

4th Franco-Mexican Advanced Seminar in the History and Philosophy of Science

Mexico City, May 17-19, 2022



 **SUHFE CIM-UNAM**
 **uamvideo**
9:30 h (CDMX)



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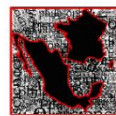


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Program

Tuesday, May 17th 2022

9:30-10:30	Opening	
Chair: Carmen Martínez Adame		
10:30-11:10	Vincent Jullien CAPHI Université de Nantes	<i>Acerca de un artículo de Jean Gayon sobre el esencialismo</i>
11:10-11:50	Camille Nerrière CAPHI Université de Nantes	<i>Putnam et l'activité scientifique comme pratique</i>
11:50-12:20	Coffee Break	
Chair: Lourdes González Huesca		
12:20-13:00	Andreina Graterol Posgrado en Filosofía de la Ciencia UNAM	<i>Una discusión sobre el significado de la zetética y su papel en la teoría de la constitución de ecuaciones de François Viète [tres usos, tres momentos]</i>
13:00-13:40	Jean Dhombres EHESS, CNRS	<i>La notion d'incertitude dans le traitement d'équations comme celle de Verhulst</i>
Chair: Gaëlle Pontarotti		
16:00-16:40	Erica Torrens UNAM	<i>Evolution and secularism in Mexico</i>
16:40-17:20	Juan Manuel Rodríguez Caso UNAM	<i>The "Darwinian" origin of Lamarckism: how the British Intelligentsia shaped Lamarck's ideas</i>
17:20-17:40	Coffee Break	
Chair: Camille Nerrière		
17:40-18:20	Ivahn Smadja CAPHI Université de Nantes	<i>In Newton's Footsteps : Chasles on Euclid's Lost Porisms and the Construction of Curves</i>
18:20-19:00	Emmylou Haffner ITEM, CNRS/ÉNS	<i>Conceptual change at the micro-level and the fine-tuning of rigor in the genesis of Dedekind's Was sind und was sollen die Zahlen?</i>

Wednesday, May 18th 2022

Chair: Emmylou Haffner

10:00-10:40	Marco Panza Chapman University, CNRS Daniele Struppa Donald Bren Presidential Chair in Mathematics Chapman University	<i>Agnostic Science and Mathematics</i>
10:40-11:20	Scott Walter CAPHI Université de Nantes	<i>The epistemic power of closed theories</i>
11:20-12:00	Juan Carlos Sánchez Hernández UAM	<i>Closure Principles and Logical Omniscience. A Multimodal Approach</i>
12:00-12:30	Coffee Break	
Chair: Jorge Martínez-Contreras		
12:30-13:10	Miguel Ángel Barrueta Alcaráz UAM	<i>Mind Reading</i>
13:10-13:50	Caroline Angleraux Labex "Who am I?", IHPST	<i>Which epistemological change results from the single cell approach?</i>

Chair: Ana Barahona

16:00-16:40	Gaëlle Pontarotti ANR, Enviro Bio Soc	<i>From exposome to health niche : conceptualizing the environment in health studies</i>
16:40-17:20	Solange Haas CEFE, IHPST	<i>Prises de décisions publiques à partir de modèles à compartiments d'épidémiologie sur l'évolution des contaminations par la Covid 19</i>
17:20-17:40	Coffee Break	
Chair: Juan Manuel Rodríguez Caso		
17:40-18:20	Jorge Martínez-Contreras UAM	<i>On the African origin of humans. Darwin's deduction or intuition?</i>
18:20-19:00	Michel Bourdeau IHPST	<i>Complexité et mathématisation: Hayek, Ulam et von Neumann</i>

Thursday, May 19th 2022

Chair: Max Fernández de Castro

10:00-10:40	Lourdes González-Huesca UNAM Favio Miranda-Perea UNAM	<i>Mechanizing diagrams: the case of Jaśkowski-Fitch modal natural deduction</i>
10:40-11:20	David Rabouin ERC Philiumm SPHERE	<i>Conceptual change and the problem of the stability of reference in mathematics : three proposals inspired by Leibniz</i>
11:20-12:00	Ariès Remaki SPHERE	<i>Leibniz's work on pronical progression: a bridge between discrete and continuous</i>
12:00-12:30	Coffee Break	
Chair: Caroline Angleraux		
12:30-13:10	Bernardo Yáñez INAH	<i>From bones to genomes: the changing face of human evolution</i>
13:10-13:50	Erica Torrens UNAM Aketzalli González UNAM	<i>De ancestras a cazadoras: cambio conceptual sobre la mujer del paleolítico</i>

Abstracts

Tuesday, May 17, 2022.

