

Maulfry Worthington: Focus of research for doctorate (VU University, Amsterdam
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The development of young children's mathematical meanings through their multi-modal 'texts' and own mathematical graphics: a longitudinal, ethnographic study in England and the Netherlands.

This study will explore how 4 -7 year-old children use a range of visual 'modes' to represent, explore and communicate their mathematical thinking and meanings as they come to understand the symbolic written language of mathematics.

This research builds on research previously conducted into children's mathematical graphics (Carruthers and Worthington, 2005; 2006) and is based on a Vygotskian, socio-cultural perspective of young children's appropriation, creation and understanding of symbolic tools as they make personal meanings. My research will begin by exploring children's early meaning-making through play, informed also by a multi-modal perspective (Kress, 1997).

Using a number of ethnographic case studies of children gathered during a period of four years, I shall trace the development of their abstract thought in early 'written' mathematics from their beginnings in play to standard written mathematics, including calculations. Data will be gathered through case-studies of children in several Early Years settings and schools in England and the Netherlands, making it possible to identify any local, institutional or other socio-cultural influences on the children's representations and how these contribute to their developing semiotic modes and to mathematical thinking.

The findings are likely to add to our understanding of the ways in which children explore, make and communicate meanings and their thinking about mathematical 'texts' and symbols through their own mathematical graphics. It will also provide greater understanding of their development over time and the affordances of various features of their chosen visual representations that support their growing understanding of the symbolic language of mathematics, including calculations.

I am sincerely grateful to the teachers who have agreed to collaborate with me in this research project. Though not a central aspect of the research, evidence gathered is likely to lead to co-construction of their understanding and a deepening of teachers' knowledge, and highlight certain aspects of pedagogy that influence children's developing understanding of the written language of mathematics.
