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26 al 30 de julio 2022
San José, Costa Rica

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PROGRAMA / PROGRAM

Martes / Tuesday

09:00 – 09:30: Inauguración

Charla Plenaria / Plenary Talk

9:30 –10:30: Brech, C: Rigidity and homogeneity in combinatorial Banach spaces.
10:30 – 11:00 Receso / Coffee break
11:00 –12:0: Godo: De Finetti's three-valued conditionals and Boolean algebras of conditionals: two sides of a same coin.
13:00 – 14:00 Tiempo para almuerzo / Time for lunch.
14:00 –15:00: Pereira, L: Revisiting Disjunctive Syllogism and Ex falso
15:00 –16:00: Pimentel, E: A tour on ecumenical systems
16:00 – 16:30 Receso / Coffee break

Tutorials
16:30 –17:30: García, D: Model theory of pseudo finite structures
17:30 –19:00: Brindis

Miércoles / Wednesday

Charla Plenaria / Plenary Talk
14:00–15:00: Haskell, D: Analytic functions on an ordered valued field

Tutorials
8:00–9:00: García, D: Model theory of pseudo finite structures
9:00–10:00: Westrick, L: Borel sets and reverse mathematics
15:00–16:00: Guzmán, O: An introduction to construction squemes.

Teoría de Conjuntos / Set theory
10:30–11:25: Montoya, D: Maximal almost disjoint families and singulars
11:30–11:55: Jardón, M: Small infinite partitions and other features of the Nowhere Centered ideal
16:30–16:55: Rivas González,N: Trace Ideals on omega
17:00–17:25: Gamboa Higuera,D: Reconstruction of Colorings from its Homogenous Sets

Computabilidad e Informática / Computability and Informatics
10:30–11:25: Fokina, E: Classification problem for effective structures
11:30–11:55: Gónzalez, L: Mechanizing a dual-context sequent calculus for the constructive modal logic S4
16:30–17:25: San Mauro, L: Classifying equivalence relations on the natural numbers

Filosofía de la lógica, Lógica filosófica y lógicas no clásicas / Philosophy of Logic, philosophical logic and non-classical logics
10:30–11:10: Freund, M: A Sortalist Approach to Aristotelian Assertoric Syllogistic

11:15–11:35: Morales, J: Inferencias Escépticas en el Razonamiento No-monotónico y sus Problemas Filosóficos
16:30–17:10: Mazzolo, A: Lógica, razonamiento y normatividad
17:15–17:35: Meza, L: A critique of Timothy Williamson's objections to Logical Pluralism

Teoría de modelos / Model theory
10:30–10:50: Cuervo, N: Schroder-Bernstein property on separable randomizations.
10:55–11:15: Zambrano, P: A characterization of continuous logic by using quantale-valued logics
11:20–12:00: Goodrick, J: Sets definable in ordered Abelian groups of finite burden
16:30–16:50: Chavarria, N: Continuous Stable Regularity
16:55–17:20: Van Abel, A: Tame Pseudofinite Theories With Wild Dimensions

Jueves / Thursday

Charla Plenaria / Plenary Talk
8:00–9:00: Harrison-Trainor, M: To what extent do structural properties and computational properties coincide?

Tutorials
10:30–12:00: Szmuc, D: Substructural approaches to logical consequence
14:00–15:00: Westrick, L: Borel sets and reverse mathematics
15:00–16:00: Guzman, O: An introduction to construction squemes

Teoría de Conjuntos / Set theory
9:05–10:00: Tsankov, T: Maximal highly proximal flows of locally compact groups
16:30–17:25: Lecomte, D: Continuous 2-colorings and discrete dynamical systems
17:30–17:55: Cano, J: Topological games in Ramsey spaces

Computabilidad e Informática / Computability and Informatics
9:05–10:00: Miranda-Perea, F: A modal sequent calculus for notions of encapsulated computation
16:30–17:25: Ventura, D: Node Replication: a logic-based optimisation in computation
17:30–17:55: Solares-Rojas, A: Tractable depth-bounded approximations to FDE

Filosofía de la lógica, Lógica filosófica y lógicas no clásicas / Philosophy of Logic, philosophical logic and non-classical logics
9:00–9:40: Estrada, L: Possibility, triviality and invalidity/Posibilidad, trivialidad e invalidez
9:45–10:05: Nava, W: The Adoption Problem and the Contents of Inference Rules
16:30–17:10: Barrio, E: Substructural Paraconsistency
17:15–17:55: Caicedo, X: TBA

Teoría de modelos / Model theory
9:10–9:50: Vicaria, M: Elimination of imaginaries in multivalued henselian valued fields
16:30–17:10: Rideau, S: Enriching stably embedded sets and expansions of the integers
17:15–17:35: Villaveces, A: Around dependent abstract elementary classes
17:40–18:00: Zapata, O: Descriptive complexity of the generalized adjacency matrix

Viernes / Friday

Charla Plenaria / Plenary Talk
9:00–10:00: León Sanchéz,O: Recent interactions between representation theory (of algebras) and model theory

Tutorials
8:00–9:00: Westrick, L: Borel sets and reverse mathematics

Computabilidad e Informática / Computability and Informatics
10:30–11:15: Miller, R: Relativizing computable structure theory

Filosofía de la lógica, Lógica filosófica y lógicas no clásicas / Philosophy of Logic, philosophical logic and non-classical logics
10:30–10:50: Mueller-Theys, J: The Refutation of Alternativeism
10:55–11:15: Meleiro, M: Towards Modular Mathematics
10:55–11:15: Logan, S: Semantics for Second-Order Relevant Logic
10:55–11:15: Trejo, M: La adjunción producto/exponencial desde un punto de vista lógico

Teoría de modelos / Model theory
10:30–10:50: Bustamante, R: Groups definable in partial differential fields with an automorphism
10:30–10:50: Valderrama, D: About $(\mathcal{L}, n)$-models

Sábado / Saturday

Charla Plenaria / Plenary Talk
14:00–15:00: Dzamonja, M: Towards another vision of effectiveness at aleph$_1$

Tutorials
8:00–9:00: Garcia, D : Model theory of pseudo finite structures
9:00–10:00: Guzman, O: An introduction to construction squemes.
10:30–12:00: Szmuc, D: Substructural approaches to logical consequence

Teoría de conjuntos / Set theory
15:05–15:30: : Nieto de la Rosa, F: Una introducción a gaps y algunos modelos de ZFC
15:30–15:55: : García, J: Constructible Sets

Computabilidad e Informática / Computability and Informatics

15:05–15:30: Montalban, A: Transfinite ramsey theorem

Filosofía de la lógica, Lógica filosófica y lógicas no clásicas / Philosophy of Logic, philosophical logic and non-classical logics

15:05–15:20: Rodriguez, R: Algebraic Semantics for Possibilistic Logic
15:25–15:45: Nagy, A: Modal Weak Godel Algebras
15:50–16:10: Vásquez, O: Deep disagreements in logic

16:35–17:15: Ramírez, E: A relating semantics for Nelson's connexive logic
17:20–17:40: Dolores, S: Genuinely non-traditional logics
17:45–18:05: Béziau, J: Classical Propositional Logic Without Atoms

Teoría de modelos / Model theory
15:10–15:50: Bernstein, A: Expansions of vector spaces with a generic submodule

Lista de contribuciones / Contribution list

RIGIDITY AND HOMOGENEITY IN COMBINATORIAL BANACH SPACES

Charla Plenaria

Brech, Christina[1]
Brasil

Abstract:
The rigidity of an object is related to the existence of few automorphisms of it. The notion of homogeneity goes in the opposite direction, frequently allowing different "parts.ºf the object to be moved one to the other through automorphisms. Important homogeneity results in combinatorics come from Ramsey theory. A classical rigidity result in Banach space theory is the Banach-Stone theorem, which says that any linear bijective isometry between two C(K) spaces is induced by a homeomorphism between the compact spaces. In our talk, we will discuss these notions in the context of combinatorial Banach spaces, which are sequence spaces whose norm are induced by combinatorial families

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TOWARDS ANOTHER VISION OF EFFECTIVENESS AT $\aleph_1$

Charla Plenaria
Dzamonja, Mirna[1]
Francia

Abstract:
The first uncountable cardinal does not easily mend itself to methods inherited from the countable. We know this through a whole list of failures of properties such as compactness and Ramsey theorems. Similarly, the descriptive set theory at this level is very different from the classical descriptive set theory and does not really seem to give as much of an idea of effectiveness. We shall propose to look at the effectiveness at $\aleph_1$ from the point of view of automata theory and generalized decidability. In so doing, we shall introduce new classes of automata and consider MSO of trees.

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DE FINETTI'S THREE-VALUED CONDITIONALS AND BOOLEAN ALGEBRAS OF CONDITIONALS: TWO SIDES OF A SAME COIN

Charla Plenaria

Godo Lacasa, Lluís [1]

España

Abstract:
Conditionals play a key role in different areas of logic and probabilistic reasoning, and they have been studied and formalised from different angles. Bruno de Finetti was one of the first who put forward an analysis of conditionals beyond the realm of conditional probability theory arguing that they cannot be described within the bounds of classical logic. He called them trievents: a conditional (a|b) is a basic object to be read "a given b"that turns out to be true if both a and b are true, false if a is false and b is true, and void if b is false. This approach, has been further developed by Gilio and Sanfilippo by interpreting conditionals as numerical random quantities with a betting-based semantics, and where the third value is a conditional probability.

On the other hand, following a more logico-algebraic approach, it has been recently shown that, in a finite setting, conditional events can be endowed with a structure of Boolean algebra and that a (unconditional) probability measure on the initial algebra of plain events can be canonically extended to a (unconditional) probability measure on the Boolean algebra of conditionals which is in fact a conditional probability.

In this talk we will show how that the apparent contradiction between the above two perspectives, one that looks at three-valued conditionals as random quantities and the Boolean algebraic perspective on conditionals, actually dissolves once we precisely set at which level the numerical and the symbolic representation intervene. In doing so, we pave the way to build a bridge between the long standing tradition of three-valued conditionals and the more recent proposal of looking at conditionals as elements from suitable Boolean algebras.

This is joint work with Tommaso Flaminio, Angelo Gilio, Hykel Hosni and Giuseppe Sanfilippo

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TO WHAT EXTENT DO STRUCTURAL PROPERTIES AND COMPUTATIONAL PROPERTIES COINCIDE?

Charla Plenaria

Harrison-Trainor, Matthew [1]

Estados Unidos

Abstract:
Given a countable structure A, we distinguish between two types of properties: structural properties and computational properties. Think of a structural property of A as a property of the isomorphism type of A, for example, the sentences it satisfies, the types it realizes, or other properties such as (if A is a group) being torsion-free. On the other hand a computational property of A is a property of the different presentations (isomorphic copies with domain $\mathbb{N}$) of A. For example, it might be that every presentation of A can compute a set X. Many of the most celebrated results of computable structure theory show the equivalence between a structural property and a computational property. I will talk about a few of these and also some interesting examples of computational properties which do not seem to be equivalent to any structural property.

