

WS1 EMBODIMENT IN MATHEMATICS: METAPHOR AND GESTURE

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One perspective on mathematics as a form of human cognition is that its roots lie in common human experience, both social and biological. In particular, our experiences as embodied, conscious beings can be seen as providing "raw material" for constructing mathematical concepts. From the perspective of embodied mathematics (Lakoff & Núñez, 2000), both mathematical objects and processes can be analysed in terms of more basic conceptual structures such as image schemata and conceptual mappings (Fauconnier, 1997). A common type of mapping is the conceptual metaphor, in which the logical and inferential structure of a source domain is utilised in making sense of a target domain (an example would be the embodied understanding of how objects can contain each other which underlies, unconsciously, the mathematical notion of set inclusion).

A complementary perspective on cognition and communication utilises the analysis of gestures to help reveal how people think about mathematics. Coming out of the work of David McNeill and other scholars and researchers (e.g., Corballis, 1999; McNeill, 1992; 2000), this perspective views gesture as an integral part of language, not simply an embellishment. In advance of the session, readings on embodied mathematics as well as the analysis of gesture generally and in mathematics teaching and learning (e.g., Goldin-Meadow et al. 1999) will be made available via a website.

During this working session, subgroups will analyse video and textual data in terms of embodiment, particularly as expressed in metaphorical language and gesture. Through group presentations and discussions, we will continue building a common vocabulary, theoretical perspective, and methodology for understanding mathematics as an embodied phenomenon. Plans will be made for possible future collaborations.

References

- Corballis, M. (1999). The gestural origins of language. *American Scientist*, 87(2), 138-45.
- Fauconnier, G. (1997). *Mappings in thought and language*. NY: Cambridge University.
- Lakoff, G. & R. Núñez (2000). *Where mathematics comes from: How the embodied mind brings mathematics into being*. Basic Books.
- McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago: Chicago University Press.
- McNeill, D. (ed.) (2000). *Language and gesture*. New York: Cambridge University Press.
- Goldin-Meadow, S., Kim, S. & Singer, M. (1999). What the teacher's hands tell the student's mind about math. *Journal of Educational Psychology*, 91(4), 720-730.