Acerca de un artículo de Jean Gayon sobre el esencialismo

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El esencialismo, noción de origen filosófico, se ha convertido en la bandera de una gran lucha ideológica en el ámbito político-ideológico. Adormecida durante 23 siglos, esta noción ha despertado en la comunidad de historiadores y filósofos de la ciencia. Esta será la ocasión de centrarse en un artículo de Jean Gayon, publicado en 2012 en la revista en línea Philonsorbonne, nº6. He pensado que era la ocasión de rendir homenaje a este excelente colega, fallecido hace dos años, que tanto contribuyó al desarrollo de nuestras actividades conjuntas franco-mexicanas, a la organización de estas reuniones, y probablemente no estaríamos hoy aquí sin su acción en este sentido.

Putnam and scientific activity as a practice

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Externalism is often linked with realism. For this reason, one tends to read Putnam's arguments in his famous article « The meaning of 'meaning' » as a defence of realism. Nevertheless, it is a partial understanding of his argument. It obliterates how important it is to take into account our practices to understand theoretical statements as, for example, « Water is H₂O ».

In order to put a light on this common misunderstanding, we will comment again on the Twin-Earth thought experiment and also will link it to previous Putnam's works discussing and rejecting the analytic status of some theoretical statements. We can read them as a rejection of a certain type of philosophical analysis : an apriori one that draws conclusions without taking into account the actual scientific theories and practices.

Una discusión sobre el significado de la zetética y su papel en la teoría de la constitución de ecuaciones de François Viète [tres usos, tres momentos]

M. Andreina Graterol Mujica, Posgrado en Filosofía de la Ciencia, UNAM

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Se presentará una discusión en torno al término zetética, con el propósito de comprender cuál es su papel en la teoría de la constitución de las ecuaciones de François Viète expuesta en su *Opus Restituitae Analyseos, seu Algebra Nova*, anunciada en *In artem analiticem Isagoge* (1591). Analizamos el uso de la palabra “zetética” en la obra de Viète, quien recuperó este término tras revisar la traducción de la Colección Matemática de Pappus elaborada por Commandino en (1588). La zetética, en Viète, presenta todas las enseñanzas relativas a la definición de la ecuación que puede resolver a un problema. Apuntamos tres usos del término zetética en los textos algebraicos de Viète, en tres momentos diferentes: i) referido a la zetética enunciada en la *Isagoge* (1591), aquí, presenta los criterios que condicionan a la definición de una ecuación (las reglas de constitución, operación y transformación), dice: “en análisis la palabra ecuación establecida por sí misma, significa una igualdad propiamente constituida de acuerdo con las reglas de la zetética”. ii) : referido al texto *Zeteticorum libri quinque* (1593), el cual es un compilado de problemas que sugieren ser resueltos a través de su previa traducción en una ecuación o proporción; aquí, el significado atribuido a la zetética es absolutamente práctico. iii) : referido al uso de la zetética dado por Viète en *De Aequationum Recognitione Tractatus Primus* (1615), para el reconocimiento de la estructura constitutiva de las ecuaciones; en esencia, la zetética, en este último tratado, busca el entendimiento de la forma general de las ecuaciones polinómicas de una variable, al apuntar al reconocimiento de la relación entre sus elementos constituyentes [coeficientes y raíces]. Así, logra la comprensión de que una ecuación cuadrática está formada por tres términos en proporción continua y una ecuación cúbica por cuatro, cuyas incógnitas asumirán determinado valor dentro de esa proporción dependiendo de los coeficientes que acompañan a la incógnita en sus grados inferiores. Esta triple función articulada del término zetética deja claro su papel dentro de la teoría de constitución de las ecuaciones de Viète, el cual es: presentar el marco formal que define a las ecuaciones así constituidas.

La notion d'incertitude dans le traitement d'équations mathématiques comme celle de Verhulst

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Franco-Mexican meetings have for some years adopted the idea of combining studies in mathematical sciences with studies in life sciences. Expecting to participate to this research, I thought that the theme of uncertainty was a promising one. I do not envisage it, however, in connection with the transformation of a question into a mathematical one - hypotheses retained to get a model, reductions of the phenomenal situations-, but for the very treatment of the mathematical equations thus obtained. Thus I take a step aside from the general epistemology of mathematization, but so conceptual changes may better be appreciated in the era of major digital processing. To be explicit in the context of a short lecture, I will compare the implementation of the heat equation in view of the determination of the age of the Earth during the second decade of the 19th century, which saw the idea of the greenhouse effect and will consider the change due to wavelets in our present 21st century, to the treatment of the Verhulst equation (established in 1845) with a particular look at epidemiology.

