CONDUCTING DUAL PORTABLE EYE-TRACKING IN MATHEMATICAL CREATIVITY RESEARCH

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Eye-tracking opens a window to the focus of attention of persons and promises to allow studying, e.g., creative processes "in vivo" (Nüssli, 2011). Most eye-tracking studies in mathematics education research focus on single students. However, following a Vygotskyan notion of learning and development where the individual and the social are dialectically interrelated, eye-tracking studies of collaborating persons appear beneficial for understanding students' learning in their social facet. Dual eye-tracking, where two persons' eye-movements are recorded and related to a joint coordinate-system, has hardly been used in mathematics education research. Especially dual *portable* eye-tracking (DPET) with goggles has hardly been explored due to its technical challenges compared to *screen-based* eye-tracking.

In our interdisciplinary research project between mathematics education and computer science, we conduct DPET for studying collective mathematical creativity (Levenson, 2011) in a process perspective. DPET offers certain advantages, including to carry out paper and pen tasks in rather natural settings. Our research interests are: conducting DPET (technical), investigating opportunities and limitations of DPET for studying students' collective creativity (methodological), and studying students' collective creative problem solving (empirical).

We carried out experiments with two pairs of university students wearing Pupil Pro eye tracking goggles. The students were given 45 min to solve a geometry problem in as many ways as possible. For our analysis, we first programmed MATLAB code to synchronize data from both participants' goggles; resulting in a video displaying both students' eye-movements projected on the task sheet, the sound recorded by the goggles, and additional information, e.g. pupil dilation. With these videos we expect to get insights into how students' attentions meet, if students' eye-movements follow one another, or verbal inputs, etc. We expect insights into promotive aspects in students' collaboration: e.g., if pointing on the figure or intensive verbal communication promote students' joint attention (cf. Nüssli, 2011). Finally, we think that the expected insights can contribute to existing research on collective mathematical creativity, especially to the question of how to enhance students' creative collaboration.

References

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