René Descartes Lectures 2010
Proof: Calculation, Intuition, and A Priori Knowledge

Tilburg, 06.10.2010 - 08.10.2012

Synopsis

Main Speaker: Professor Ian Hacking, University of Toronto and Collège de France

Every other year, a distinguished philosopher visits Tilburg University for one week to present the Ren Descartes Lectures. It is a great pleasure to announce that Professor Ian Hacking will give this year's lectures.

A century ago Bertrand Russell wrote that, "The question which Kant put at the beginning of his philosophy, namely 'How is pure mathematics possible?' is an interesting and difficult one, to which every philosophy which is not purely sceptical must find some answer." These lectures do not try to answer Kant's question, as understood by Russell, but, after reading some remarks of Wittgenstein's, try to undermine it. They will conclude with another version of the same question, namely, how did mathematical ability arise as a human faculty?

These lectures are not mathematical in character. Our concern is not philosophical analysis of specific issues about the infinite, or about constructive as opposed to classical proof, or the significance of Gdel's results. We are preoccupied by a powerful strand in philosophizing that is strikingly present in philosophers as diverse as Plato, Descartes, and Husserl, in addition to the three just mentioned, Kant, Russell, and Wittgenstein.

The motto of these lectures could well be from Wittgenstein's Remarks on the Foundations of Mathematics: "What we are supplying are really remarks on the natural history of mankind: not curiosities however, but rather observations on facts which no one has doubted and which have only gone unremarked because they are always before our eyes." Yet the consequences of these observations lead to truly radical changes in our conceptions of mathematics.

The Lectures are conjoined with a workshop on the theme of the lectures and the *Third European Graduate School on Language, Mind and Science*, a cooperation of the universities of Bochum, Lausanne and Tilburg. It is preceded by the Workshop "Objectivity and the Practice of Science" on Tuesday, 5 October 2010.

Organizers: Stephan Hartmann (TiLPS), Jan Sprenger (TiLPS)

Professor Ian Hacking

Ian Hacking is a Canadian philosopher who has written about many things: On experimental science in Representing and Intervening; on mental illness in Rewriting the Soul and Mad Travelers; on the 'archaeology' of ideas about probability in The Emergence of Probability and the Taming of Chance – as well as on topics of the moment such as The Social Construction of What? and essays in the New York Review of Books and The London Review of Books. His most recent honor was the 2009 Holberg International Memorial Prize awarded annually in Norway for 'outstanding scholarly work in the fields of the arts and humanities, social sciences, law and theology'. These lectures take up matters that Hacking has been mulling over for decades, ever since he was a graduate student at Cambridge University.

Lecture I: Why Is there "Philosophy of Mathematics"?

First, a historical observation: "mathematics" is not a given. What counts as mathematics has varied greatly in the history of Western mathematics, and indeed Kant's "pure mathematics" is something of a historical artefact. Second, a reflection on why mathematics has so fascinated many of the canonical Western philosophers. Certain experiences of doing mathematics, usually associated with proofs, have prompted philosophical obsessions. The phenomena connected with mathematical demonstration, including the "hardness of the logical must", are the focus of these lectures. And also, the "*motley* of techniques of proof." Some proofs are primarily calculations, while others are what Wittgenstein called "perspicuous" or "surveyable." These prompt two distinct attitudes to mathematics, the one represented historically by Leibniz, and the other by Descartes. Thus already we discourage the idea that there is one thing, "mathematics," of which there should be a "philosophy."

Commentators: Hannes Leitgeb (University of Bristol) and Mary Leng (University of Liverpool)

Lecture II: Meaning and Necessity - and Proof

This title is a riff on Carnap's title, *Meaning and Necessity* (1947). The idea, current in the early Vienna Circle, that logical necessity is grounded on meaning, was already devastated by Quine's *Truth by Convention* (1936).Yet it contains bold insights that, reworked gingerly and somewhat metaphorically, can be retained. Its fundamental flaw is seldom noticed, namely that it still subscribes to the mediaeval conception of necessary truth as "eternal". It must be replaced by a more dynamic model suggested not only by Wittgenstein, but also by Imre Lakatos's *Proofs and Refutations.* Kant was correct to say, in his words, that mathematical propositions are "synthetic a priori," but they may become "analytic" in the dialectic of proof. Unlike so much philosophical writing after Kripke, Wittgenstein's thoughts on following a rule are here regarded as a secondary theme, an essential bulwark against a knee-jerk rejection of his primary line of inquiries, rather than their motivation. Scepticism (of a philosophical sort) does not arise.

