

Dans le cadre du
Séminaire Histoire et philosophie des mathématiques

Conférence exceptionnelle de SOLOMON MARCUS

22 octobre 2010

14 h-16 h

Biographie

Né à Bacau, Roumanie, le 1er Mars 1925. Etudiant, assistant, lecteur, maître de conférences, professeur, emeritus à la Faculté de Mathématiques et Informatique à l'Université de Bucarest, Roumanie.

Membre correspondant de l'Académie Roumaine en 1993, membre titulaire en 2001.

Activité de recherche en mathématiques, linguistique, informatique, poétique, sémiotique et anthropologie culturelle; dans ces domaines, il a publié plusieurs dizaines de livres en roumain, français, anglais, allemand, italien, espagnol, russe, tchèque, hongrois, serbo-croate, grec et plusieurs centaines d'articles dans les journaux internationaux de spécialité. Il est considéré comme l'un des initiateurs de la linguistique mathématique et de la poétique mathématique. Auteur des grammaires contextuelles (qui ont bénéficié d'une monographie de synthèse à Kluwer, 1998), initiateur d'une école roumaine de théâtrologie mathématique. Erdos nombre 1. Contribution concernant le statut logique et sémiotique de la Formule canonique du mythe de Claude Levi-Strauss. Membre du Comité éditorial de plusieurs dizaines de journaux internationaux de mathématique, informatique, linguistique, sémiotique et poétique. Cité par plus de mille auteurs. Militant pour une vision unitaire de la connaissance et de l'enseignant, mettant l'accent sur les paradigmes universaux qui traversent les disciplines et sur leur interaction. Intérêt pour l'Histoire et la Philosophie des sciences et pour leur interaction avec les arts.

L'erreur mathématique comme source de créativité.

Abstract:

There is a positive face of mistakes, they are sometimes the price we have to pay in order to make possible creativity. This fact is important at all levels: learning, teaching, research. There are in most languages two apparently equivalent terms: error and mistake (erreur and faute). However, in "error of approximation" we cannot replace 'error' by 'mistake'. 'Error' is related to the verb 'to err', which comes from the Latin verb 'errare' (in French: errer) meaning "walking at random, here and there; to roam, to wander"; the ludic aspect is clear and it persists in its English and French variant. There are three types of mistakes: syntactic, semantic and pragmatic, according to the distinction made in a Hilbert formal

system. For instance, if we look for the meaning of 'mistaken' according to the way we choose its opposites, then its syntactic opposite is 'correct', its semantic opposite is 'true', while its pragmatic opposite could be 'adequate', 'suitable' etc, but other options are also possible.

Mistakes in computation are typical syntactic mistakes. That made by Archimedes in computing the fourth decimal of the number pi stimulated the whole research in this respect, his mistake was discovered much later. Mersenne's mistake (1640) concerning the primality of Mersenne's numbers $M(q)$ for various values of q is still today a question which is not yet completely answered. The concept of 'uniform convergence' is born from a syntactic-semantic mistake made by Cauchy. The concept of an ideal in a ring was invented by Ernst Kummer trying, but failing to solve Fermat's Last Theorem. Henri Lebesgue's syntactic mistake in his famous "Sur les fonctions représentables analytiquement" (1905) became the starting moment of a new branch in General Topology: "Theory of analytic and projective sets" (Suslin, Lusin). Chaos theory was initiated by Poincare by trying to bridge the gap in his famous work related to the three-body problem.

The initial definition of cardinal transfinite numbers (Frege, Cantor) was invalidated by a semantic mistake, stimulating the invention of another, better definition, using the concept of ordinal transfinite numbers. Camille Jordan's definition of the length of a curve was blocked by a semantic mistake, discovered when trying to transfer Jordan's procedure to the area of a surface (Schwartz paradox); to bridge this gap, Frechet and Lebesgue proposed a different approach, including concepts such as convergence in position and convergence in distance. Hilbert believed (1926) he proved the continuum hypothesis, but his syntactic-semantic mistake was discovered by Gustave Choquet (1945), pointing out Hilbert's incapacity to capture the meaning of Goedel's incompleteness theorem (1931).

WE show that many, if not most pioneering works include mistake *shaving* a very stimulating role.

Noam Chomsky's pioneering paper (1956) leading to the beginning of a new development in the theory of formal grammars and languages was full of syntactic and semantic mistakes. The process of bridging the syntactic mistakes lead to the theory of formal grammars and was completely achieved by Arto Salomaa (1973); the process of bridging the semantic mistakes begun only in the eighties and it is stillactive. A similar situation happened with Turing's, Shannon's and Mandelbrot's pioneering works, including, in their initial variant, mistakes oscillating between benign and malign; these mistakes stimulated considerably the further development. Computer-aided proofs today follow a similar itinerary.

Historically, the unsuccessful attempts by Saccheri, Lambert, and Legendre had their role in inventing non-euclidean geometries. Gauss was stimulated in his proof of the fundamental theorem of algebra by the unsuccessful proposals by D'Alembert, Euler and Lagrange. Leibniz started his calculus with the wrong formula $d(uv) = d(u)d(v)$.

V.I. Arnold (2000) pointed out the mistakes giving rise to Leray's works on the hyperbolic PDEs, Holmogorov's initial definition of entropy of a dynamical system, Pontriagin's calculations of homotopy groups of spheres. The positive face of mistakes is crucial in education also. ■

Salle Mondrian, 646A, 6e étage,
bâtiment Condorcet, Université Paris-Diderot,
10, rue Alice Domont et Léonie Duquet,
75013 Paris

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