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Mental representation in mathematical problem resolution

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In this paper we investigate mental-representation strategies applied to solve contextual problems that involve mathematical calculus. We are interested in formal procedures, algorithms, and strategies that could be used by three groups of peoples: with specific mathematical knowledge (*the expert group*); without this knowledge (*the control group*); and without this specific knowledge but acquainted with the designed problem context (*the familiar group*).

Our investigation demonstrates that the reasoning developments of these three groups are quite different from one another: in the expert group the reasoning is only based on algorithmic operations; in the control group the reasoning combines algorithm with other mathematical strategies; and the familiar group uses a more intuitive reasoning, probably influenced by their familiarity with the problem context and by their special mental strategies.

In this research we aim to come through with Cognitive Science studies on the nature of human knowledge. Mathematical problem resolutions in general and arithmetic calculus in particular are very interesting tools to recognize the difference between expert and novice knowledge and reasoning.