Children's knowledge of Integers

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Human infants already possess representations with numerical content: these representations are sensitive to numerical quantity while abstracting away non-numerical aspects of stimuli, and they can enter into arithmetical operations and inferences in line with the laws and theorems of mathematics. However, while core cognition captures many properties of numbers, children's early representations are not powerful enough represent our princeps concept of number, the type of numbers children first encounter in language and at school: Integers. In this talk, I will present two series of recent studies where we probed children's knowledge of fundamental properties of Integers, i.e. properties that serve as foundations for formal descriptions of Integers. First, we studied how children aged $2\,{}^{1}/_{2}$ to 4 years understand the relation of one-one correspondence between two sets. We found that children do not initially take one-one correspondence to instantiate a relation of numerical equality (a violation of Hume's principle, at the foundation of set-theoretic descriptions of Integers); instead, they interpret one-one correspondence in terms of set extension. Second, we developed a new task to probe children's intuitions about the structure of the set of Integer, as described in Dedekind-Peano's axioms: in particular, we tested whether children understand that Integers form a list structure where all numbers can be generated by a successor function (+1), and whether they understand that this list never loops back on itself. In both sets of studies, we asked both at what age children understand essential properties of Integers, and whether numerical symbols play a role in their acquisition.