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Analytic functions on an ordered valued field

Charla Plenaria
Haskell, Deirdre[1]
Canadá

Abstract:
Model theory has had great success in establishing properties of sets defined by restricted analytic functions on an ordered field. Here restrictedïs defined using the ordering, and .ªnalytic function"means that its power series is convergent in the sense of the ordering. Similar ideas have been used for the study of restricted analytic functions on a valued field, where restricted.ªnd çonvergent.ªre now understood in the sense of the valuation. If a field has both an ordering and a valuation, which interact in a nice way, it is not so clear which of the relations should be considered primary in order to choose the functions to study. In this talk, I will explain the model-theoretic questions one might ask, review some of the past results, and discuss another collection of functions that one can study on an ordered valued field. I will do my best to explain all technical terms in this abstract (and more!).

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RECENT INTERACTIONS BETWEEN REPRESENTATION THEORY (OF ALGEBRAS) AND MODEL THEORY

Charla Plenaria

León Sánchez, Omar[1]
Reino Unido

Abstract:
In the last decade, a new crossroad between representation theory and model theory emerged. The specific programme (in representation theory) is called the Dixmier-Moeglin equivalence. This programme aims at characterizing the primitive ideals of an algebra over a field. Model theory had an appearance in the context of algebras of differential operators, and also in the context of Poisson algebras. In this talk, I will give a survey past and present results.

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REVISITING DISJUNCTIVE SYLLOGISM AND EX FALSO

Charla Plenaria

Pereira, Luiz Carlos[1] *Edward Hermann Haeusle*
Victor Nascimento
Brasil

Abstract:
The relation between ex falso and disjunctive syllogism, or even the justification of ex falso based on disjunctive syllogism, is an old topic in the History of Logic (see [2], [3], [4]). This old topic reappears in contemporary Logic since the introduction of Minimal logic by Johansson(see [6], [10], [11]). The disjunctive syllogism seems to be part of our general non-problematic inferential practices and superficially it doesn't seem to be related to or to depend on our acceptance of the ex falso rule; on the other hand, the general validity of the ex falso has been subjected to dispute. We know that the acceptance of the ex falso is a sufficient condition for the acceptance of the disjunctive syllogism and that the acceptance of the Disjunctive-syllogism rule implies the acceptance of the ex falso, as the following simple derivations in an intuitionistic natural deduction system (see [1], [5]) extended with the Disjunctive-syllogism rule show:

$$\dfrac{(A \vee B) \qquad [A]^1 \qquad \dfrac{\dfrac{[B]^2 \qquad \neg B}{\bot}\,\neg_{Elimination}}{A}\,\bot_i}{A}\,\vee_{Elimination}\ {}^{1,\,2}$$

$$\dfrac{\dfrac{A}{(A \vee B)} \qquad \neg A}{B}\ \text{Disjunctive-syllogism rule}$$

The interesting question is: is the ex falso really a necessary condition for the acceptance of the disjunctive syllogism? The aim of the present paper is to discuss some possible ways to define systems that combines the preservation of the disjunctive syllogism with the rejection of the ex falso. In the final part of the paper we discuss some interesting similarities and differences between our approach and Neil Tennant's relevantist approach ([6], [7], [8], [9]) to the same topic.

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A TOUR ON ECUMENICAL SYSTEMS

Charla Plenaria

Pimentel, Elaine[1]
Reino Unido

Abstract:
Some questions naturally arise with respect to ecumenical systems: what (really) are ecumenical systems? What are they good for? Why should anyone be interested in ecumenical systems? What is the real motivation behind the definition and development of ecumenical systems?
Based on the specific case of the ecumenical system that puts classical logic and intuitionist logic coexisting in peace in the same codification, we would like to propose three possible motivations for the definition, study and development of ecumenical systems.
- Philosophical motivation.
Logical inferentialism, is the semantical approach according to which the meaning of the logical constants can be specified by the rules that determine their correct use. There are some natural (proof-theoretical) inferentialist requirements on admissible logical rules, such as harmony and separability. We will start by discussing such requirements in the view of Prawitz' ecumenical system.
- Mathematical/computational motivation.
Dowek has this very interesting remark:
"Which mathematical results have a classical formulation that can be proved from the axioms of constructive set theory or constructive type theory and which require a classical formulation of these axioms and a classical notion of entailment remains to be investigated."
The second part of the talk is devoted to discuss ecumenical axiomatizations of mathematics.
- Logical motivation.
In a certain sense, the logical motivation naturally combines certain aspects of the philosophical motivation with certain aspects of the mathematical motivation. According to Prawitz, one can consider the so-called classical first order logic as "an attempted codification of a fragment of inferences occurring in [our] actual deductive practice". Given that there exist different and even divergent attempts to codify our (informal) deductive practice, it is more than natural to ask about what relations are entertained between these codifications.
Our claim is that ecumenical systems may help us to have a better understanding of the relation between classical logic and intuitionistic logic.
Maybe we can resume the logical motivation in the following (very simple) sentence:
Ecumenical systems constitute a new and promising instrument to study the nature of different (maybe divergent!) logics.
We will finish the talk by explaining how all this discussion can be lifted to the case of modal logics.

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MODEL THEORY OF PSEUDOFINITE STRUCTURE

Tutorial/Minicurso

García, Darío[1]
Colombia

Abstract:
A structure M is said to be pseudofinite if every first-order sentence that is true in M has a finite model, or equivalently, if M is elementarily equivalent to an ultraproduct of finite structures. For this kind of ultraproducts, the fundamental theorem of ultraproducts (Los Theorem) provides a powerful connection between finite and infinite structures, which can be used to prove qualitative properties of large finite structures using combinatorial methods applied to non-standard cardinalities of definable sets. Also, in the other direction, quantitative properties in classes of finite structures often induce desirable model-theoretic properties in their ultraproducts.

The idea is that the counting measure on a class of finite structures can be lifted using Los theorem to give notions of dimension and measure on their ultraproduct. This allows ideas from geometric model theory to be used in the context of pseudofinite theories, and potentially we can prove results in finite combinatorics (of graphs, groups, fields, etc) by studying the corresponding properties in the ultraproducts.

This approach was used by Hrushovski and Wagner in [10], but was better explored in his striking papers [8] and [9], where he applies ideas from geometric model theory to additive combinatorics, locally compact groups and linear approximate subgroups. On the other hand, Goldbring and Towsner developed in [6] the Approximate Measure Logic, a logical framework that serves as a formalization of connections between finitary combinatorics and diagonalization arguments in measure theory or ergodic theory that have appeared in various places throughout the literature. Using this, Goldbring and Towsner gave proofs of the Furstenberg's correspondence principle, Szemerédi´s Regularity Lemma, the triangle removal lemma, and Szemerédi´s Theorem: every subset of the integers with positive density contains arbitrarily long arithmetic progressions.

More recently there has been an increasing interest in applications of model-theoretic properties to combinatorics, starting with the Regularity Lemma for stable graphs due to Malliaris-Shelah (see [12]) and including several versions of the regularity lemma in different contexts: the algebraic regularity lemma for sufficiently large fields [14], regularity lemmas in distal structures ([3]) and the stable regularity lemma for groups (see [15], [4]).

In the other direction, we have the concept of asymptotic classes of finite structures,defined by Macpherson and Steinhorn in [11] as classes of finite structures that satisfy strong conditions on the sizes of definable sets. The most notable examples are the class of finite fields, the class of cyclic groups, or the class of Paley graphs. The infinite ultraproducts of asymptotic classes are all supersimple of finite SU-rank, but recent generalizations of this concept (known as multidimensional asymptotic classes, or m.a.c.) are more flexible and allow the presence of ultraproducts whose SU-rank is possibly infinite. (cf. [1], [16]).

In this series of lectures I will recall some model-theoretic results regarding ultraproducts of finite structures, and review some of the applications that can be derived from them. On the model-theoretic side, we will study the so-called "pseudofinite dimension" (cf. [9]) and its relationship with the forking and model-theoretic dividing lines in pseudofinite structures as presented in [5]. We will also introduce the concept

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of multidimensional asymptotic classes having as motivating example the theory of the everywhere infinite forest, which is the theory of an acyclic graph G such that every vertex has infinite degree, a well-known example of an ω-stable theory of infinite rank.
On the applications to combinatorics we will see a proof of Szemerédi´s Regularity Lemma using ultraproducts of finite structures, (cf. [6]) as well as some improvements of this result under the assumption of stability due to Malliaris and Shelah. This last approach was used by Chernikov and Starchenko in [2] to obtain some progress in the study of the Erdos-Hajnal conjecture.

Referencias/References:

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An introduction to construction squemes

Tutorial/Minicurso
Guzmán, Osvaldo[1]
México

Abstract:
Construction/Capturing schemes are a powerful combinatorial tool introduced by Stevo Todorcevic. The point is to build uncountable structures by performing careful amalgamations on its finite structures. Using this schemes it is possible, for example, to build a Hausdorff gap or an Aronszajn tree in just countably many steps. The construction of some uncountable structures becomes easier when using construction schemes. This mini course will be a short introduction to Construction and Capturing schemes. We will survey some previously known results and present some new ones, which are part of a Joint work with Stevo Todorcevic and Jorge Cruz Chapital.

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SUBSTRUCTURAL APPROACHES TO LOGICAL CONSEQUENCE

Tutorial/Minicurso

Szmuc, Damian[1]
Argentina

Abstract:
In this mini-course, we will present a family of logical systems that do not take for granted all the structural features usually attributed to logical consequence, especially as conceived through the Tarskian tradition. Discussion of Montonicity, Contraction, and Exchange will be held, but special attention will be devoted to the slew of systems rejecting Reflexivity and Transitivity that were at the center of some vivid debates during the past decade. Particularly, we will analyze the families of three-valued valuations that, together with a non-transitive understanding of logical consequence, render the same valid inferences that Classical Logic. In connection with these, we will study different sequent calculi where the Cut rule is admissible, hoping to draw a connection between its underivability and the resulting system's substructurality.

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BOREL SETS AND REVERSE MATHEMATICS

Tutorial/Minicurso

Westrick, Linda[1]
Estados Unidos

Abstract:
Theorems about Borel sets are sometimes proved by recursing along the structure of the Borel sets, but more often they are proved via measure or category. It is natural to wonder if these are essentially different proofs. Reverse mathematics provides a way to formalize this kind of question. We analyze the statements .[Ev]ery Borel set has the property of Baire.[a]nd .[Ev]ery Borel set is measurable"to show that category arguments and measure arguments are strictly less powerful than arguments which recurse directly on the structure of a Borel set. This framework can then be applied to query the necessity of measure and category methods in various theorems about Borel sets, especially in descriptive combinatorics.

