Mathesis metaphysica quadam

Leibniz, entre Mathématiques et Philosophie/Leibniz, between Mathematics and Philosophy

Colloque international/International Conference
M. Detlefsen (ANR-chaire d'excellence « Ideals of Proof »)
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8-10 mars 2010

The Ideals of Proof (IP) Project (ANR) and REHSEIS (UMR 7219, SPHERE) are pleased to announce a workshop on interrelationships between mathematics and philosophy in the thought of Leibniz. The workshop will take place Monday, March 8 through Wednesday, March 10, 2010. All meetings the first two days will be in the salle Dusanne of the ENS (45 rue d'Ulm, Paris). On the third day, the meetings will be in the Klee room, which is room 454A of the Condorcet building, on the Grands Moulins campus of the U of Paris-Diderot. The talks and discussions are free and open to the public. All interested persons are warmly invited to attend.

Monday, March 8th. Salle Dusanne, ENS

Session I: 9h00-10h50
Herbert Breger (Leibniz-Archiv, Hannover) : "The substructure of Leibniz's metaphysics"

Abstract
Leibniz believed that his philosophy was nearly mathematical or could be transformed into mathematical certainty. We know that he thereby alluded to his project of a characteristica universalis. Although we are not convinced of Leibniz's claim, we can recognize a substructure of Leibniz's metaphysics which is mathematical or is built on notions of philosophy of mathematics.

Session II: 11h00--12h50
Michel Serfati (IREM, Université Paris VII) : "Mathematics, metaphysics and symbolism in Leibniz: the principle of continuity"

Abstract
On the basis of the epistemological analysis of several Leibnizian mathematical examples I will first attempt to show how Leibniz's "principle of continuity" (which is, in fact, a meta-principle) belongs to the conceptual framework of what he calls "symbolic thought", at least insofar as its mathematical implementations are concerned. I will then show how the ambiguity of the mathematical and metaphysical status of the principle engendered controversies between Leibniz and some of his correspondents. In light of these several examples we will also appreciate Leibniz's stand vis-à-vis a central question, underlying this study, namely the architectonic character in mathematical thought

of the use of signs, and especially this crucial point, namely the capacity of the mathematician to remain at the symbolic level, to continue to work at that level, retarding as much as possible the appeal to meanings ; this is a primordial prescription for Leibniz – deriving from what he calls the "autarchic" character of the sign. Finally, it will be shown how this seventeenth century "principle" remains to these days fully operational in research and teaching. Let us repeat, emphasizing Leibniz's glory: these epistemological procedures, this "continuity schema" seen as interiorized methodological guide, this specific conception of continuity as a regulative principle – all these concepts that are so familiar to present day mathematicians that one can hardly imagine that they were not so before, were in fact ignored before him, especially by Descartes. Nowadays, therefore, 300 years after Leibniz, the "principle of continuity" belongs to an interiorized set of methodological rules. Like the principle of homogeneity (considered as normative) or that of generalization-extension (considered as a standard procedure of construction of algebraic or topological objects), they constitute part of the daily mathematical practice.

Lunch 12h50--14h20

Session III: 14h30--16h20

Vincenzo De Risi (Humboldt Fellow, Technische Universität, Berlin) : "Leibniz's studies on the Parallel Postulate"

Abstract

The development of non-Euclidean geometries is often regarded as an exemplar topic to consider the relations between philosophy and mathematics. Although the philosophical import of the foundational studies on the Parallel Postulate was clearly recognized only in the second half of the 19th century, there is no doubt that a number of mathematicians and philosophers were well aware of the metaphysical and epistemological issues raised by the theory of parallelism already in the 17th and 18th centuries. I would like to show the most important contributions of Leibniz to the geometrical foundations of a theory of parallels and their philosophical consequences for a full-fledged monadology, framing his considerations in the more general conceptual development which eventually gave birth to the modern concept of space.

Tuesday, March 9, 2010

Session IV: 9h00-10h50

Philip Beeley (Linacre College, Oxford) : "*In deliberationibus ad vitam pertinentibus*. Method and Certainty in Leibniz's Mathematical Practice"

Abstract

Already in his earliest philosophical writings, Leibniz was concerned to account for the success in the application of the mathematical sciences to our understanding of nature. In this context he developed a sophisticated concept of negligible error which would later stand him in good stead in

his mathematical writings, particularly those which are now seen to have played a decisive role in the emergence of modern analysis. The paper examines the historical and methodological context of Leibniz's error concept and shows how it serves to exemplify the profound ways in which Leibniz's philosophical deliberations on the application of mathematics informed his mathematical practice.

