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Early arithmetical development in preschoolers: The role of own action in inversion problem

An important component in arithmetical development concerns the understanding of inversion principle between addition and subtraction. Complex operation can be solved without calculation by using an inversion-based shortcut (3-terms-problems a+b-b must equal a). Although there is a wide variation in the age at which children use inversion principle [1], children around the age of 4 solve inversion problems (i.e., without calculation: 9+7-7) more accurately than standard problems (i.e., when calculation is necessary: 9+7-5). However, little is known about inversion-principle development before the onset of formal schooling. Using a method based on children’s action, the current study was designed to determine whether 2-year-olds can use inversion principle to resolve 3-terms-problems. We have already showed that children detected more accurately an impossible arithmetical outcome when the operation was realized by themselves (actor mode) than when it was presented to them by the experimenter (onlooker mode) [2]. Here, 2- and 3-year-old children (n=40) were confronted with inversion problem (1+1-1= 1 or 2) and standard problem (3-1-1= 1 or 2) either in onlooker or actor mode in a violation-of-expectation paradigm [2, 3, 4]. Results revealed that 2-year-olds were significantly more accurate on inversion than standard problem only in actor mode, suggesting that action helps young children to implicitly use the inversion-based shortcut. Acting the inversion (i.e., remove the own action) seems thus more effective than just observe the experimenter doing it himself. This result provides new insights about the emergence of preschool children’s academics learning and is potentially a basis for adapting pedagogical methods.