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EXPANSIONS OF VECTOR SPACES WITH A GENERIC SUBMODUL

Charla Invitada
Berenstein, Alexander [1]
Netherlands

Abstract:
We study expansions of a vector space V over a field F, possibly with extra structure, with a generic submodule over a subring of F. We show that this expansions preserve tame model theoretic properties such as stability, NIP, NTP1, NTP2 and NSOP1.

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Sets definable in ordered Abelian groups of finite burden

Charla Invitada
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Colombia

abstract:

We will present some new results on the properties of sets definable in expansions of ordered Abelian groups under the hypothesis that the theory has finite burden (inp-rank). The notion of "burden"measures the combinatorial complexity of sets definable in the theory, and corresponds to dp-rank in NIP theories and weight in stable theories. We obtain new structure results for discrete sets definable in finite-burden OAGs, which in the dp-rank 2 case turn out to be very close to being finite unions of arithmetic sequences intersected with intervals. As for the topological properties of definable sets, in a dp-rank 2 OAG there cannot be both an infinite definable discrete set and a definable set which is dense and codense in some interval. All these results are joint work with Alfred Dolich.

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Enriching stably embedded sets and expansions of the integers

Charla Invitada
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Francia

Abstract:
This all started with a question on the possible unary expansions of the group of integers: all of the known stable examples are superstable of rank omega and strictly simple examples use highly non trivial results in number theory. As it turns out, that was all just a coincidence and any graph can be interpreted in some enrichment of (Z,+) by a single unary predicate. The main tool to build these examples is that adding structure to a stably embedded set does make it much more complicated (classification wise) than the initial structure or the added structure were. These « resplendence » phenomenons were implicit in work of Chernikov and Hils on NTP_2 and were later made explicit in work on Jahnke and Simon on NIP. In this talk I will explain how these results extend to other classes, among which stability, superstability, simplicity and NSOP_1. And I will explain how this relates to the (apparently unrelated) initial question!

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ELIMINATION OF IMAGINARIES IN MULTIVALUED HENSELIAN VALUED FIELDS

Charla contribuida

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Abstract:
One of the most striking results in the model theory of henselian valued fields is the Ax-Kochen theorem, which roughly states that the first order theory of a henselian valued field of equicharacteristic zero, or of mixed characteristic, unramified and with perfect residue field is determined by the first order theory of the residue field and its value group.

A model theoretic principle follows from this theorem: any model theoretic question about the valued field can be reduced into a question to its residue field, its value groups and their interaction in the field. A fruitful application of this theorem has been applied to describe the class of definable sets in a valued field, for example Pas proved elimination of field quantifiers relative to the residue field and the value group once we add an angular component in the equicharacteristic zero case. One can therefore ask the following question: Can one obtain an Ax-Kochen style theorem to eliminate imaginaries in a henselian valued field? Following the Ax-Kochen principle, it seems natural to look at the problem in two orthogonal directions: one can either make the residue field extremely tame and understand the problems that the value group brings naturally to the picture, or one can assume the value group to be very tame and study the issues that the residue field would contribute to the problem.

In this talk we will address the first approach. I will present how to eliminate imaginaries in henselian valued fields of equicharacteristic zero with residue field algebraically closed. The results obtained are sensitive to the complexity of the value group. I will start by introducing the problem of imaginaries in order abelian groups according to their combinatorial complexity. Once the picture has been clarified for this setting, we will present how to solve the question for valued fields.

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GROUPS DEFINABLE IN PARTIAL DIFFERENTIAL FIELDS WITH AN AUTOMORPHISM

Charla contribuida

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Montenegro Samaria
Costa Rica

Abstract:
This is a joint work with Zoé Chatzidakis and Samaria Montenegro.
In this talk we will study, from the model-theoretic point of view, simple groups definable in differential and difference fields. A differential field is a field with a set of commuting derivations and a difference-differential field is a differential field equipped with an automorphism which commutes with the derivations. Cassidy studied definable groups in differentially closed fields, in particular she studied Zariski dense definable subgroups of simple algebraic groups and showed that they are isomorphic to the rational points of an algebraic group over some definable field. In this talk study Zariski dense definable subgroups of simple algebraic groups, and show an analogue of Phyllis Cassidy's result for partial differential fields.

Keywords: Molde theory, differential algebra, field theory, difference fields

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CONTINUOUS STABLE REGULARITY

Charla contribuida

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Resumen:
Hablaremos de un trabajo reciente realizado en conjunto con G. Conant y A. Pillay en el que producimos una versión del lema de regularidad estable de Malliaris-Shelah en el contexto de la lógica continua. Esta nos permite hablar sobre la estructura de funciones estables de la forma $f : V \times W \to [0, 1]$, donde pensamos en V y W como las partes de un grafo bipartito çon peso". En el proceso, mencionaremos también algunos resultados respecto a la estructura de las medidas de Keisler locales en el contexto continuo.

Abstract:
We will discuss recent work with G. Conant and A. Pillay regarding a version of the Malliaris-Shelah stable regularity lemma realized in the context of continuous logic, which allows us to speak about the structure of stable functions of the form $f : V \times W \to [0, 1]$, where we think of V and W as the parts of a "weighted" bipartite graph. In the process, we will also mention some results about the structure of local Keisler measures in this setting.

Palabras clave: Regularidad, Lógica continua, Estabilidad, Medida de Keisler

Keywords: Regularity, Continuous logic, Stability, Keisler measure

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SCHRODER-BERNSTEIN PROPERTY ON SEPARABLE RANDOMIZATIONS.

Charla contribuida
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Abstract:

A theory T has the *Schröder-Bernstein property* or simply the *SB-property* if any pair of elementarily bi-embeddable models are isomorphic. This property has been extensively studied for first-order theories (e.g 1,2), but it remains unexplored in continuous context.

This work is a first study of the SB-properties on continuous theories. Examples of complete continuous theories that have this property include Hilbert spaces and atomless probability spaces. Using a characterization of separable randomizations given by Andrews an Keisler in 1 we prove that if a first-order theory T with $\leq \omega$ countable models has the SB-property, then its randomization theory T^R has the SB-property for separable randomizations. This give us as a corollary that, a first order theory T with $\leq \omega$ countable models has the SB-property for countable models if and only if T^R has the SB-property for separable randomizations.

Keywords: Continuous logic, randomizations, Schröder-Bernstein property.

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ABOUT $(\mathcal{L}, n)$-MODELS

Charla contribuida

Valderrama Hernández, David[1] *Andrés Villaveces*
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Abstract:
The method of $(\mathcal{L}, n)$-models was developed originally by Shelah as a model theoretic way of proving the Paris-Harrington theorem, and to find a true Π^1_0-sentence not provable in the Peano arithmetic (PA). In this talk, we will review the basic notions of the method, but we will present a different definition from the original. The reason for this change is due to technical issues that will be explained in the talk; however, we are going to show that the theory developed, with respective adjustments, remains with the new definition.

Keywords: $(\mathcal{L}, n)$-model, Fulfillment, Paris-Harrington theorem

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TAME PSEUDOFINITE THEORIES WITH WILD DIMENSIONS

Charla contribuida
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Abstract:

In their 2014 paper “Pseudofinite Structures and Simplicity", authors Garcia, Macpherson and Steinhorn present a number of results showing that if an ultraproduct of finite structures satisfies various conditions on Hrushovski’s fine pseudofinite dimension, then the theory of that structure satisfies various tameness conditions, such as stability and simplicity. They prove that these results do not reverse directly, by presenting tame pseudofinite structures where the dimension conditions are not satisfied. In this talk, we strengthen these counterexamples, by giving two tame pseudofinite theories such that no ultraproduct satisfying these theories satisfy the dimension conditions. We also discuss some stronger tameness conditions which do admit such reversals, where either some pseudofinite model of the theory or every pseudofinite model of the theory satisfies the dimension conditions.

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AROUND DEPENDENT ABSTRACT ELEMENTARY CLASSES

Charla contribuida

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Abstract:
he development of Stability Theory in the context of Abstract Elementary Classes (AECs) has been steady and robust, up to the stable zone, and including a bit of simplicity as well, more recently. Canonicity of non-forking, a robust study of superstability, several applications to the model theory of modules in recent work, attest to this assertion. The study of dependent AECs is now beginning to bloom. I will describe earlier results of mine (with Grossberg and VanDieren; the spectrum of generic pairs) and recent results in dependent AECs, joint with Shelah (extraction of indiscernibles in various dependent contexts) and Nájar (definable types in dependent AECs).

Palabras clave: Estabilidad, AECs, Dependencia

Keywords: Stability Theory, AECs, Dependence

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A characterization of continuous logic by using quantale-valued logics

Charla contribuida

Zambrano, Pedro H.[1] *David Reyes*
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Abstract:
In this talk, we will talk about a generalization of Continuous Logic ([1]) where the distances take values in suitable co-quantales (in the way as it was proposed in [2]). By assuming suitable conditions (e.g., being co-divisible, co-Girard and a V-domain), we provide, as test questions, a proof of a version of the Tarski-Vaught test and Lo's Theorem in our setting. Iovino proved in [3] that there is no any logic extending properly (equivalent logics to) Continuous Logic satisfying both Countable Tarski-Vaught chain Theorem and Compactness Theorem. Since [0, 1] satisfies all of the assumptions given above, we get new logics by dropping any of those assumptions.

Keywords: metric structures, lattice valued logics, co-quantales, Tarski-Vaught test, Los theorem

Referencias/References:

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Descriptive complexity of the generalized adjacency matrix

Charla contribuida

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México

Abstract:
If Γ is a simple, undirected graph with adjacency matrix A, and J is the all-ones matrix, then any matrix of the form $xA + yJ + zI$ with $x, y, z \in \mathbb{R}$, $x \neq 0$, is called a generalized adjacency matrix of Γ. Two graphs are said to be $\mathbb{R}$-cospectral just in case their generalized adjacency matrices have the same characteristic polynomial. A graph Γ is *determined by its generalized spectrum* if every graph which is $\mathbb{R}$-cospectral with Γ is isomorphic to Γ. We consider this properties in relation to logical definability. We show that any pair of graphs that are elementarily equivalent with respect to the three-variable counting first-order logic C^3 are $\mathbb{R}$-cospectral, and this is not the case with C^2, nor with any number of variables if we exclude counting quantifiers. We also show that the class of graphs that are determined by their generalized spectra is definable in partial fixed-point logic with counting. We relate these properties to other algebraic and combinatorial problems.