Evolution and secularism in Mexico

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Perhaps one of the most interesting aspects of current studies on the history of biological evolution is the growing interest in exploring its role and scope in non-scientific fields. Examples of these are in the fine arts and education since evolutionary theory not only provoked an unprecedented revolution in the study of living beings but also had an impact –as few scientific theories have had– on culture. This is one of the reasons that led us to explore the topic of Evolution and Secularism in Mexico, since the relationship between the State, secularism, the Catholic hierarchy and conservative-oriented groups in the educational field, particularly with the subject of biological evolution, is not only interesting but in several respects alarming and worthy of a call for action.

This talk fits into the sub-theme of the conference "diversity, equity, inclusion and justice in science". We will begin with a brief biography of Charles Darwin and some details of his theory, followed by a commentary on the tension between evolutionary biology and religion. Then we will concentrate on the issue of secular education in the Mexican educational system where a historical overview of the challenges for the secular state and

its educational institutions in relation to the teaching of biological evolution will be given to conclude with the current state of affairs.

The “Darwinian” origin of Lamarckism: how the British Intelligentsia shaped Lamarck’s ideas

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The French historian of science Goulven Laurent (1925-2008) comments that “Lamarckism” is a term that is hardly found in French literature, a situation that is striking considering the importance of Jean Baptiste Lamarck’s work. On the other hand, from the nineteenth century it abounds in Anglo-Saxon texts. This situation arises from the different historiographical approaches to the history of biology and evolutionary theory promoted in each context. This presentation aims to reconstruct how Lamarck’s ideas were discussed in Britain during the nineteenth century. It is acknowledged that the first author to discuss – and harshly criticise Lamarck – was the geologist Charles Lyell, who serves as the initial example. Afterwards, although Alfred R. Wallace is recognised as an accomplished critic of Lamarck, he can at the same time be seen as an arduous disseminator of Lamarck’s ideas. Finally, a selection of works will be shown that refer to the case of “Lamarckism”, by authors such as George J. Romanes, Raphael Meldola, E. Ray Lankester, Samuel Butler, among others.

In Newton’s Footsteps : Chasles on Euclid’s Lost Porisms and the Construction of Curves

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In this talk, I will present some aspects of a joint work with Nicolas Michel, based on archival research at the Paris Académie des sciences. – Among the nineteenth-century French geometers, self-proclaimed followers of Monge, who contributed to promote the methods of pure geometry as distinct from, and independent of, the analytical methods whose prevalence in modern geometry they challenged, Michel Chasles developed a characteristic research practice. He constantly intertwined his pursuit of pure geometry with close historiographical scrutiny of past methods. The way he connected his work on Euclid’s lost Porisms and his new approach to the construction of curves offers a perfect case in point. Relying on previous insights by Comte and Poncelet on the difference between ancient and

modern geometry, Chasles crafted a new tool, both interpretive and constructive, by means of which he read in a new light Pappus's well-known lemmas on Euclid's Porisms. Although perfectly aware that such rewriting of ancient Greek lemmas in terms of anharmonic ratios would constrain our understanding of ancient mathematics into an alien format, he nevertheless considered his new tack justified and fruitful. Indeed, Chasles crucially drew on the work of the seventeenth- and eighteenth-century British mathematicians, viz. those who, from Edmond Halley to Thomas Simson, endeavored to unriddle Euclid's lost Porisms, as well as those who, from Isaac Newton to Colin MacLaurin, and William Braikenridge, strove for the organic description of curves. In contrast to his British predecessors, however, Chasles devised a new notational technology supposedly connecting ancient and modern methods. He then claimed to succeed where they had fallen short, viz. solve the ancient riddle and construct a general theory of the description of geometrical curves.

Conceptual change at the micro level and the fine-tuning of rigor in the genesis of Dedekind's *Was sind und was sollen die Zahlen?*

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Richard Dedekind left several manuscripts containing reflections on the foundation of mathematics, some of which were posthumously published by Emmy Noether and by Pierre Dugac and became fairly well-known among Dedekind scholars. In particular, Dirk Schlimm's and Wilfried Sieg's works showed very well how these documents help shed light on the successive changes in Dedekind's concept of number.

