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Mental mathematics with mathematical objects other than numbers: the case of operation on functions.

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Summary: This article reports on a study, part of a larger research program, focused on issues of mental mathematics with mathematical objects other than numbers. The study is about operations on functions in a Cartesian graph environment with two groups of 30 high school students (grade 11). Grounded in aspects of the enactivist theory of cognition, the research aims at characterizing students' emerging mathematical activity by analyzing the strategies they put forth in this mental mathematics environment. It illustrates how students pose their own problems when solving tasks and thus made emerge tailored strategies for solving the very problems that they posed. The data analysis highlights three specific approaches that students engaged with/in for solving tasks: algebraic/parametric, graphical/geometric, and numerical/graphical. This characterization offers understandings of how students have engaged in and succeeded in solving the various tasks, leading to a discussion of the generation of strategies for solving these tasks. Triggered by the nature of students' engagements, the article closes with future research avenues and issues to investigate in mental mathematics.

Classification: I24 D54 C34

Keywords: mental mathematics; graphical environment; operations on functions; enactivist theory of cognition

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