

WS06: SYMBOLIC COGNITION IN ADVANCED MATHEMATICS

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Symbolic Cognition is the study of the construction of mathematical signs and symbols and the processes involved in manipulating such objects into meaningful concepts, procedures and representations in a variety of mathematical contexts. More practically, it aims to understand the ways in which symbols in many different representational forms, both as static squiggles as well as dynamic interactive objects, help us to do mathematics, build intuitions, develop mathematical concepts and construct powerful mathematical ideas. We investigate this through consideration of the evolution of symbols and their role in the intellectual development of the learner from the early years through to maturity.

Recent work has developed a three-fold mode of inquiry with associated research questions: 1. The use of symbols in human activity and theories of their use, e.g. theories of symbol-systems, semiotics, etc, how they interrelate and their roles, 2. The specific use of symbols in mathematics, with a special focus on advanced mathematical thinking, 3. The role of symbol-use with new technologies. We propose to meet for a fourth year to develop these areas into researchable domains. On-going work has been facilitated by an email discussion group and a constructive body of work (see www.symcog.org for details of work to date).

This year, we aim to deepen our inquiry by focusing our study on particular areas of mathematics and in so doing, address the second task type highlighted in the PME Working Session format of “Doing Mathematics”, examining multiple perspectives of teaching and learning particular areas of advanced mathematics and the co-evolution of mathematical notation systems.

We have met for three years and have had a rolling clientele. We will continue to have open meetings for the sake of those attending the conference, but would like now to focus on a publication. For this purpose we will also plan a smaller meeting for those who have something to offer to the work on a multi-author book. Anyone