Among these documents, we find several drafts for his 1888 essay on natural numbers, *Was sind und was sollen die Zahlen?*, dating from the 1870s and 1887, which will be the focus of this talk. These documents offer great insights into Dedekind's writing process, as they display many of the steps and corrections made by the author: from one draft to another, but also in each draft, since Dedekind used a two column layout that allowed for numerous corrections and additions. I will analyse how the material organisation of the writing gives us clues both on the conceptual clarification(s) and on the stepwise process of adjusting and sharpening the deductive structure, thus working towards what Dedekind would consider the most rigorous version of his text.

Wednesday, May 18, 2022.

Agnostic Science and Mathematics

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In our talk we argue that data science is a coherent and novel approach to empirical problems that, in its most general form, does not build understanding about phenomena. Within the new type of mathematization at work in data science, mathematical methods are not selected because of any relevance for a problem at hand; mathematical methods are applied to a specific problem only by 'forcing', i.e. on the basis of their ability to reorganize the data for further analysis and the intrinsic richness of their mathematical structure. We explore the broader question of the appropriateness of data science methods in solving problems, and argue that this question should not be interpreted as a search for a correspondence between phenomena and specific solutions found by data science methods; rather, it is the internal structure of data science methods that is open to precise forms of understanding. We conclude by suggesting that our investigation may lead to a better understanding of why, how, and where, data science methods work best.

The epistemic power of closed theories

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The two great scientific revolutions of the early 20th century -- relativity theory and quantum mechanics -- shocked physicists' confidence in the validity of their methods. Some of the participants in these revolutions, including Henri Poincaré and Werner Heisenberg, drew from their experience an epistemological lesson: pre-relativistic physics was both unsurpassable and true. Their philosophical understanding of the foundations of the phenomenal world, according to which certain "closed" theories are essential to the progress of knowledge, is echoed in the writings of several leading theorists, including Niels Bohr, G. D. Birkhoff, H. P. Robertson, and John von Neumann. My talk complements Bokulich (2006) by underlining the epistemic practice of these theorists and its consequence for theory construction in various domains.

Closure Principles and Logical Omniscience. A Multimodal Approach

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Since the invention of possible worlds semantics, modal logic applications have increased by developing logics alethic, tense, epistemic, doxastic, and so on. However, many logicians also recognize that a modal logic that only considers one kind of modality is quite restricted. Multi-modal logics raise intending to consider the most ambits involved in the validity of inferences, such as time, place, knowledge, belief, obligations, and so on. In this presentation, I will develop how we can use multi-modal logics to criticize the validity of some instances of the Closure Principle for epistemic logic, how these logics face the omniscience problem, and a pair of solutions adding non-normal worlds and epistemic states to the semantics. My syntactic approach will be merely axiomatic.

Mindreading

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Premack and Woodruff (1978) open the debate on *theory of mind* or mindreading (MR). Their work claims, after a series of experiments, that primates have cognitive skills which are similar to those of humans. The results showed that primates acknowledged there was a problem, what was necessary to satisfy some purposes, and, moreover, they were able to see what fulfilling these objectives required. However, an anthropocentric and philosophical perspective suggests that what primates did was too basic to be ascribed the cognitive skills that help humans explain, predict, and interact with conduct in general. The debate is based on a supposed dichotomy, where some assume primates possess MR, while others deny it.

On the other hand, the study of such ability allows us to establish a close connection between possessing certain skills, fitness, and evolutionary success. In other words, MR can be regarded as a cognitive tool that promotes evolution, language, and interaction.

Which epistemological change results from the single cell approach?

Caroline Angleraux, Labex "Who am I?"/IHPST

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Bulk sequencing techniques are usually used to sequence genetic material. It implies to break the cell membrane and then to analyze the data statistically, which masks the heterogeneity of the cell sample. On the contrary, the single cell sequencing techniques preserve the cell membrane; it results an analysis that distinguishes each cell profile, which emphasizes the heterogeneity of the cell sample. The single cell approach is particularly useful to study epigenetic phenomena which concern a very few cells of the sample and which would not have been highlighted in a bulk approach. It is more and more used in biological, medical and neuroscience research. This single cell approach implies new theoretical questions (how the microenvironment of a cell is taken into account? Which limit is considered to be relevant for analyzing the data?). But it also implies a new way of epistemologically questioning the cell concept. In this sense, this talk aims to present the epistemological change, especially about the cell concept, that the single cell approach embraces.