Keywords: Descriptive complexity, Finite model theory, Spectral graph theory, Counting logics, Isomorphism problems

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CONTINUOUS 2-COLORINGS AND DISCRETE DYNAMICAL SYSTEMS

Charla Invitada
Lecomte, Dominique [1]
Francia

Abstract:
We consider various classes of graphs, from the most general ones to those induced by a function. The basic concern in this work is to understand when a graph has a continuous coloring in two colors. We compare the graphs with the quasi-order associated to either injective continuous homomorphisms, or continuous homomorphisms. We present structural properties of these quasi-orders. We will see that discrete dynamical systems are very useful to do that. This analysis also provides information about the quasi-order of Borel reducibility on the class of analytic equivalence relations, in particular about the relation of conjugacy of minimal homeomorphisms of the Cantor space.

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Maximal almost disjoint families and singulars

Charla contribuida

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Abstract:
Throughout the last years, many generalizations from classical cardinal characteristics of the Baire space have been studied. Particularly, special interest has been given to the study of the combinatorics of the generalized Baire spaces κ^κ when κ is an uncountable regular cardinal (or even a large cardinal). In this talk, I will present some results regarding a generalization to the context of singular cardinals of the concept of maximal almost disjointness. The first known result in this area is due to Erdös and Hechler in , who introduced the concept of almost disjointness for families of subsets of a singular cardinal λ and proved many interesting results: for instance, if λ is a singular cardinal of cofinality $\kappa < \lambda$ and there is an almost disjoint family at κ of size γ, then there is a maximal almost disjoint family at λ of the same size. The main result of this talk is the construction of a generic extension in which the inequality $(\lambda) <$ holds for λ a singular cardinal of countable cofinality. The model combines the classical technique of Brendle to get a model in which together with the use of Příkrý type forcings which change the cofinality of a given large cardinal κ to be countable and, at the same time control the size of the power set of this given cardinal.

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MAXIMAL HIGHLY PROXIMAL FLOWS OF LOCALLY COMPACT GROUPS

Charla Invitada
Tsankov, Todor[1]
Francia

Abstract:
The notion of a highly proximal extension of a flow generalizes the one of an almost one-to-one extension (injective on a dense G_delta set), which is an important tool in topological dynamics. The existence of maximal such extensions was proved by Auslander and Glasner in the 70s for minimal flows using an abstract argument, and a concrete construction using near-ultrafilters was recently given by Zucker for arbitrary flows. When the acting group is discrete, the MHP extension is nothing but the Stone space of the Boolean algebra of the regular open sets of the space. We give yet another construction of the MHP extension for arbitrary topological groups and prove that for MHP flows of a locally compact group G, the stabilizer map $x \to G\_x$ is continuous (for general flows, this map is only semi-continuous). This is a common generalization of a theorem of Frolík that the set of fixed points of a homeomorphism of a compact, extremally disconnected space is open and a theorem of Veech that the action of a locally compact group on its greatest ambit is free. This is joint work with Adrien Le Boudec.

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TOPOLOGICAL GAMES IN RAMSEY SPACES

Charla contribuida

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Abstract:
Topological Ramsey theory was originally proposed by Carlson and Simpson in 1990, and further developed by Todorcevic in 2010. Its purpose is to study a class of combinatorial topological spaces, called topological Ramsey spaces, that characterize and unify essential features appearing in those combinatorial frames where the Ramsey property is equivalent to Baire property, such as the Ellentuck space. In this talk, we will present a general overview on the combinatorial structure of topological Ramsey spaces, analyzing their main features and studying some representative examples, where we will propose an alternative proof of abstract Ellentuck theorem. Also, we will give a generalization of Kastanas game in Ellentuck space, constructing topological games that characterize Baire property for a large family of topological Ramsey spaces. This is joint work with Carlos Di Prisco.

Keywords: topological Ramsey space, abstract Ramsey property, Baire property, topological game.

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RECONSTRUCTION OF COLORINGS FROM ITS HOMOGENOUS SETS

Charla contribuida
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Abstract:
Let $\varphi : [X]^2 \to 2$ be a coloring on a countable (or finite) set X. A subset H of X is called homogenous for φ if φ is constant on $[H]^2$. We denote $\hom(\varphi)$ the collection of homogeneous sets for φ, and consider the problem of finding the colorings ψ such that $\hom(\psi) = \hom(\varphi)$. A coloring φ is called reconstructible if the only ψ as above are φ and $1 - \varphi$.

The present work is a continuation of the work of UZCA-PIÑA2021. In particular, we answer a question that was left there of whether a reconstructible coloring necessarily has infinitely many reconstructible initial segments, i.e, $\varphi|n$ is reconstructible for infinitely many n. We call such colorings strongly reconstructible. The purpose of the talk is to describe some properties about the reconstruction of colorings.

Keywords: Coloring, Homogenous sets, Reconstructible

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Constructible Sets

Charla contribuida

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Estados Unidos

Abstract:
Given an initial family of sets, we may take unions, intersections and complements of the sets contained in this family in order to form a new collection of sets; our construction process is done recursively until we obtain the last family. Problems encountered include the minimum number of steps required to arrive to the last family as well as a characterization of that last family; we solve all those problems. We define a class of simple families (n-minimal constructible) and analyze the relationships between partitions and separability (our new concept) that leads to interesting results such as finding families based on partitions that generate finite algebras. We prove a number of new results about n-minimal constructible families such as every finite algebra of sets has a generating family which is n-minimal constructible for all $n \in \mathbb{N}$ and we compute the minimum number of steps required to generate an algebra.

Keywords: constructible sets, algebras of sets, minimal-constructible, separable families.

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Small infinite partitions and other features of the Nowhere Centered ideal

Charla contribuida

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Resumen:

Se presenta el ideal *nunca centrado* $\mathcal{NC}$. Es un ideal coanalítico de $\omega \times \omega$ cuya principal característica es que los conjuntos de la forma $X \times Y$, donde X, Y son subconjuntos infinitos de ω, forman una familia densa en el cociente $\mathcal{P}(\omega \times \omega)/\mathcal{NC}$. Este cociente tiene particiones numerables y consistentemente tiene particiones de tamaño ω_1 mientras $\mathfrak{a} > \omega_1$. Esto representa un gran contraste con otros cocientes definibles. Otras características combinatorias de este ideal se presentarán, así como algunos resultados en una familia ideales similares de dimensión más alta.

Abstract:
The *nowhere dense ideal* $\mathcal{NC}$ is introduced. It is a coanalytic ideal of $\omega \times \omega$ whose defining characteristic is that the sets of the form $X \times Y$, where X, Y are infinite subsets of ω, form a dense family in the quotient $\mathcal{P}(\omega \times \omega)/\mathcal{NC}$. This quotient has countable partitions and consistently has partitions of size ω_1 while $\mathfrak{a} > \omega_1$. This represents a huge contrast with other definable quotients. Other combinatorial features of this ideal are presented, as well as some results on a family of similar, higher dimensional ideals.

Keywords: Boolean algebras,partitions,towers,ideals

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UNA INTRODUCCIÓN A GAPS Y ALGUNOS MODELOS DE ZFC

Charla contribuida
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México

Resumen:
Un pregap es un par (A, B) donde A y B son familias de subconjuntos numerables de números naturales. A está totalmente ordenado por $\subseteq^*$, B por $\supseteq^*$ y para cada $a \in A$ y $b \in B$ $a \subseteq^* b$. Entonces, un pregap se llama gap si no hay $c \subseteq \omega$ tal que $a \subseteq^* c \subseteq^* b$.
Desde ZFC podemos mostrar que existen algunas gaps, pero esto depende de la cardinalidad de las familias A y B. Sin embargo, podemos preguntarnos por más gaps de las que podemos encontrar en ZFC. De hecho, las gaps que podemos encontrar están relacionados con nuestro modelo de ZFC. En particular, hablaremos sobre las gaps en los modelos de PFC y algún modelo de MA específico.

Abstract:
A pregap is a pair (A, B) where A and B are families of countable subsets of natural numbers. A is totally ordered by $\subseteq^*$, B by $\supseteq^*$ and for every $a \in A$ and $b \in B$ $a \subseteq^* b$. Then, a pregap is called a gap if there is not $c \subseteq \omega$ sutch that $a \subseteq^* c \subseteq^* b$.
From ZFC we can show that there are some gaps, but this depends on the cardinality of the families A and B. However, we can wonder about more gaps than we can find in ZFC. In fact, the gaps we can find are related to our ZFC model. In particular, we will talk about the gaps in the PFC models and some specific MA model.

Palabras clave: Gaps, modelos de ZFC, PFA, MA, forcing

Keywords: Gaps, ZFC model, PFA, MA, forcing

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Trace Ideals on omega

Charla contribuida

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Resumen:
Esta charla trata sobre la definición de Ideal Traza, dada por J. Brendle, la cual conecta ideales sobre 2^ω (o sobre ω^ω) con ideales sobre un conjunto numerable. El objetivo es dar algunas relaciones que hay entre un ideal y su traza, e.g. sus cardinales asociados. Además, se introducen nuevos cardinales y se muestran sus relaciones con los estándar. Por último, se dan algunos ejemplos concretos de ideales traza.

Abstract:
This talk focuses on the definition of Trace Ideal, given by J. Brendle, which associates ideals on 2^ω (or ω^ω) with ideals on ω. The aim is to show some relations between the ideal and its trace, such as the associated cardinals. Additionally, new cardinals are introduced and their relations with the standard cardinals are established. Finally, we provide some concrete examples of trace ideals.

Palabras clave: Ideal sobre ω, Ideal Traza, Cardinales asociados a un ideal, Orden de Tukey

Keywords: Ideal on ω, Trace Ideal, Cardinals associated to an ideal, Tukey Order

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Classification problem for effective structures

Charla Invitada

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Abstract:
In this talk we will review several approaches to study the complexity of classifying effective structures up to isomorphism or another equivalence relation. Calculating the complexity of the set E(K) of pairs of indices corresponding to equivalent computable structures from a fixed class K is one of the approaches. One can use 1-dimensional or 2-dimensional versions of m-reducibility to establish the complexity of such index sets. According to this approach, a class is nicely classifiable if the set E(K) has hyperarithmetical complexity (provided the class K itself is hyperarithmetical). Another approach is to classify structures on-the-fly. We call a class classifiable in this sense if we can uniquely (up to a fixed equivalence relation) identify each structure from the class after observing a finite piece of the structure.

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CLASSIFYING EQUIVALENCE RELATIONS ON THE NATURAL NUMBER

Charla Invitada
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Abstract:

The study of the complexity of equivalence relations has been a major thread of research in diverse areas of logic. A reduction of an equivalence relation E on a domain X to an equivalence relation F on a domain Y is a function $f : X \to Y$ which induces an injection on the quotient sets, $X/E \to Y/F$. In the literature, there are two main definitions for this reducibility:

- In descriptive set theory, Borel reducibility is defined by assuming that X and Y are Polish spaces and f is Borel.
- In computability theory, computable reducibility is defined by assuming that X and Y coincide with the set of natural numbers and f is computable.

