



*Psychometric Analyses of Computer Adaptive Practice Data: A New Window
on Cognitive Development*

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Engelse Samenvatting (short; 250 max)

Large longitudinal data sets are required to answer fundamental questions on cognitive development and learning. To capture the developmental patterns, data should be collected while children learn. Math Garden, a web-based adaptive training and monitoring system, is developed to do so, and includes a set of games that students use to practise different skills (e.g., multiplication and proportional reasoning).

The popularity of Math Garden provides researchers with an invaluable data set. The research in the current thesis can be categorized by three different approaches. The first approach is based on analyses of parameters that follow from the system. Following this approach, in Chapter 2 we analyze parameters of the counting game to investigate enumeration strategies. A second approach is aimed at understanding the cognitive strategies by analysing 'raw' data with models that can capture more detailed processes. In Chapter 3 and 4, we study the rules that children use to solve items from the balance-scale and multiplication task. The third approach concerns longitudinal studies. We investigate the links between the development of different skills (Chapter 5), developmental processes of learning to touch type (Chapter 6), and present different learning analytics that provide descriptives of times-series of responses to single items (Chapter 7).

This dissertation builds on and extends earlier research with Math Garden. The examples in this dissertation go beyond snapshots of what develops and show the dynamics of development. Our results show that Math Garden data, although not easy to analyze, provide a new window on cognitive development.