

Symbolic Cognition in Advanced Mathematics

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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.