From exposome to pathogenic niche : conceptualizing the environment in health studies

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During the last few years, the concept of exposome has been widely used to designate the totality of human environmental exposure from conception onward (Wild, 2005; Rappaport and Smith, 2010). This concept is meant to provide a more exhaustive and more operational description of the environment in health studies, and notably in epidemiology. The point of its proponents, indeed, is to better take into account the role of environmental factors in the etiology of non-communicable diseases. In this talk, I present this promising concept and I highlight some of its theoretical limitations, before introducing an alternative conceptual tool to make sense of the environment in health studies, that of pathogenic niche. Inspired by biological and philosophical studies about niche construction, the concept of pathological niche is meant to be more relevant and more useful than that of exposome for scientists seeking to outline the environmental parameters at play in the origin of diseases, and intending to plan efficient interventions.

Prises de décisions publiques à partir de modèles à compartiments d'épidémiologie sur l'évolution des contaminations par la Covid 19

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On the African origin of humans. Darwin's deduction or intuition

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In February 1871, Darwin published *On the Descent of Man, and Selection in Relation to Sex*, a book on which –with the previous help of Huxley– he had worked the previous years. “Descent” has to be understood here as “ancestry”. Let’s remember that in *On the Origin of Species* (1859) he already announced that humans obey the same laws as any other living being, they are not different in that aspect, and they have to have a primitive ancestor. Sexual selection (SS) in this book is as important as fitness in evolution, it is indeed a part of fitness. He gives more place to the study of SS than to that of the origin of humans, but we won’t deal with this matter. Concerning our origin, famously, he proposes an African one, and now we are certain that he was right. With the Englishman, Primatology (which has already started with Tyson and Buffon, although the name only appears many decades after his death) enters the realm of evolution and beyond a purely classificatory endeavor. Chimpanzees and orangutans (although sometimes confused as a single species, with two varieties) had already been described since the 18th C. The gorilla is “discovered” by Europeans just before the publication of *On the Origin of Species* (1859), in 1847. But Paleoanthropology (although this name did not exist either) begins with Huxley and him, in an evolutionary perspective, since the remains of three Neanderthals discovered by then are mentioned, although not pretending they were a different species. On the other hand, Darwin had encountered “primitive” humans (the Fuegians, for instance) but he was somehow more interested in non-human primates (NHP) ethology (another yet to appear name) than in anthropology. Based on the existence of two Anthropoids in Africa –and on other data– he discovered our African ancestry. This was quite simply a deductive argument considering his theory. But, on the other hand, we consider quite intuitive, and based on his observations and studies of NHP behavior, a less scientifically solid, but emotionally strong, intuitive argument in favor of his hypothesis.

Complexité et mathématisation: Hayek, Ulam et von Neumann

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En 1947 Warren Weaver, alors un des grands responsables de la politique scientifique US, publie un article, *Science and Complexity*, où il propose de distinguer trois domaines : la science des phénomènes « simples », comme la physique ; la science des phénomènes complexes inorganisés, qui relèvent de la statistique ; la science des phénomènes complexes organisés. Hayek a aussitôt adhéré à une proposition qui présentait pour lui un triple avantage, Elle attirait l'attention sur un phénomène qui se trouvait déjà au centre de sa pensée, — puisque c'est l'extrême complexité de la division du travail qui empêche la planification centralisée et contraint de s'en remettre aux mécanismes du marché—, mais qui n'était pas thématiquement tel. De plus cela entraînait un profond changement dans le positionnement épistémologique de l'économie. Auparavant, et notamment dans *Scientisme et sciences sociales* (publié en 1952, écrit entre 42-45), Hayek se situait dans un cadre subjectiviste hérité de Dilthey; mais, en se coupant ainsi des sciences de la nature, il risquait de compromettre le statut scientifique de sa discipline, ce qui lui avait valu les critiques sévères d'Ernest Nagel. Enfin l'idée de complexité organisée, en confortant le refus de la mathématisation de l'économie, caractéristique de l'école autrichienne, permettait d'échapper à la tutelle de la physique et incitait à développer des relations avec cette autre science de la complexité organisée qu'est la biologie. Mais à la même époque se développe une autre approche des phénomènes complexes, qui prend en défaut la tripartition établie par Warren et qu'on trouve par exemple chez Stanislaw Ulam ou chez von Neumann. Comme pour Weaver, le contexte est celui de l'effort de guerre, mais l'étude de la complexité passe cette fois par la poursuite de la mathématisation et est inséparable du recours aux ordinateurs, qui apparaissent au même moment. Après avoir rappelé brièvement le tournant biologique opéré par von Neumann après la publication de *Game Theory and Economic Behavior*; je m'arrêterai sur les travaux de Stanislaw Ulam, en qui on a voulu voir le père de la Bombe H, mais qui est aussi l'inventeur de la méthode de Monte Carlo, méthode qui non seulement permet de résoudre, grâce à la puissance de calcul et à un recours original aux statistiques, des problèmes jusqu'alors insolubles, mais qui conçoit en outre l'ordinateur comme un instrument qui sert à simuler les phénomènes que l'on veut étudier, et qui permet ainsi de "réaliser des expériences non avec des appareils physiques, mais de façon théorique".

