

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

Report No. 08/2009

DOI: 10.4171/OWR/2009/08

## Mini-Workshop: Category Theory and Related Fields: History and Prospects

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February 15th – February 21st, 2009

ABSTRACT. The workshop concerned various topics in the history of category theory and related fields, paying attention to some extent also to open questions, present and possible future development.

*Mathematics Subject Classification (2000)*: 01A60, 01A65, 01A67, 01A70, 14-03, 18-03, 19-03, 55-03.

### Introduction by the Organisers

By evaluating the history of category theory and related fields, the workshop aimed at continuing and broadening a historical study initiated by the late Saunders Mac Lane some 15 years ago in a short paper<sup>1</sup>. Most of the participants of the workshop are historians of mathematics having contributed to the historiography of category theory itself or one of its fields of application. But we hosted as well some leading mathematicians concerned with the development of category-theoretic tools in the various fields, in order to discuss, still in a line with Mac Lane's contribution, not only past but also recent, ongoing and possible future developments. The workshop also opened towards the two other parallel mini-workshops by offering a public lecture on the biography of category theorist Samuel Eilenberg<sup>2</sup>.

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<sup>1</sup>Saunders Mac Lane, "The development and prospects for category theory", in: *The European Colloquium of Category Theory Tours, 1994*, vol. 4 (2-3) of *Appl. Categ. Structures*, 1996, pp.129-136, MR97e:18001.

<sup>2</sup>No abstract of this talk is contained in the present report; see Ralf Krömer, "Ein Mathematikerleben im 20. Jahrhundert. Zum 10. Todestag von Samuel Eilenberg", in: *Mitteilungen der deutschen Mathematiker-Vereinigung* 16 (2008), 160-167.

The contributions of a purely historical kind covered (in an approximately chronological order which is not the order of the abstracts below) the following subject matters: the emergence of the concept of groupoid and its relation to the development of category theory; the roots of category theory in conceptual developments beyond the original works of Eilenberg and Mac Lane, especially the work of Steenrod and Ehresmann on the topology of fiber spaces; the role of category theory in homotopy theory (Kan, Quillen) and the theory of simplicial sets; biographical studies concerning Eilenberg and Mac Lane; the role and the influence of Ehresmann and his school; the reception of category theory in Germany; a study of the development of Grothendieck's theory of motives.

Presentations of ongoing developments both on the research level and the expository level included applications of category theory in Analysis (as initiated by Sato), some developments in categorical logic suggested by Mac Lane's comments on Carnap's work, a new presentation of Grothendieck's algebraic geometry intended to convince non-experts of its utility and simplicity, a collection of case studies about the role of category theory in contemporary mathematics from a philosophical point of view, and last but not least a new proposal for a logical foundation of category theory by Pierre Cartier. The basic ideas of Cartier's proposal can be traced back to the beginnings of his Bourbaki membership in the early fifties and corresponding discussions of the foundations of category theory, partly visible in the online collections of the Bourbaki archives.