Despite the clear analogy between the two notions, for a long time the study of Borel and computable reducibility were conducted independently. Yet, a theory of computable reductions which blends ideas from both computability theory and descriptive set theory is rapidly emerging. In this talk, we will discuss differences and similarities between the Borel and the computable settings as we provide computable, or computably enumerable, analogs of fundamental concepts from the Borel theory (such as dichotomy results, orbit equivalence relations, and the Friedman-Stanley jump).

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RELATIVIZING COMPUTABLE STRUCTURE THEORY

Charla contribuida

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Abstract:
Computability theorists have learned that an arbitrary Turing program must be treated essentially as a black box. The undecidability of the Halting Problem,along with related results such as Kleene's Recursion Theorem, simply makes it impossible to predict what that program will do on a given input:the only way to find the answer is to run the program and wait to see whether it ever halts and gives an output.
This being the case, it makes sense to broaden computable structure theory to include noncomputable structures as well. The atomic diagram of a noncomputable structure, given to a Turing functional as an oracle, can be treated by that functional using exactly the same techniques used for the atomic diagram of an arbitrary computable structure. Indeed, generalizing in this way has resulted in a number of very pleasing results, including the relative version of the Ash-Nerode Theorem, the syntactic equivalent of relative computable categoricity, and the recent theorem of Csima and Harrison-Trainor on degrees of categoricity of countable structures.We will present these results and note that, in addition to being cleaner and more direct than the corresponding results on computable structures, they also tend to have simpler proofs. The broad intention is to encourage further investigation of computable structure theory using these relativized procedures.

Keywords: computable structure theory, computable categoricity, relativization

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TRANSFINITE RAMSEY THEOREM

Charla contribuida
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Estados Unidos

Abstract:
We consider a version of the Ramsey Theorem for coloring tuples within a finite set where the exponent is transfinite. That is, the tuples we color are gamma-large for some ordinal gamma. As in Ramsey theorem we ask: How large should a finite set of numbers be to ensure that, for all colorings of the gamma-large tuples with a certain finite number of colors, there exists a homogeneous set that is alpha-large? Again, alpha being an ordinal. The answer should be an ordinal, and its existence follows from the Galvin-Prikry Theorem. What we ask is about the precise value of the bound, given as a function of the ordinals alpha and gamma. We also consider computability theoretic and reverse mathematics issues related to this. This is joint work with Alberto Marcone

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PROBABILISTIC MARTINGALES AND RELATIVE RANDOMNESS

Charla contribuida

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Abstract:
It follows from van Lambalgen's theorem for Martin-Löf randomness, that every Martin-L¨of random set X is also Martin-Löf random relative to almost all oracles. Is this also true for notions of randomness for which van Lambalgen's theorem does not hold? We answer this question in the negative for computable randomness. A binary sequence X is a.e. computably random if there is no probabilistic computable strategy which is total and succeeds on X for positive measure of oracles. Using the fireworks technique we construct a sequence which is computably random but not a.e. computably random. We also prove separation between a.e. computable randomness and partial computable randomness. This happens exactly in the uniformly almost everywhere dominating Turing degrees.

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A MODAL SEQUENT CALCULUS FOR NOTIONS OF ENCAPSULATED COMPUTATION

Charla contribuida

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Abstract:
Modal logic, originated in Mathematics and Philosophy, plays nowadays an important role in Computer Science. For instance in the theory of programming languages, where modal formulas of the form $\Box A$, can be considered as types designating enhanced or encapsulated values, in contrast to ordinary values of type A. The encapsulation feature can be interpreted in several ways, for instance as run-time generated code that computes values of type A, useful in staged computation; or as the type of mobile code of type A in distributed computing. In this talk I present a programming language prototype for encapsulated computation where the typing is controlled by a sequent-calculus whose cut elimination process generates an operational semantics related to the so-called A-normal form, an essential transformation in the compilation of functional languages. This research is being supported by UNAM-DGAPA-PAPIIT IN119920.

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NODE REPLICATION: A LOGIC-BASED OPTIMISATION IN COMPUTATION

Charla Invitada
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Abstract:
Abstract: Connections between logical systems and term calculi are unveiled by the so-called Curry-Howard isomorphisms, where different logical proof normalisation procedures correspond to different methods in implementing substitutions. In this sense, normalisation in Natural Deduction is related to full substitution while cut elimination in Proof-Nets corresponds to partial substitution. Replication of nodes, where substitution of terms are executed constructor by constructor, is based on a Curry-Howard interpretation of Deep Inference.
In this talk, a term calculus implementing higher-order node replication is introduced where, besides implementation of a full node replication, two evaluation strategies were investigated: call-by-name and fully lazy call-by-need. Skeletons are the key notion behind such strategies and its extraction is internally codified in the calculus. Observational equivalence between strategies is then proved through a standard non-idempotent intersection type system.

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MECHANIZING A DUAL-CONTEXT SEQUENT CALCULUS FOR THE CONSTRUCTIVE MODAL LOGIC S4

Charla contribuida

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Abstract:
In this talk we discuss the mechanization of a cut-free dual-context sequent calculus for CS4, called DGCS4, a sequent calculus following the tradition of the reconstruction of modal logic through hypothetical and categorical judgments a la Martin-Löf (Pfenning and Davies, 2001). This approach has a special kind of sequents, which keeps two separated contexts representing ordinary and enhanced hypotheses, intuitively interpreted as true and valid assumptions (Kavvos, 2020; Miranda-Perea et al., 2020). The full mechanization of system DGCS4 represents a challenge that requires considerable additional effort while automatizing the admissibility for the ordinary cut rule, for ordinary hypotheses, as well as the elimination of a second cut rule, which manipulates enhanced hypotheses. Furthermore, we provide a formal verification of the equivalence of this system with an axiomatic and a dual-context natural deduction systems for CS4 using our previous results in (González-Huesca et al., 2019; Gonzalez Huesca et al., 2020). The mechanization using the Coq proof-assistant is available in `https://bitbucket.org/luglzhuesca/mlogic-formalverif/src/master/DCS4/`

Keywords: Constructive modal logic, sequent calculus, dual-context systems, formal verification, Coq

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TRACTABLE DEPTH-BOUNDED APPROXIMATIONS TO FDE

Charla contribuida

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Italia

Abstract:
Many useful propositional logics are likely to be intractable, so we cannot expect a real agent to be always able to recognize in practice that a certain conclusion follows from a given set of assumptions. The "depth-bounded" approach to Classical Propositional Logic [8, 7, 6] provides an account of how this logic can be approximated in practice by realistic agents in two moves: i) providing a semantic and proof-theoretic characterization of a tractable 0-depth approximation, and ii) defining an infinite hierarchy of tractable k-depth approximations, which can be naturally related to a hierarchy of realistic resource-bounded agents, and admits of an elegant proof-theoretic characterization.
The logic of First-Degree Entailment (FDE) [1] admits of an intuitive semantics based on informational values [9, 4], which was put forward as the logic in which "a computer should think". These values are interpreted as four possible ways in which an atom p can belong to the present state of information of a computer's database, which in turn is fed by a set of equally "reliable" sources: t means that the computer is told that p is true by some source, without being told that p is false by any source; f means the computer is told that p is false but never told that p is true; b means that the computer is told that p is true by some source and that p is false by some other source (or by the same source in different times); n means that the computer is told nothing about the value of p. The values of complex formulae are computed via 4-valued truth-tables derived by monotonicity considerations.
Despite its informational flavour, FDE is co-NP complete [12, 2] and so an idealized model of how an agent can think. A key observation in this work is that a fair amount of idealization is present in the interpretation of the values t, f and n, that presupposes complete information about the set of sources S by an agent a. While the meaning of b is "there is at least a source assenting to p and at least a source dissenting from p" (which is information empirically accessible to a in that a may actually hold this information without a complete knowledge of S), the meaning of t, f and n involves information of the kind "there is no source such that..." (and so requires complete information about the sources in S, which may not be empirically accessible to a at any given time). What if the agent has no such complete knowledge about the sources (e.g., the set of sources is "open")? Inspired by [5] and [10, 11, 3], we address this issue by shifting to signed formulae where the signs express imprecise values associated with two distinct bipartitions of the standard set of 4 values. These are values such as "t or b", which is implicit in the choice of the set of designated values in the semantics of FDE. Thus, we present a proof system which consists of linear operational rules and only two branching structural rules, the latter expressing a generalized rule of bivalence. This system naturally leads to defining an inf inite hierarchy of tractable depth-bounded approximations to FDE. Namely, approximations in which the number of nested applications of the two branching rules is bounded. Further, we show that the resulting hierarchy admits of an intuitive 5-valued non-deterministic semantics.
Keywords: FDE, tractability, natural deduction, tableaux

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Classical Propositional Logic Without Atoms

Charla contribuida
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Abstract:

Classical propositional logic (and other propositional logics) are generally presented with atomic formulas, due to a philosophical idea of Wittgenstein (1921), baptized by Bertrand Russell "Logical Atomism" (1924). This philosophical view is controversial and from a mathematical point of view it is possible to construct propositional logic without atoms. This is what we will show here in the case of classical propositional logic. Surprisingly enough this has not yet been studied in details. On the one hand Gödel very succinctly talked about that and in a informal way (1929/1930). On the other hand Suszko developed what he called "abstract logic", a general theory of propositional logics without the atomic assumption, but did not study in details particular cases. We will here present a precise mathematical definition of classical propositional logic without axioms, present a semantics for it, a sequent calculus and prove the completeness theorem using a very general abstract version of this theorem (Beziau 2001).

