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Visuospatial Reasoning in Toddlers: A Correlational Study of Door Task Performance

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Abstract

Previous research using violation-of-expectation paradigms suggests that very young infants have a good understanding of unobserved physical events. Yet toddlers appear to lack this knowledge when confronted with the door task, a visuospatial reasoning task which parallels ones used in the habituation/looking time studies. Many studies have been conducted in an effort to determine why toddlers perform poorly on the door task yet the answer remains unclear. The current study used a correlational approach to investigate door task performance from both psychological (executive function), and neuroscience (prefrontal cortex) perspectives. Children between the ages of 2 ½ - 3 years were tested on the standard door task as well as four other tasks. Three of the tasks were believed to activate prefrontal cortex: the three boxes-stationary, a spatial working memory task; the three boxes-scrambled, a non-spatial working memory task; and the three pegs task, an inhibitory control task. The fourth task was a recognition memory task which had been previously linked to the medial temporal lobe. Only a single task, the three pegs task, was found to correlate with door task performance ($r = .510, p < .01$). Even with age, sex, and performance on the other tasks controlled for, this correlation remained significant ($r = .459, p < .05$). Furthermore, in a logistic regression the three pegs task was found to be the only significant predictor of door task performance ($z = 2.87, p < .01$). An examination of the errors children made on the door task revealed that over half (58%) could be classified as inhibitory control errors (children returned to the previously rewarded location or repeatedly searched a favorite door). Taken together these data suggest a possible relationship between inhibitory control ability and successful completion of the door task.

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