Session V: 11h00--12h50

Richard Arthur (Department of Philosophy, McMaster University) : "Leibniz's Actual Infinite in Relation to his Analysis of Matter"

Abstract

In this paper I examine some aspects of the relationship between Leibniz's thinking on the infinite and his analysis of matter. I begin by examining Leibniz's quadrature of the hyperbola, which demonstrates the connection between his work on infinite series, his upholding of the part-whole axiom, and his consequent fictionalist understanding of the infinite and infinitely small. On that conception, to say that there are actually infinitely many primes, for example, is to say that there are more than can be assigned any finite number N. There is no such thing as the collection of all primes, nor a number of them that is greater than all N, although one can calculate with such a number as a fiction under certain well-defined conditions. I then show how this conception fits with Leibniz's conception of the infinite division of matter, relating it to his principle of continuity, and contrasting his position on the infinite and the composition of matter with those of Georg Cantor.

Lunch 12h50--14h20

Session VI: 14h30--16h20

Samuel Levey (Department of Philosophy, Dartmouth College) : "Leibniz's analysis of Galileo's paradox"

Abstract

In "Two New Sciences" Galileo shows that the natural numbers can be mapped into the square numbers, yielding the seemingly paradoxical result that the naturals are both greater than and equal to the squares. Galileo concludes that in the infinite the terms 'greater', 'less', and 'equal' do not apply. Leibniz rejects this on the ground that it would violate the axiom, from Euclid, that the whole is greater than the part, and argues instead that the paradox shows the idea of an infinite whole to be contradictory. Russell and others have rejected Leibniz's analysis as resting on a crucial ambiguity in Euclid's Axiom, and Galileo's paradox is typically resolved by abandoning a key premise. Leibniz has some defenders who point out that Russell's criticisms proceed from a distinctly post-Cantorian standpoint. In this paper I argue that Leibniz's analysis involves a more subtle error, and even granting Galileo's premises as well as Euclid's Axiom it does not follow that the idea of an infinite whole is contradictory. This follows only on a "strong" definition of 'infinite', whereas Leibniz's own (now standard) definition allows infinite wholes consistently with Galileo's paradox. The details involved cast light well into the recesses of Leibniz's philosophy of mathematics.

Wednesday, March 10

Session VII: 9h00--10h50

Emily Grosholz (Department of Philosophy, Pennsylvania State University) : "The Representation of Time in Galileo, Newton and Leibniz"

Abstract

I revisit the representation of time in the writings of Galileo, Newton and Leibniz, to see whether they treat time as concrete, choosing representations that allow us to refer with reliable precision, or as abstract, choosing representations that allow us to analyze successfully, locating appropriate conditions of intelligibility. I interpret the conflict between Leibniz and Newton as due to differences in their choice of representation, and argue that the conflict has not been resolved, but remains with us.

Session VIII: 11h00--12h50

Eberhard Knobloch (Institut für Philosophie, Wissenschaftstheorie, Wissenschafts- und Technikgteschichte, Technische Universität Berlin) : "Analyticité, équipollence et la théorie des courbes chez Leibniz"

Abstract

Avant et après l'invention de son calcul différentiel, Leibniz s'appuyait sur les notions d'analyticité et d'équipollence de lignes et de figures. Ces deux notions jouent un rôle essentiel dans les mathématiques leibniziennes. Les deux parties de la géométrie ont besoin de deux différents types d'analyse tandis que l'existence de l'analyse entraîne la géométricité des objets. Plus tard, Leibniz a donné une autre justification pour la géométricité d'une courbe. Qu'est-ce que veut dire 'analytique' ou 'équipollent'? La conférence essaiera de clarifier cette question. En plus,, elle va expliquer la classification leibnizienne des courbes, en particulier celle de la 'Quadrature arithmétique du cercle etc.', leur géométricité et va démontrer quelques théorèmes généraux sur les courbes analytiques simples.

Pour plus d'informations/For further information, please contact either of the workshop organizers, Michael Detlefsen (mdetlef1@nd.edu) or David Rabouin (rabouin@ens.fr).