

**GESTURES AND MULTIMODALITY IN MATHEMATICS CLASSROOM ACTIVITIES: A  
SEMIOTIC PERSPECTIVE**

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The term ‘multimodality’ is used in mathematics education to refer to the importance and the mutual co-existence of a variety of modalities or resources in the teaching-learning processes in the mathematics classroom, and more generally in the development of mathematical meanings:

These resources or modalities include both oral and written symbolic communication as well as drawing, gesture, the manipulation of physical and electronic artifacts, and various kinds of bodily motion (Radford, Edwards & Arzarello, 2009, pp. 91-92).

Taking a multimodal perspective, embodied and perceptual-motor actions such as motion movements, gestures, the manipulation of materials or artifacts, rhythms, and so on come to play a relevant role for the so-called ‘abstract thinking’, together with more conventional forms of meaning expression.

On the other hand, multimodal resources can play the role of signs according to the Vygotskian idea of psychological tools that allow the human beings to organize their behavior and to plan actions (Vygotskij, 1931/1978). Accordingly, Arzarello (2006) has proposed the “semiotic bundle” notion as a methodological tool to frame the multimodal resources in the mathematics classroom from a semiotic perspective: a semiotic bundle is a system of signs (in a Vygotskian sense) used by students and teacher in their interactions and evolving in time.

Using the semiotic bundle lens, I will focus on the role of gestures in mathematical activities. After discussing the theoretical underpinnings of a semiotic analysis of multimodality, I will draw on classroom teaching experiments in primary school, to discuss the potentialities and limits offered by gestures, in synergy with the other semiotic resources, for carrying out mathematical argumentation processes. In particular, the phenomenon of “catchment” or gesture repetition (McNeill, 2005) will be investigated with respect to the contextual-general dialectics in the development of mathematics argumentation processes.

**References**

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