

Spontaneous Focusing on Numerosity in the Development of Mathematical Skills

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ABSTRACT

In my presentation, I shall describe a series of longitudinal studies on young children's development of cardinality-related skills. The aim of the longitudinal studies was to explore 2-9-year-old children's Spontaneous Focusing on Numerosity (SFON) and its relation to early mathematical development. The specific goals were to capture in method and theory the distinct process by which children focus on numerosity as a part of their activities involving exact number recognition, and individual differences in this process that may be informative in the development of more complex number skills. Over the course of conducting the five research projects, fifteen novel tasks were progressively developed for the SFON assessments. In the tasks, confounding effects of insufficient number recognition, verbal comprehension, other procedural skills as well as working memory capacity were aimed to be controlled. Furthermore, how children's individual differences in SFON are related to their development of number sequence, subitizing-based enumeration, object counting and basic arithmetic skills was explored. The effect of social interaction on SFON was also tested.

The results of the six studies assert that within a child's existing mathematical competence, it is possible to distinguish a separate process, which refers to the child's tendency to spontaneously focus on numerosity. Moreover, there are significant individual differences in children's SFON at the age of 3-11 years. Moderate stability was found in this tendency across different tasks assessed both at the same and at different ages. Furthermore, SFON tendency is related to the development of early mathematical skills.

In conclusion I shall propose that focusing on numerosity is one potential sub-process of activities involving exact number recognition, and it should be regarded in future studies. Educational implications of the findings emphasise, first, the importance of regarding focusing on numerosity as a separate, essential process in the assessments of young children's mathematical skills. Second, the substantial individual differences in SFON tendency during the childhood years suggest that uncovering and modeling this kind of mathematically meaningful perceiving of the surroundings and tasks could be an efficient tool for promoting young children's mathematical development, and thus prevent later failures in learning mathematical skills. Directions for future studies on SFON will be discussed.