Keywords: Classical Propositional Logic, Atoms, Completness

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GENUINELY NON-TRADITIONAL LOGICS

Charla contribuida
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Abstract:

Let N be some negation and $\otimes$ be some conjunction. According to Béziau and Franceschetto , a logic **L** is *genuinely paraconsistent* if and only if it satisfies the following two conditions:

$$\text{(GPcons1)} \not\models_{\mathbf{L}} N(\alpha \otimes N\alpha)$$
$$\text{(GPconsis2)}\ \alpha \otimes N\alpha \not\models_{\mathbf{L}}$$

Initially, Béziau and Franceschetto used the term 'strong paraconsistent logics'; later, in , Béziau renamed these logics as *genuinely paraconsistent*. Building upon Béziau and Franceschetto's example, Tello, Borja and Coniglio define a *genuinely paracomplete* as one meeting the following two conditions:

$$\text{(GPcomp1)}N(\alpha \oplus N\alpha) \not\models_{\mathbf{L}}$$
$$\text{(GPcomp2)}\ Q \not\models_{\mathbf{L}} (\alpha \oplus N\alpha).$$

where N is again some negation and $\oplus$ some disjunction.
Genuine paraconsistency and genuine paracompleteness are, so to speak, extreme rejections of the traditional laws of non-contradiction and excluded middle, respectively. But, traditionally, those two principles are not alone, they are in company of Identity: $\alpha > \alpha$, with $>$ some conditional. Then, investigating non-reflexivity (of the conditional) is but the next natural step.
We will say that a logic **L** is *genuinely non-reflexive* if and only if it satisfies the following two conditions:

$$\text{(GNR 1)}\not\models_{\mathbf{L}} \alpha > \alpha$$
$$\text{(GNR 2)}\ N(\alpha > \alpha) \not\models_{\mathbf{L}}.$$

In this paper define the notion of *genuinely non-traditional logic*, and show that **FDE** is an easy example of such sort of logics. Since some might find the arrow (definable) in **FDE** unsuitable to play the role of a conditional, even for a non-reflexive logic, we consider some expansions of **FDE** with connectives satisfying more properties usually expected from conditionals.
The structure of the paper is as follows. In section 1 we will introduce the semantics of **FDE**. In Section 2, we will show that **FDE** is a logic that satisfies the necessary properties to be a genuinely non-traditional logic. In Section 3, we consider some expansions of **FDE** with connectives satisfying more properties usually expected from conditionals.
Keywords: Genuinely non-traditional logic, genuine paraconsistency, genuine paracompleteness, genuine non-reflexivity, FDE.

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SEMANTICS FOR SECOND-ORDER RELEVANT LOGIC

Charla contribuida

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Estados Unidos

Abstract:
As Kit Fine showed in the 1980s, quantification in relevant logics is trickier than it looks. It turns out that going second order has its own tricks too. In this talk I will provide a semantic theory for second-order relevant logics, explain the main difficulty in providing such, and give a philosophical explanation of what's at the root of the phenomenon. As time allows, I will also gesture at the interesting parts of the soundness and completeness proofs for the 'Henkin' fragment of the logic.

Keywords: Relevant logic, second-order logic, quantification

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THE REFUTATION OF ALTERNATIVEISM

Charla contribuida
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Abstract:

Let $L \neq \emptyset$, $\phi, \psi, \ldots \in L$, $\Phi, \ldots \subseteq L$; $\vee$: $L \times L \to L$. Furthermore, $\vdash \subseteq \wp(L) \times L$ be such that $\phi \in \Phi$ implies $\Phi \vdash \phi$, $\Phi \vdash \phi$ implies $\Phi \vdash \phi \vee \psi$, and $\Phi \vdash \psi$ implies $\Phi \vdash \phi \vee \psi$. Thereby $\Phi \vdash \phi$ or $\Phi \vdash \psi$ becomes a sufficient condition for $\Phi \vdash \phi \vee \psi$.
We now proof-theoretically specify the intuitionist view that the "truth" of an alternation requires some proof of some of its components. We say that $\vdash$ is *alternativeist* iff $\Phi \vdash \phi$ or $\Phi \vdash \psi$ is a necessary condition for $\Phi \vdash \phi \vee \psi$, videlicet $\Phi \vdash \phi \vee \psi$ implies $\Phi \vdash \phi$ or $\Phi \vdash \psi$.
Let $\neg$: $L \to L$. As usual, Φ is called *complete* :iff $\Phi \vdash \phi$ or $\Phi \vdash \neg\phi$. Φ *has TND* :iff $\Phi \vdash \phi \vee \neg\phi$. *If* Φ *is complete,* Φ *has TND. If* $\vdash$ *is alternativeist,* Φ *is complete iff* Φ *has TND*. Consequently, classical $\vdash$ are not alternativeist.
Let us now assume that there is semantics with interpretations $I, J, \ldots$ such that $I \models \phi \vee \psi$ iff $I \models \phi$ or $I \models \psi$, $\Phi \models \phi$:iff for all I: $I \models \Phi$ implies $I \models \phi$, and $\Phi \vdash \phi$ implies $\Phi \models \phi$.
We call $\phi \vee \psi$ *essential* iff neither $\phi \vee \psi \models \phi$ nor $\phi \vee \psi \models \psi$. We say that $\vdash$ *has essential alternations* :iff some $\phi \vee \psi$ is essential. *If* $\vdash$ *has essential alternations,* $\vdash$ *is* not *alternativeist*: By assumption, $\phi_0 \vee \psi_0 \not\models \phi_0, \psi_0$, whence $\Phi_0 \nvdash \phi_0, \psi_0$ for $\Phi_0 := \{\phi_0 \vee \psi_0\}$; anyway, $\Phi_0 \vdash \phi_0 \vee \psi_0$.
ϕ, ψ are called *logically dependent* :iff $\phi \models \psi$ or $\psi \models \phi$. *If* ϕ, ψ *are logically independent,* $\phi \vee \psi$ *is essential, and vice versa*: Since $\phi \not\models \psi$, $I_0 \models \phi$, but $I_0 \not\models \psi$, whence $I_0 \models \phi \vee \psi$, whereby $\phi \vee \psi \not\models \psi$. Since $\psi \not\models \phi$, $\phi \vee \psi \not\models \phi$. $\vdash$ *shows (logical) independency* :iff some ϕ, ψ are independent. $\vdash$ *has essential alternations if (and only if)* $\vdash$ *shows independency*.
It follows that $\vdash$ *is* not *alternativeist provided that* $\vdash$ *shows logical independency*, which, however, is a standard property of logical systems. Consider e. g. intuitionistic $\vdash$ and regard that they are sound with respect to classical semantics.
Note. As a possible solution to the long-standing question of the author on the truth of intuitionism, this essay defines the concept of alternativeist logical system and connects it with an old observation on alternations, which has happened in the days after a polemical talk by Antonino Drago on February 9th, 2022 at the Logica Universalis Webinar (closely connected with Jean-Yves Beziau). Joint work with Wilfried Buchholz, who explored the connection to logical indepencence. Peter Maier-Borst mentioned more concrete examples for essential alternations, which might give rise to more detailed considerations. Personal thanks to "Peana Pesen", Andreas & Heike Haltenhoff, Wernher Bornemann-von Loeben.

Keywords: intuitionism, alternativeist derivabilities, essential alternations, logical independence, intuitionistic logics

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MODAL WEAK GODEL ALGEBRAS

Charla contribuida
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Abstract:

An algebra $\langle A, \wedge, \vee, \rightarrow, 0, 1\rangle$ of type $(2, 2, 2, 0, 0)$ is said to be a weak Heyting algebra (WH-algebra for short) if $\langle A, \wedge, \vee, 0, 1\rangle$ is a bounded distributive lattice and the following conditions are satisfied for every $a, b, c \in A$:

(1) $a \rightarrow a = 1$,

(2) $a \rightarrow (b \wedge c) = (a \rightarrow b) \wedge (a \rightarrow c)$,

(3) $(a \vee b) \rightarrow c = (a \rightarrow c) \wedge (b \rightarrow c)$,

(4) $(a \rightarrow b) \wedge (b \rightarrow c) \leq a \rightarrow c$.

The class of WH-algebras is a variety, which will be denoted by $\mathbf{WH}$. The variety $\mathbf{WH}$ and some of its subvarieties were studied in 2. In this talk we are interested in the following subvarieties of $\mathbf{WH}$: $\mathbf{RWH} = \mathbf{WH} + \{\mathrm{R}\}$ and $\mathbf{SRL} = \mathbf{RWH} + \{\mathrm{T}\}$, where (R): $a \wedge (a \rightarrow b) \leq b$ and (T): $a \rightarrow b \leq c \rightarrow (a \rightarrow b)$. The members of $\mathbf{RWH}$ are called RWH-algebras and the members of $\mathbf{SRL}$ are called subresiduated lattices. The variety of Heyting algebras is a proper subvariety of $\mathbf{SRL}$, and the last one is a proper subvariety of $\mathbf{RWH}$.
Let $\langle A, \wedge, \vee, \rightarrow, 0, 1\rangle$ be a RWH-algebra. An unary operator $\Box \colon A \rightarrow A$ is said to be a modal operator if the following conditions are satisfied for every $a, b \in A$:

(1) $\Box(1) = 1$,

(2) $\Box(a \wedge b) = \Box(a) \wedge \Box(b)$,

(3) $\Box(a \rightarrow b) \leq \Box(a) \rightarrow \Box(b)$.

The identities (2) and (3) are equivalent in the framework of Heyting algebras which satisfy the condition (1). However, this property is not valid in general in the framework of subresiduated lattices. The identity (3) is known as the normality identity for modal operators and it is denoted by (K). Motivated by the previous fact, an algebra $\langle A, \wedge, \vee, \rightarrow, \Box, 0, 1\rangle$ of type $(2, 2, 2, 1, 0, 0)$ is said to be a KRWH-algebra (KSRL-algebra) whenever its $\{\wedge, \vee, \rightarrow, 0, 1\}$-reduct is a RWH-algebra (subresiduated lattice) and the identities (1), (2) y (3) are satisfied. We write $\mathbf{KRWH}$ and $\mathbf{KSRL}$ to denote the varieties of KRWH-algebras and KSRL-algebras respectively.

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In this talk we will present some results of 3. More precisely, we shall study the lattice of congruences of $\mathbf{KRWH}$ and $\mathbf{KSRL}$. Besides we shall study principal congruences, simple algebras, subdirectly irreducible algebras and compatible functions, providing a generalization of results given in 1,4,5,6. Finally, we shall study the subvariety of $\mathbf{KRWH}$ generated by its totally ordered members.

Keywords: Modal, Weak Heyting algebras

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ALGEBRAIC SEMANTICS FOR POSSIBILISTIC LOGIC

Charla contribuida

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Abstract:
Usually, Gödel modal logics are defined in terms of Gödel-Kripke models $M = \langle W, R, e\rangle$ where W is a non-empty set of worlds, $e : W \times Var \mapsto G$ is a G-valuation of propositional variables in each world, and $R : W \times W \mapsto G$ is an accessibility relation G-valued with G a Gödel algebra, in both cases. These logics have been investigated in some detail by Caicedo and Rodriguez, Metcalfe and Olivetti when G is the standard Gödel algebra on $[0, 1]$. More general approaches, focussing mainly on finite-valued modal logics, have been developed by Fitting, Priest, and Bou et al..

