

## **'Symbolic thought and graphical representations: what counts in early childhood education?'**

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This paper explores features of children's graphicacy that mediate symbolic understanding, showing how different cultural beliefs of nursery, home and school impact on their meaning-making. It draws on data gathered in England for doctoral research, which aims to trace the emergence of children's mathematical graphics (Carruthers & Worthington, 2005) in play (Worthington, 2010a, 2010b & 2010c).

Based on cultural-historical theory, it takes a social-semiotic perspective of symbolic tool-use and communication (Vygotsky, 1978).

It explores the considerable shift in adult expectations that occurs when children enter school. Empirical data were gathered from 3-5-year old children at nursery, home and at school. Parents and teachers collaborated in making observations and collecting examples: the researcher also made observations, joining in shared dialogue with the children, parents, and teachers to ensure reliability. The research draws on ethnographic theory, recognizing the importance of gaining informed consent, to privacy and listening to participants' views.

Analysis uncovered complex ways in which the children used graphical signs and communicated across boundaries of symbolic languages of drawing, writing and mathematical representations, showing how their own graphics contribute to their personal agency and identity. It shows how children's graphics may not always be those that are expected or accepted in school, and are likely to challenge established perceptions.

Rather than 'realistic' drawings and skills-based teaching of writing and the written symbolic language of mathematics, the findings highlight the need for a significant paradigm shift in schools that acknowledges the power of young children's symbolic thought.

**Key words:** *graphicacy, drawing; children's mathematical graphics; thinking; adult perceptions*

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