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Preschoolers' nonsymbolic arithmetic with large sets: is addition more accurate than subtraction?

J. Exp. Child Psychol. 103, No. 4, Special issue: typical development of numerical cognition, 409-420 (2009).

Summary: Adult and developing humans share with other animals analog magnitude representations of number that support nonsymbolic arithmetic with large sets. This experiment tested the hypothesis that such representations may be more accurate for addition than for subtraction in children as young as 3 1/2 years of age. In these tasks, the experimenter hid two equal sets of cookies, visibly added to or subtracted from the sets, and then asked 3 1/2-year-olds which set had more cookies. Initial set size was either large (7 or 9) or very large (18 or 30), and the final sets differed by either a high proportion (ratio of 1 : 2) or a low proportion (difference of 1 cookie). Children's addition performance exceeded chance, as well as their subtraction performance, across set sizes and proportions, whereas subtraction performance did not exceed chance. Arithmetic performance was also independent of counting ability. Addition performance was remarkably accurate when ratios between outcomes were close to 1, in contrast to previous findings. Interpretations for the asymmetry between addition and subtraction are discussed with respect to the nature of representations for nonsymbolic arithmetic with large sets. (Contains 1 table and 1 figure.) (ERIC)

Classification: F21 C31

Keywords: subtraction; preschool children; arithmetic; task analysis; mathematics skills

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