Commentators: James Conant (University of Chicago) and Martin Kusch (University of Vienna)

Lecture III: Roots of Mathematical Reasoning

Our picture is somewhat modular: there may be distinct faculties for mathematical reasoning. Kant thought there are two, one arithmetical, and the other geometrical. At any rate there are human capacities, which have emerged in the evolution of our species, and there is the cultural discovery of these capacities, for instance, the discovery, in the Eastern Mediterranean, over 2300 years ago, of the power of demonstrative proofs in geometry. These lectures conclude at the intersection of the evolutionary psychology of the mathematical faculty, and what the historian of ancient mathematics, Reviel Netz, calls its cognitive history. We do not yet well know what a dense cognitive history would look like. The cognitive psychology of the subject is itself evolving rapidly from work as various as that of Susan Carey, Stanislas Dehaene, and Lakoff & Nunez. Here we have a radical revision of Kant's question: "How, as a matter of human prehistory and history, did mathematics become possible?" Yet we should not think we thereby reduce our philosophical questions to sciences and histories, for the bedrock of these lectures is the commonplace, not the esoteric.

Commentators: Marcus Giaquinto (University of London) and Pierre Jacob (University of Paris)

Program

Wednesday 06.10

Morning session
Room DZ1

08:30 - 09:00	*Registration*
09:00 - 10:30	Ian Hacking: *Why Is There "Philosophy of Mathematics"?*
10:30 - 11:00	*Coffee break*
11:00 - 12:30	Hannes Leitgeb and Mary Leng: *Commentary and discussion*
12:30 - 02:00	*Lunch break*

Parallel sessions

	Room CZ111	Room CZ113
02:00 - 02:45	Davide Rizza: *Mathematical Practices and Philosophical Views: The Case of Applicability*	Kathy Puddifoot: *Contexts, Reflection and Norms of Reasoning*
02:45 - 03:30	Holger Leuz: *A Priori / A Posteriori Within Mathematics*	Tomoo Ueda: *Communicating Beliefs: A Communicational Theory of Propositional Attitude Reports*
03:30 - 04:00	*Cofee break*	
04:00 - 04:45	Elijah Chudnoff: *A Cartesian Theory of Intuitive Knowledge*	Martin Kusch: *Mini-tutorial: Hacking on Styles of Reasoning (takes two blocks)*
04:45 - 05:30	Jennifer Mulnix: *A Reliabilist Account of Mathematical Intuition and A Priori Knowledge*	
06:00 - 07:30	*Get together in Cafe Esplanada*	

Thursday 07.10

Morning session
Room CZ7

09:00 - 10:30	Ian Hacking: *Meaning and Necessity - and Proof*
10:30 - 11:00	*Coffee break*
11:00 - 12:30	James Conant and Martin Kusch: *Commentary and discussion*
12:30 - 02:00	*Lunch break (Dante Foyer)*

Parallel sessions

	Room CZ111	Room CZ113
02:00 - 02:45	Fabrizio Cariani: *Mathematical Induction and Explanatory Value in Mathematics*	Julie Jebeile: *Numerical Calculations Versus Certainty*
02:45 - 03:30	Susan Vineberg: *Explanation and Proof*	Juan Duran: *The Materiality Problem in the Dilemma of Computer Simulations*
03:30 - 04:00	*Cofee break*	
04:00 - 04:45	Ole Hjortland: *Proof-Theoretic Semantics in the Substructural Era*	James Conant: *Mini-tutorial: Hacking on Logic, Mathematics, and Proof (takes two blocks)*
04:45 - 05:30	Stefan Wintein: *Calculating With Sentences Which Are A Priori in Virtue of Our Intuitive Notion of Truth*	
05:30 - 06:15	Anna Ciaunica: *A Priori Physicalism Naturalized?*	
08:00	Conference dinner	

Friday 08.10

Morning session
Room CZ7

09:00 - 10:30	Ian Hacking: *Roots of Mathematical Reasoning*
10:30 - 11:00	*Coffee break*
11:00 - 12:30	Marcus Giaquinto and Pierre Jacob: *Commentary and discussion*
12:30 - 02:00	*Lunch break (Dante Foyer)*

Parallel sessions

	Room CZ186	Room CZ127
02:00 - 02:45	Madeline Muntersbjorn: *Kinds of Minds and the Unity of Mathematics*	Oran Magal: *A Kantian Reading of Hilbert's Programme: Formalism for the 21st Century*
02:45 - 03:30	Catarina Dutilh Novaes: *Demonstration as Discourse, Calculation as Mental Process*	Katherina Kinzel: *Stability and Dynamics in the Laboratory Sciences: A Comment on Hacking and Rheinberger*
03:30 - 04:00	*Cofee break*	
04:00 - 04:45	Tim Storer: *Dummettian 'Logicism', Intuitive Models, and A Priori Knowledge*	Kim-Erik Berts: *The Certainty of Mathematics*
04:45 - 05:30	Bence Nanay: *Singularist Semirealism*	Vincent Ardourel: *How Does Physical Analogy Help Solve Pure Mathematical Problems?*
05:30	*Closing recption*	

Acknowledgement

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