

Predicting Preschool Handedness from Infant Handedness

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Introduction

Several studies show that hand preference is an early developmental phenomenon. Michel and Goodwin (1979) found that the fetus's intrauterine head orientation predicted neonatal supine head orientation which predicts the infant's hand preference at 4 months. Michel (1981) found that during the first 2 months postpartum, infants prefer to turn their heads to the left or to the right which predicts hand preference for reaching from 4 to 18 months (Michel & Harkins, 1986).

Although it may be plausible that infant handedness is predictive of adult hand preference, researchers disagree in estimations of the age at which children exhibit stable hand use. Age estimates for stable hand use preference range from 7 to 13 months (Michel, Sheu, & Brumley, 2002; Michel, Tyler, Ferre, & Sheu, 2006) to a span of 3 to 8 years (Annett, 1970; McManus, 1988; Janssen, 2004). This variability could be attributed to methodological differences, differences in types of skills assessed, or differences in measurement technique.

The goal of this study is to compare preschool hand preference data with infant handedness. Since hand preference is an easily observable manifestation of cerebral asymmetry, measuring stability of hand preference over time can serve as a model for the development of cerebral lateralization. Longitudinal data of this magnitude from infancy to early childhood is rare in the literature.

Annett's (1970, 1972) peg-board task for measuring hand preference has been shown to be valid and reliable from early childhood through adulthood. Using Annett's (1970, 1972) task to capture early childhood hand preference, the data from this study can expand our understanding of development of handedness from infancy to preschool.

Method

Participants

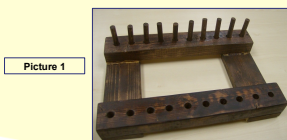
25 Preschoolers (8 females) 36 to 44 months of age; 13 manifested no consistent hand-use preference for acquiring objects during their first 6-14 months of age (NP group); 12 manifested a consistent right hand-use preference for acquiring objects during their first 6-14 months (RP group).

Materials

A standard Annett (1970) pegboard, and a stopwatch were used. The Annett pegboard, consists of two boards held at a fixed distance of 8 in. apart, each board with 10 holes, 1 in. apart, each hole slightly larger than 1/2 in. in diameter and approximately 1/2 in. deep. The dowel rods are roughly 2 in. tall and 1/2 in. in diameter (Picture 1).

Procedure

During a visit to each participant's home, preschoolers performed 3 trials of the peg moving task with each hand, alternating hands at each trial. For each trial, the child moved the (10) pegs from the top row of holes to the bottom row of holes, one at a time, from right to left with the right hand or from left to right with the left hand. At the end of each trial, the pegboard was rotated 180 degrees so that the pegs were again at the top. The pegboard was placed so that the child's shoulders and elbows were not hyper-extended, and so that the reach was unencumbered. Each trial was timed with a stopwatch and the times were recorded in seconds.



Handedness Group Speed Difference

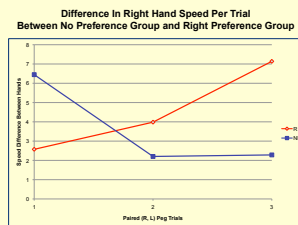


Figure 1

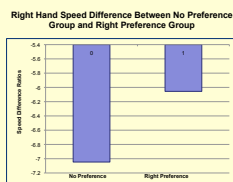


Figure 2

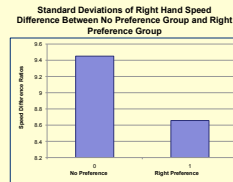


Figure 3

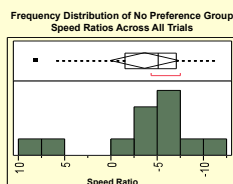


Figure 4

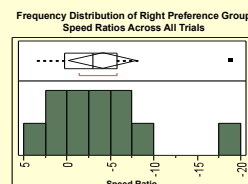


Figure 5

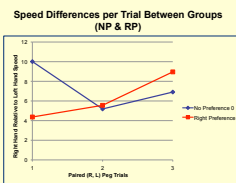


Figure 6

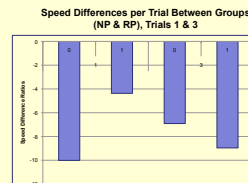


Figure 7

Figure Captions

Figure 1: On the first trial, the No Preference group exhibit a faster movement of their right than left hand. However, by the third trial, the Right Preference group exhibits a faster movement of their right hand than left hand and the No Preference group's difference has decreased.

Figure 2: The No Preference group is faster overall (across all trials combined) with the right hand than with the left hand as compared to the Right Preference group.

Figure 3: The variability of the speed differences between the hands is much larger for the No Preference group than for the Right Preference Group.

Figure 4: This figure shows the distribution of the speed ratios for the No Preference group across the three trials. Note that the spread of the No Preference group is shifted more toward a negative speed ratio, indicating faster right hand speed than left hand speed.

Figure 5: This figure shows the distribution of the speed ratios for the Right Preference group across the three trials. Note that the spread of the Right Preference Group is shifted more toward a positive speed ratio, indicating faster left hand speed than right hand speed.

Figure 6: Faster right hand use for the No Preference group at Trial 1 than at Trial 3, but faster use of the right hand at Trial 3 than at Trial 1 for the Right Preference group. Both groups equally fast with right hand on Trial 2.

Figure 7: No Preference group faster with right hand on Trial 1 than Right Preference group. Right Preference group faster with right hand on Trial 3 than No Preference group.

Discussion

Hand preference is an early developmental phenomenon that may be used to reliably predict later handedness. Using Annett's (1970, 1972) handedness assessment with the Infant Development Center's former infant participants who are now preschoolers from 36 – 44 months of age. Surprisingly, we found that the No Preference group's right hand speed compared to left hand speed is greater than the Right Preference group's between-hand speed ratio, and the No Preference group's overall speed ratios fall more toward faster right hand speed (Figure 4) and the Right Preference group's speed ratios show faster left hand speed (Figure 5). Although the right handers' right hand speeds tend to be faster overall, more No Preference children are faster with their right hands than with their left hands. Since this data encompasses only one time point in the development of preschool children's handedness, we expect that, as the children continue to develop, right hand speed for the No Preference and Right Preference groups will become somewhat more similar, with the No Preference group exhibiting more right handedness on these peg trials. We will continue to follow these children's handedness and we will be including children who exhibited left hand preferences as infants.