Thursday, May 19, 2022.

Mechanizing diagrams: the case of Jaśkowski-Fitch modal natural deduction

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The role and importance of diagrammatic and visual reasoning in mathematical practice has been thoroughly studied from distinct points of view. In logic we can find these visual devices for instance in syllogistic reasoning but also in deductive systems like tableaux, binary resolution, and natural deduction. In the latter case Fitch, based on Jaśkowski's work, introduced a visual aid (boxes, lines, or indentations) in formal derivations in order to capture argumentations that depend on a temporal assumption, called subordinate proofs. It has been said that deductive systems were invented to make the process of capturing mathematical proofs almost mechanical, carrying out valid reasoning in an accurate way. A natural question arises about the role of diagrammatic aids in the construction of formal proofs, inquiry that becomes more important nowadays from the point of view of the implementation and formal verification of deductive systems employing modern interactive theorem provers. In this talk we discuss some issues about mechanizing diagrammatic natural deduction in the case of Fitch-style for modal natural deduction where a second notion of subordinate proof is present and requires an extra visual aid to construct derivations.

Conceptual change and the problem of the stability of reference in mathematics : three proposals inspired by Leibniz

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It is quite natural to consider that our discourse reaches the world when we are able to provide true descriptions of it. This is even a presupposition of many considerations about the way reference to things works and about the nature of truth. Such a view, however, is endangered by the very existence of a history of science. If there have been different theories of what an atom, a gene, or an earthquake is, and if one of them alone seems adequate today, then there may have been inadequate descriptions of these same objects - and, as a consequence, the objects can be reached through false knowledge. There are

several solutions to this problem, the most famous one consisting in positing a form of direct access to things ("semantic externalism"), independent of descriptions. But this solution does not seem to be available for mathematical objects, with which we have precisely no "direct" relationship (we do not interact causally with them). The lecture will present some simple examples illustrating this problem throughout the history of mathematics and will outline some ways to remedy it inspired by Leibniz's theory of knowledge.

Leibniz's work on pronic progression : a bridge between discrete and continuous

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After reading Wallis' *Arithmetica Infinitorum* during his stay in Paris, Leibniz became interested in the problems posed by the British mathematician's method of interpolation. He then developed a new concept of progression, which he called "pronic" and which embodied the gap between discrete and continuous methods. This notion also allowed the young Leibniz to deepen his reflection on exponents. These mostly unpublished works illustrate the common origin of the young philosopher's reflections on the subject of the differential calculus and the analysis of transcendents. In addition to linking the discrete and the continuous, the concept of the pronic also brings together the notions of powers and differences, foreshadowing the future discoveries that Leibniz and Jacques Bernoulli would later share.

From bones to genomes: the changing face of human evolution

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Human evolution is a fascinating issue, both for its conceptual and methodological principles, as well as, for its philosophical and epistemological bases. It is also an interesting topic because of the way in which its postulates have "evolved"; throughout its history. In this presentation, I will address the latter, through the analysis of the fossil record as the main evidence for this scientific activity. I will analyze how, in the last fifty years, there has been a tension between comparative anatomy and morphology or morphometry research, with molecular biology oriented studies, mainly those with ancient DNA (aDNA). Tension that can be described as the dispute over the epistemic primacy of which of these academic strategies—bioanthropology/bioarchaeology or paleogenomics—is better equipped for the

best collection, analyses, interpretation, and explanation of the fossil evidence. Here, I will focus on two main points: i) I will contrast the theoretical and methodological underpinnings of these two ways of approximating the fossil record. Further, ii) I will show a dramatic shift towards a more impactful influence of the paleogenomic orientation, as a more definitive way of reconstructing the past. Finally, I close my presentation with a critical perspective that delves with the necessity of conducting integral research for those disciplines dealing with human evolution, rather than pondering one over the other.

De ancestras a cazadoras: cambio conceptual sobre la mujer del paleolítico

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