In, the authors show that the *possibilistic logic* GKD45 is complete with respect to a simpler semantics, given by *possibilistic* structures $M = \langle W, \pi, e\rangle$ where W and e are as above with $G = [0, 1]$, and $\pi : W \to [0, 1]$ is a fuzzy set of worlds instead of a fuzzy relation as in Gödel-Kripke models satisfying $\sup_w \pi(w) = 1$. We show that this simpler semantics is equivalent to the algebraic semantics given by pseudomonadic Gödel algebras introduced in. In this way, we prove that pseudomonadic Gödel algebras are the algebraic semantics for the logic GKD45. In addition, by using the completeness result of GKD45 with respect to possibilistic semantics, we are able to prove that the variety of pseudomonadic Gödel algebras is generated by the class of possibilistic complex algebras, i.e. the algebras associated to possibilistic Gödel frames.

It is well known that monadic Gödel algebras form a proper subvariety of pseudomonadic Gödel algebras and have a natural interpretation as a one-variable fragment of first order Gödel logic with constant domain (see and). In this work, using the equivalence between possibilistic semantics and pseudomonadic Gödel algebras, we show that pseudomonadic algebras have a nice interpretation on another one-variable fragment of first order Gödel logic known as Scott logic which was introduced in .

Keywords: Pseudomonadic Algebras, Possibilistic Logic, Epistemic Logic, Modal Godel Logics.

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DEEP DISAGREEMENTS IN LOGIC

Charla contribuida

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Abstract:
Deep disagreements are usually understood as that kind of disputes where there is clash of fundamental principles. Fogelin (1985) holds that there are deep disagreements and that these disputes are immune to rational resolution. However, it has been difficult to find decisive examples to support both claims. Recently, Martin (2019) offers an argument for the idea that logic is a good place to find examples of deep disagreements. Unlike the examples proposed by Fogelin (1985) taken from ethics and politics, the example used by Martin allows him to hold that there is at least a particular kind of deep disagreement that is rationally resoluble. Such an example is taken from the debate between dialetheists and classical logicians. In this work I show, first, that there is a tension between the argument that Martin offers for the idea that logic is a good place for searching deep disagreements and the kind of debate that he takes in consideration. Second, I propose other ways to understand both logical disputes and deep disagreements. On the one hand, I precise the kind of debates that we find in logic based on how logicians characterize logical theories and the criteria that they use to choose among such theories. In particular, I consider the characterization of classical and dialetheistic logic from a metainferential point of view. Besides, I discuss the reasons that have been offered in favor (and against) these theories. On the other hand, I propose to address the deep disagreements and their problems from the fundamental epistemic principle theory point of view (Lynch, 2016). I hold that only from this kind of epistemology some debates about logical theories could be understood as deep disagreements.

Keywords: Deep disagreements, logical theories, non-classical logics, rational resolution

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Substructural Paraconsistency

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Abstract:
Metainferences have recently come into focus as a useful way of analyzing substructural properties of logical consequences. as a new way to characterize a logic, as a way to analyze the debate between global and local validity, and as a toolkit for understanding abstract features of consequence relations. In this talk, I am going to discuss what are the connections between valid inferences and their valid metainferences. I will explore the notions of external and internal logical consequences in the context of mixed Many-Valued Consequences. Then, I present some substructural paraconsistent features that are part of some non-transitive logics. There are some paraconsistent elements that connect Priest's Logic of Paradox (LP) and the Strict-Tolerant approach ST: giving up Cut in the latter has as a consequence the loss of other metainferences, closely connected with Modus Ponens and Explosion labeled as Meta-modus Ponens and Meta-explosion. This feature can be generalized elaborating a new notion of paraconsistency.

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POSSIBILITY, TRIVIALITY AND INVALIDITY

Charla Invitada

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Abstract:
In this talk I show that taking $\Diamond$A as logically valid is not as damaging as it is usually thought; in particular, I show that its combination with S5 principles does not necessarily lead to triviality. One of the easiest ways to have $\Diamond$A as logically valid is by having a trivial index in the relational semantics. Weber has recently put forward some reticence to include such a world on the basis that it would lead to the invalidity of all arguments. I will show that the invalidity of all arguments is something that a committed dialetheist, like Weber himself, has to live with anyway, regardless of the inclusion of a trivial world in the semantics

Keywords: possibility, accessibility relation, trivial world, validity, invalidity

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LÓGICA, RAZONAMIENTO Y NORMATIVIDAD

Charla Invitada

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Abstract:
During the last years, the discussion about the normative role of logic in human reasoning has raised a vigorous philosophical debate. Although it has traditionally been held that logic is normative for reasoning, a deeper inquiry has led to questioning this connection and even refuting the thesis that logic is a normative discipline (Russell, 2020). This reconsideration has been possible in light of the current theoretical developments in the philosophy of logic and the psychology of reasoning. Beginning with Harman's Skeptical challenge (Harman, 1986), and analyzing responses in the line of bridge principles to justify the normative constraints of logic for reasoning (MacFarlane, 2004), I propose to look at the core concepts involved in this debate. This analytical inquiry will make it possible to smooth the way to sketch out an argument for the normative role of logic for reasoning. The stance I try to defend is close to social naturalism, insomuch as it is supported by a dialogical characterization of normativity and reasoning ((Dutilh-Novaes, 2021; Dogramaci, 2015; MacKenzie, 1989).

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A Sortalist Approach to Aristotelian Assertoric Syllogistic

Charla invitada

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Abstract:
As widely recognized, one of the important problems surrounding Aristotelian (assertoric) syllogistic theory concerns the logical role that singular propositions might play in this theoretical framework. This presentation will initially focus on this problem. We'll show first that Aristotle's work doesn't provide an unambiguous answer to the problem. Then, we'll consider post-Aristotelian solutions, which assimilate singular propositions to categorical propositions. Although these solutions partially hit the target, we'll see that they lack a full semantic grounding. This grounding is required to constitute philosophically adequate elucidations of the issue. An attempt to fill the above semantic gap might be conducted along the lines of Nino Cocchiarella's interpretation of singular propositions. His theory constitutes a sortalist approach to proper names and would provide the semantic foundation lacking in the post-Aristotelian proposals. However, as we'll point out, a Cocchiarellan-inspired solution wouldn't conform to the Aristotelian truth conditions for singular propositions. Moreover, this solution and, in general, any attempt to interpret singular propositions as categorical might conflict with Aristotle's view of universals. The above difficulty leads us to explore the alternative of extending Aristotle's syllogistic to singular propositions, instead of attempting to assimilate them to categorical propositions. For this purpose, we'll propose two formal sortal logics that will capture such a syllogistic theory as extended to singular propositions. One of the systems is an axiomatic system, and the other a natural deduction system. We'll show that Aristotelian intuitions ground both systems.

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A RELATING SEMANTICS FOR NELSON'S CONNEXIVE LOGIC

Charla invitada

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Abstract:
The main topic for this talk is Everett Nelson's connexive logic. First, we will go through a brief overview behind the philosophical motivations for this system, including the various views Nelson held with regards to the validity of some well- known logical principles. Then, we will go over a relational semantics for the axiomatic system. We will find that a relational semantics reveals a clear picture of the behavior of the compatibility relation between propositions without being loaded with technical details, as it sometimes happens with possible worlds semantics.

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TOWARDS MODULAR MATHEMATICS

Charla contribuida
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Abstract:

Synthetic reasoning is a powerful method, albeit circumscribed, of exploring mathematical landscapes. A synthetic researcher works by analyzing current mathematical efforts in an area of interest, extracting distinctive features in that area's mathematicians' reasoning, and *synthetizes* those features into an axiomatic system that allows and makes convinient exactly *that* kind of reasoning. One example is well-known: Kock's Synthetic Differential Geometry (SDG), and related works. But there are others: Bauer's Synthetic Computability Theory ; Synthetic Probability and Statistics ; and even Kock's alternative theory for SDG .
Synthetic theories often follow a pattern: they are type theories intended to be interpreted inside sufficiently structured categories. This makes its power doublefold: on one side, the adequacy of the axiomatics to a particular area; on the other, the fact that that theory (and its theorems) can be interpreted inside other mathematical worlds.
For example: in SDG, one postulates a type R with the structure of a ring, defines a subset $D = \{d : R \mid d^2 = 0\}$ using the underlying logic's tools, and puts forth the axiom

$$\forall f : D \to R \, \exists b : R \, \forall d : D \; f(d) = f(0) + b \cdot d$$

Here, we are using some kind of type theory, and it can be interpreted so that D and R are objects, and f, b and d are arrows – given that category has, *e.g.*, products and pull-backs. Arguably, such an axiom captures the structural meaning of differentiation (see 1 and 3 for a discussion).
But powerful as it may be, synthetic reasoning only goes so far. Theory-crafting is a meticulous and artisanal job, which is what allows it to be so well-fitted to a particular domain. But, without the syntactical tools to do otherwise, a theory-crafter is bound to make their theories restricted to that domain, and unable to communicate with others but for more handwork. However, a syntactical "meta-framework", so to say, that incorporates lessons from Universal Logic, would aid the theorycrafter in connecting theories together.
Universal Logic (UL) has been an area of active study for the last few decades (see, *e.g.*, 8 or 4). One might summarize its goals in three separate points: how to *identify*, *translate*, and *combine* logics? We should then require a complete formalism from UL to allow its users to specify logical theories (whatever the system commits to as "a logic", part of the first question) that could then be compared, translated, and combined with each other in mechanical ways. That is analogous to how category theory structures and guides mathematical enquiry: there is still work to be done, but the framework guides the mathematician's efforts in the right direction (or more so than when not using it).
A UL formalism, then, would be a suitable workbench for a theory-crafter. Everything in math is a model of a theory. Indeed, that is just a consequence of accepting synthetic reasoning: if a theory provides vocabulary and rules for reasoning about some objects, those objects must, individually or colectivelly, be models for that theory (or it'd be a bad theory). Examples are abundand: plain algebraic objects are interpretations

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of their first order theories into some kind of set theory; SDG shows the same for geometric objects. In a informal sense, every definition creates this sort of theory-model relation.
There is also a well-known cartesian structure to model-taking and theory-combining. For example, in categorial logic there are synthetic objects called "sketches" that admit models in some categories. Given two sketches $\mathcal{S}$ and $\mathcal{T}$, a sufficiently equiped category C and suitable definitions of $\otimes$ and Mod, it can be shown that

$$\mathrm{Mod}(\mathcal{S} \otimes \mathcal{T}, C) \simeq \mathrm{Mod}(\mathcal{S}, \mathrm{Mod}(\mathcal{T}, C))$$

