields a general syntactic cut-elimination procedure that works beyond the continuous fragment. Yet this method has only been applied to the one-variable fragment of the mu-calculus. It is open how to generalize it to the whole logic.

I will present these resent results and discuss possible generalizations and promising directions for further work.

$$M \in SN \Leftrightarrow T(M) \in F.$$

Strong normalizability as a finiteness property via the Taylor expansion of lambda-terms

Lionel Vaux

I2M, AMU

Finiteness spaces were introduced by Ehrhard as model of linear logic allowing to interpret types as particular topological vector spaces and lambda-terms as analytic morphisms, thus justifying the introduction of differential linear logic.

The main feature of finiteness spaces is that supports of vectors of dual types have a finite intersection, hence the inner products involved in the interpretation of a cut are given by finite sums.

This feature can be loosely rephrased as : "finiteness spaces forbid infinite computations".

We provide a formal account of that intuition, via the Taylor expansion of λ-terms in the resource λ-calculus : we introduce a finiteness structure on the set of resource λ-terms, such that a λ-term is strongly normalizing iff the support of its Taylor expansion is finitary. This refines a previous result by Ehrhard (LICS 2010).

Joint work with Michele Pagani and Christine Tasson (PPS).