

Symbolic Cognition in Advanced Mathematics

Stephen Hegedus, University of Massachusetts, USA (Convenor)

David Tall, University of Warwick, UK.

Ted Eisenberg, Ben-Gurion University, Israel

The main aim in establishing a group for the discussion of *Symbolic Cognition in Advanced Mathematics* would be to enable a forum for international debate and exchange in a field which has received much attention recently at PME in a variety of formats (e.g. Tall, 1999)

We would aim to facilitate discussion of new ideas emerging in the field and to distinguish between research in undergraduate mathematics education and inquiry into more general psychological aspects of mathematical thinking.

The role of symbol and cognitive processes relating to the representation and manipulation of mathematical signs and symbols is a popular topic (e.g. Dehaene, 1997; Deacon, 1997). The discussion group would aim to discuss such works and related aspects of pedagogy as well as present technological appreciation of symbolic cognition. In discussing the role of symbol in advanced mathematical work we would aim to discuss the process of symbolic manipulation from a psychological perspective where one would investigate in more depth the transitional processes from elementary mathematical thinking to advanced mathematical thinking.

Agenda: Research in following areas for possible discussion

1. The role of symbol in mathematical thought and meaning making;
2. Syntactic progression from the evolution of signs into symbols;
3. The historic consequence of sociological devices which enable constructive meaning for symbolic development;
4. Emerging theories of symbolic cognition in the fields of mathematical psychology and neuroscience;
5. Discussion of symbolic processing with reference to specific mathematical topics, i.e. in addition to limits, functions, calculus, analysis, linear algebra develop topics in abstract algebra, topology, probability/statistics, etc.

Tall, D. O. (1999) *Reflections on APOS Theory in elementary and advanced mathematical Thinking*. In Proceedings of the 23rd Conference of the International Group for the Psychology of Mathematics Education, Volume 1, p111-118.

Dehaene, S. (1997) *The Number Sense*. NY: Oxford University Press.

Deacon, T. (1997) *The symbolic species: the co-evolution of language and the human brain*. Allen Lane: Penguin Press.

Contact details of proposers:

Dr Stephen Hegedus
Assistant Professor
Department of Mathematics,
University of Massachusetts - Dartmouth
285 Old Westport Road,
North Dartmouth, MA 02747-2300. USA.
Office: (508) 910-6433
Fax: (508) 910-6917
SimCalc: (508) 999-9154

Professor Theodore Eisenberg
3 Zalaf Street Dept. of Mathematics
Omer 84965 Ben-Gurion University
Israel Beer Sheva 84105
972-8-6460-302 (home) Israel
972-8-6461-617
eisenbt@barak-online.net
eisen@math.bgu.ac.il

Professor David Tall
Mathematics Education Research Centre
Institute of Education
University of Warwick
COVENTRY CV4 7AL

home address: 21 Laburnum Avenue, Kenilworth CV8 2DR, UK
e-mail: david.tall@btinternet.com (home)
 david.tall@warwick.ac.uk (university)
tel: 01926 856728 (00441926 856728) (home)
 02476 523867 (00442476 523867) (university)