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The Investigation of Motion and its Symbolic Mathematical Expression

Generally speaking perceptual activity, gestures, concrete actions, and natural language provide one with the basic resources to achieve a certain understanding of motion. However, as the studies conducted in the late Middle Ages suggest, the mathematical investigation of motion rests on a process of idealization achieved through the use of signs. This is why a mathematical investigation of motion requires not only the overcoming of the concrete experience and its intuitive, phenomenological key concepts (e.g. space, time, velocity), but also the understanding of new subtle concomitant forms of mathematical symbolization. In this presentation we pay attention to this idealization considered as a dialectic process between concepts and signs. We analyze some classroom excerpts that point to some of the students' difficulties in their attempt to understand and make sense of motion and its symbolic mathematical expression. It is suggested that rather than merely "representing" motion, algebraic symbolism (in its graphical or formulaic form) is an artifact. Algebraic symbolism mediates new ontogenetic ways of reflecting about the world that emphasize certain qualitative and quantitative relationships and leads to specific cultural conceptions of space, time and motion.