MODAL CONTINUITY IN DEAF STUDENTS' SIGNED MATHEMATICAL DISCOURSE

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Despite numerous studies pointing to the delay in mathematical achievement of deaf and hard-of-hearing (DHH) students as compared to their hearing peers (e.g., Traxler, 2000; Pagliaro & Kritzer, 2013), only little is known about the peculiarities of mathematical learning processes of DHH learners. At the same time, studies both in psycholinguistics and mathematics education portray sign language (SL) as playing a key role in their individual and social processes of concept formation (e.g., Kurz & Pagliaro, 2020; Krause, 2019).

From both embodied and semiotic perspectives, the iconicity of SL signs may be relevant for mathematical thinking and learning: emerging from action, some signs carry and sustain enactive and/or depictive features of source sensorimotor forms, thus spontaneously schematizing individuals' situated enacted experience. As this, it becomes part of the modal hybrid of gestures and signs in signed discourse and thereby shapes the development of socially negotiated mathematical meaning. At the same time, the gestural expression develops from idiosyncratic gestures towards locally conventionalized signs that refer to the situated mathematical meaning. What is first action then influences a gestural representation *of* the action in a new mathematical context and eventually a gestural representation *for* a developing mathematical idea. Signed discourse thus facilitates *modal continuity* in the gestural modality from individual manual action to expression in social interaction, vice versa feeding into the individual's situated understanding. How modal continuity affects mathematical thinking and learning, we submit, is important for the theory and practice of mathematics education, both for DHH and for hearing learners. More broadly, theorizing modal continuity could illuminate the relationships between embodiment, representations, and language in processes of teaching and learning mathematics.

The poster reports on an ongoing design-based research project in which we develop a mathematical learning opportunity that considers sign language as a resource for learning mathematics. More concretely, we adapt a well-established embodied design—the Mathematical Imagery Trainer for Proportions (Abrahamson & Trninc, 2015)—with an eye on emerging manual movement patterns that foster a common ground for mathematical discourse in a way that is conducive to linguistic accuracy of (American) SL. In a two-step design, students first each develop sensorimotor schemes through solving a dynamic interaction problem, then explore in pairs a related mathematical problem, negotiating mathematical meaning in signed discourse. The poster will expand on the design's rationale and elaborate on the theoretical construct of modal continuity in light of data collected with Deaf and hearing students.

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