

Gentzen Centenary Symposium

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University of St Andrews
Tuesday 24 November 2009

Programme

- 11.10 Alex Simpson: *Non-well-founded proof theory*
- 11.55 James Brotherston: *Display calculi for bunched logics*
- 12.25 Julien Murzi: *Notions of harmony in proof-theoretic semantics*
- 14.15 Graham Leigh: *Proof theory and theories of truth*
- 14.40 William Stirton: *Gentzen's second consistency proof and its after-life*
- 15.15 Lucas Dixon: *Graphical logic*
- 15.55 Bahareh Afshari: *Proof theory of the infinite Ramsey Theorem*
- 16.25 Peter Chapman: *Automation of Gentzen-style proof theory*
- 17.00 Jan von Plato: *Gentzen's Logical Calculi: Historical and Systematic Aspects*

Social Programme

- 13.00 Lunch in the Jack Cole Building, aka School of Computer Science, 12 minutes walk away
- 14.00 Coffee/tea available from common room machine or kettle in the JCB (40p/30p per cup)
- 19.15 Dinner at Zizzi's Restaurant, 87-89 South St, 5 minutes walk away.

Gerhard Gentzen

- 24 November 1909, born in Greifswald
- 21 July 1933, submitted PhD dissertation
- 2 October 1934, awarded PhD by Göttingen Univ.
- 1935–39, assistant, Göttingen Univ.
- 1939, submitted *Habilitation* thesis
- 1939–43, military service
- 1943–45, docent without (and then with) salary, Prague Univ.
- 4 August 1945, died in Prague

Scientific work and impact

- Natural deduction calculi: NJ, NK (Reduction rules; normalisation theorem for NJ)
- Sequent calculi: LJ, LK (Cut Reduction rules; Hauptsatz for both)
- Consistency of arithmetic

Scientific work and impact, 2

- **Natural deduction calculi:** NJ (and its reduction rules) as basis for typed lambda calculus, *aka* “typed functional programming”, including modern extensions such as Martin-Löf type theory
- **Sequent calculi:** cut-free LJ: with modifications, this is the basis for proof search in (e.g.) Horn logic, *aka* “logic programming”. Variations of cut-free LK are the basis of [easily automated] reasoning by the tableau method for classical logic (and its many variations and extensions).
- **Computational linguistics:** (“parsing as proof search”)
- **Philosophical logic:** his remarks about relation between I-rules and E-rules has led to the Lorenzen-Prawitz ideas on inversion principles and to several notions of “harmony”
- **Reductive proof theory and ordinal analysis:** his use of induction up to ϵ_0 initiated the classification of fragments of mathematics according to proof-theoretic strength

References

- *Collected papers*, ed. by M. E. Szabo, North Holland, 1969
- E. Menzler-Trott, *Logic's Lost Genius: The Life of Gerhard Gentzen*, AMS & LMS, 2007
- J. von Plato, *Gentzen's Proof of Normalization for Natural Deduction*, Bull. Symbolic Logic, 2008
- S. Negri & J. von Plato, *Structural Proof Theory*, CUP, 2001
- A. Troelstra & H. Schwichtenberg, *Basic Proof Theory*, CUP, 2000