Or, as is didactically explained in a talk by Maaike Zwart , under the formalization of algebraic and composite theories, the theory of rings is given as the composite theory of monoids and then abelian groups (but not the other way around!). This shows a formal instance *in the wild* that perhaps confirms, perhaps corrects, mathematicians' intuition.
So a theory-crafter could combine synthetic theories – which, at least in principle, can encompass all of mathematics – to obtain new mathematical notions; perhaps even old ones, but decomposed in novel ways. These combinations should behave well, and commute with the taking-of-models, as in the above expression. A combined theory can reveal interesting interactions that are present in the relevant objects. One example of a possible combination: Lie groups are nothing more than models of a theory of a group in the world of differential manifolds; or alternatively, a differential manifold in the world of groups; or, even, a model of a combined theory of groups and manifolds. The point is that an UL formalism should strive to capture those practical notions of theory-combination find in the wild.
One candidate for such a formalism is MMT, a system proposed with the aim of providing a "module system for mathematical theories" . In MMT, "theories" are sequences of declarations that may depend on previous declarations. There is a conflation of types *qua* types and propositions; and between terms, signature members, axioms, and proofs. A theory of monoids could look like this:

$$\begin{aligned}
M &: \mathrm{Type} \\
\cdot &: M \to M \to M \\
e &: M \\
\mathsf{assoc} &: (x, y, z : M) \to x \cdot (y \cdot z) = (x \cdot y) \cdot z \\
\mathsf{unit}_{\mathrm{L}} &: (x : M) \to x = e \cdot x \\
\mathsf{unit}_{\mathrm{R}} &: x \cdot e = x
\end{aligned}$$

Morphisms work purely syntactically, taking declared names to complex terms. An interpretation of the theory of a monoid as the monoid of endofunctions in some sort of set theory could look like this:

$$\begin{aligned}
M &\mapsto X^X && \text{(X a previously constructed set)} \\
\cdot &\mapsto \lambda f \lambda g (\lambda x \ \ .f(g(x))) \\
e &\mapsto \lambda x \ x \\
\mathsf{assoc} &\mapsto [\ldots] \text{ (proof of associativity)} \\
\mathsf{unit}_{\mathrm{L}} &\mapsto [\ldots] \text{ (proof of left unitality)} \\
\mathsf{unit}_{\mathrm{R}} &\mapsto [\ldots] \text{ (proof of right unitality)}
\end{aligned}$$

MMT seems precisely suitable to the definition, combination and translation of mathematical theories[1]. Given the proper tools to quickly construct and transform synthetic theories, it could become a powerful tool for modular mathematics.
However, there are some limitations for such a system – or perhaps some underdevelopment. A proper UL formalism must provide, besides rules and syntax, a toolbox for creating and transforming theories, and a knowledge-base of examples of applications of that toolbox to standard mathematical problems, and perhaps a demonstration of applications to new ones. In addition, a closed monoidal structure is missing; that would allow quick and mechanical taking of models and combination of theories.
At last, we might punctuate that a formalism for UL allied with the perspective of synthetic reasoning can allow logic to become an engine for mathematical praxis: the practicing mathematician may analyze his own practice, and synthetize new ways of doing it, which will fuel more analyzis (as exemplified by the evolution from 1 to 3).
Keywords: Universal Logic, Synthetic Reasoning, Foundations, Proof Assistants

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[1] Indeed, it *was* designed for that, afterall. See the titles of Rabe’s papers.

A critique of Timothy Williamson's objections to Logical Pluralism

Charla contribuida

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Resumen:
En los últimos años, el debate en torno del anti-excepcionalismo lógico ha ocupado un rol central en el campo de la filosofía de la lógica. Esta tesis plantea que la epistemología de la lógica no es esencialmente distinta de la epistemología propia de las ciencias, lo cual implica que el problema de la elección racional entre lógicas (logical theory choice) no es estructuralmente desemejante de la cuestión análoga que afrontan los científicos a la hora de elegir entre propuestas teóricas contendientes. No infrecuentemente esta tesis suele ser entendida como una propuesta en favor de la aplicación de una metodología abductiva para la comparación de teorías lógicas, tal cual acontece en el caso de las ciencias. Por otra parte, el pluralismo lógico es la tesis que sostiene que hay más de una lógica correcta, lo cual se contrapone a lo que se conoce como monismo lógico, tesis que plantea que solamente una lógica es la correcta, siendo habitualmente la lógica clásica, i.e., la lógica de predicados de primer orden con identidad, la elegida. Timothy Williamson, uno de los principales proponentes del anti-excepcionalismo, ha argumentado (2017, 2021) en favor de que la adopción de una metodología abductiva para la comparación de lógicas permite cimentar la preferibilidad de la lógica clásica por sobre cada una de sus alternativas. En esta Charla contribuida analizaremos y objetaremos a las principales críticas que desarrolla Williamson contra el pluralismo lógico, a partir de lo cual argüiremos en favor, pace Williamson, de que la aplicación del anti-excepcionalismo para la comparación de teorías lógicas conduce en realidad hasta el pluralismo lógico. Es decir, en favor de que si la elección entre lógicas alternativas se comporta estructuramente como se comporta la elección de teorías en las ciencias, entonces falso es que un solo sistema resulte el más adecuado para lidiar con todos y cado uno de los problemas propios de la lógica, como por ejemplo, con los condicionales contrafácticos y con las paradojas semánticas.

Abstract:
In recent years, the debate surrounding anti-exceptionalism has gained a lot of traction in the philosophy of logic. This thesis claims that the epistemology of logic is not essentially different from the epistemology of the sciences, which means that the problem of rational choice between different logics (=logical theory choice) is structurally similar to the issue faced by scientists when choosing between contending theoretical proposals. Not infrequently, this thesis is understood as a defense of the application of an abductive methodology for the comparison of logical theories, just as it happens in the case of the sciences. On the other hand, logical pluralism is the thesis that there is more than one correct logic -whether in nature or in application-, which is opposed to what is known as logical monism, a thesis that states that only one logical theory is right, usually being classical logic (i.e., first-order logic) the chosen one. Timothy Williamson, one of the leading proponents of anti-exceptionalism, has argued (2017, 2021) that the adoption of an abductive methodology for the comparison of logics grounds the preferability of classical logic over any of its

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alternatives. Here we propose to analyze and respond to Williamson's main objections to Logical Pluralism within the context of an anti-exceptionalist setting, in order to argue, pace Williamson, that the adoption and subsequent application of anti-exceptionalism for the comparison of logical theories actually leads to logical pluralism. That is to say, in favor of the fact that if the choice between alternative logics behaves in a structurally similar way as the choice of theories in science, then it is false that a single formal system is the most adequate to deal with each and every one of the problems of logic, as v.g., with the problems of counterfactual conditionals and semantic paradoxes.

Palabras clave: Pluralismo lógico, abductivismo lógico, elección de teorías lógicas, anti-excepcionalismo lógico, Timothy Williamson.

Keywords: Logical pluralism, logical abductivism, logical theory choice, anti-exceptionalism, Timothy Williamson.

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INFERENCIAS ESCÉPTICAS EN EL RAZONAMIENTO NO-MONOTÓNICO Y SUS PROBLEMAS FILOSÓFICOS

Charla contribuida

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Abstract:
Ambiguity is one of the central problems that emerge in the context of non-monotonic logics. This problem refers to situations where two independent arguments or lines of reasoning coincide in directly opposing and conflicting conclusions (e.g., structural arrangements such as the Nixon Diamond). To address this class of problems skepticism, the skeptic stance dictates that the acceptable conclusions are those that can be located in the intersection of the extensions associated with a non-monotonic theory. The result of this intersection operation yields the set of acceptable conclusions with respect to a specific non-monotonic theory. Nevertheless, there are at least two different ways in which we can instantiate the intersection of extensions as prescribed by skepticism: (a) direct skepticism and (b) indirect skepticism. In this work, we evaluate the problem associated with the existence of a twofold approach to skepticism known as floating conclusions. We propose a heuristic approach to the problem of floating conclusions and discuss the role of this type of approaches to such class of problems within non-monotonic logics.

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The Adoption Problem and the Contents of Inference Rules

Charla contribuida

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Abstract:
The adoption problem is an argument, introduced by Kripke in the 70's, purporting to show that certain logical inference rules cannot be rationally 'adopted'—roughly because one would need to already be guided by them in order to go about the process of adopting them. In this talk, I want to propose a way of understanding how this argument is supposed to work; and what, exactly, it accomplishes if it is successful. I'll conclude by showing how, contrary to Kripke's original intentions, the adoption problem can be repurposed as a novel argument against the viability of classical logic.

Keywords: Epistemology of logic, adoption problem, inference, non-classical logic

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La adjunción producto/exponencial desde un punto de vista lógico

Charla contribuida

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Abstract:
In this paper I examine the validity of the product/exponential adjunction from a logical perspective. A *product* in a category **C** is an object $A \times B$ whose elements are all the pairs (a, b) such that *a* is an element of A and *b* is an element of B, while an *exponential* is an object B^A whose elements are all the morphisms from A to B. An *adjunction* is, roughly, an equivalence relation between two kinds of morphisms in a given category. In particular, the product/exponential adjunction expresses that every morphism $f : A \times B \longrightarrow C$ in the category **C** is a morphism $g : A \longrightarrow C^B$, and vice versa.

To every category corresponds a higher-order typed language. In general terms, every object corresponds to a proposition; in particular, a product $A \times B$ corresponds to a conjunction $\phi \wedge \psi$, and an exponential corresponds to an implication $\phi \Rightarrow \psi$. On the other hand, morphisms amount to deducibility relations. It follows that a morphism of the form $A \times B \longrightarrow A$ corresponds to an instance of Conjunction Elimination , that is, $\phi \wedge \psi \vdash \phi$, while a morphism of the form $A \longrightarrow B^A$ corresponds to $\phi \vdash \psi \Rightarrow \phi$. From the product/exponential adjunction it follows that $\phi \wedge \psi \vdash \phi$ iff $\phi \vdash \psi \Rightarrow \phi$, which is an instance of *Residuation (of the conditional, to the left, using a conjunction)*.

Nevertheless, in relevance logic there are objections to the equivalence between $\phi \wedge \psi \vdash \phi$ and $\phi \vdash \psi \Rightarrow \phi$. In particular, the left side is considered valid, but the right side is considered a *fallacy of relevance*. So, if there are reasons to reject *Residuation*, then there are reasons to reject the product/exponential adjunction. The aim of this talk is to present these reasons, and the implications in categories where this adjunction holds.

Some implications are as follows: in the category of sets, for instance, the product/exponential adjunction is valid. Then, it is natural to ask what kind of category is obtained in its place when this adjunction does not hold, and whether from the features of such a category additional arguments could be drawn to the relevantists against *Residuation*, or whether, as in logic of relevance, more subtle and sophisticated forms of *Residuation* need to be expressed.

The structure of this paper is as follows: in the first part, I formally define in categorical terms what a product, an exponential and an adjunction are; in the second part, I show the logical counterpart of the product/exponential adjunction and some logical objections to its validity; in the third one, I present the mentioned categorical implications of these objections.

Keywords: adjunction, product, exponential, relevance logic, category theory

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Index of Keywords

Índice de palabras claves

Índice de contribuciones de países

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