

A Hand Use Preference Affects Successful Building in Infants 10-14 Months

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Introduction

- ❖ As infants explore objects in their environment, they acquire knowledge of the properties of that environment. As manual skill develops, they can manipulate objects in their environment more effectively (Piaget, 1952).
- ❖ Some of these more complicated manipulations include construction skills, like building.
- ❖ Building – Multiple toys are organized so that the structure maintains itself because of the physical properties of the toys.
- ❖ Building activity informs us about infant development as it represents both cognitive and motor skills:
 - ❖ Appropriate utilization of object properties
 - ❖ Manual skill (Chen, Keen, Rosander, & von Hofsten, 2010)
- ❖ This skill of building also suggests an interplay between different modes of development, the cognitive and motor (Keen, 2011). The interplay exhibits reciprocity with one domain of development initially affecting the other, which in turn will reciprocally affect the first.
- ❖ Early infant handedness affords greater manual skills, thus an infant with a hand-use preference will be more adept at navigating and exploring their environment. In fact, the literature demonstrates that infant handedness benefits motor and early cognitive abilities.
 - ❖ Acquisition of moving or stationary objects abilities (Goldfield & Michel, 1986b; Fagard & Speike, 2009)
 - ❖ Object management (Kotwica, Ferre, & Michel, 2008)
- ❖ Because previous research has shown that infant handedness provides a benefit to early cognitive and motor abilities, it could enhance later and more complicated skills, such as building.
- ❖ **Hypothesis:** Infants with a hand use preference will exhibit increased building skill over infants with no hand use preference.
- ❖ We will also add sex to our model, as the literature has shown sex differences in motor development during infancy.

Methods

Participants:

- ❖ 27 infants (10 females)
- ❖ Left, right, and no preference infants ($n_{\text{group}}=9$)
 - ❖ Infants were categorized by hand use preference from a reaching task across 9 monthly visits (6-14 months)
- ❖ Matched for motor development, sex, and older siblings

Apparatus and Presentation:

- ❖ At a crescent-shaped table, the infant sat on the mother's lap across from the researcher.
- ❖ A camera was placed perpendicular on the left and directly above the infant's hands

Building Toys

Building Task

- ❖ Given at 5 monthly visits (from 10 to 14 months of age)
- ❖ Toy building action demonstrated by a presenter
- ❖ Deconstructed pieces are presented to infant's midline in an unbiased manner
- ❖ Each building action within a 20 second interval from initial pick-up of a toy was coded



Toys:

- ❖ 6 building toys (pictured above)
 - ❖ At least 3 pieces
 - ❖ 3 possible actions: stacking, nesting, or affixing
- ❖ Each toy had at least 1 action
 - ❖ Stacking – a toy placed upon another
 - ❖ Nesting – a toy settled completely within a larger toy
 - ❖ Affixing – a toy attached without the aid of gravity
- ❖ Two actions were possible for two toys: the Stacking Rings (stacking and affixing) and Cakes (stacking and nesting).
 - ❖ Infants were shown a demonstration of both actions
 - ❖ Both types of actions were coded when observed

Analysis:

- ❖ 3-way repeated measures Analysis of Variance was performed, using Age, Handedness, and Sex.
- ❖ The three way interaction between Age, Handedness, and Sex was significant (Wilks' Lambda=2.119, $p=.059$) at the $\alpha<.06$ level.

Results

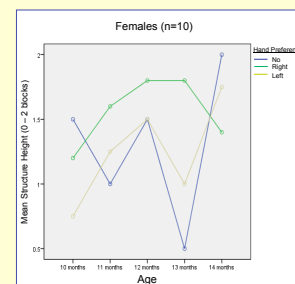


Figure 1a. Females by Hand Preference

- ❖ The no preference trajectory had an erratic pattern, although the mean structure height increased sharply by 14 months.
- ❖ The right preference trajectory increased rapidly from 10-12 months; but flattened from 12-13 months, and finally decreased at 14 months.
- ❖ The left preference trajectory consistently increased across time, except for a sharp nadir at 13 months.

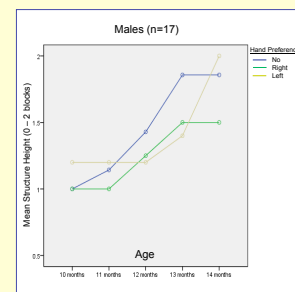


Figure 1b. Males by Hand Preference

- ❖ The no and right preference trajectories were similar, except the trajectory of the right preference infants did not increase as steeply as that of the no preference group.
- ❖ Across time, the right preference trajectory was consistently building smaller structures than the no preference group.
- ❖ The left preference trajectory started higher than the no and right groups, flattened towards the middle period (11 and 12 months), and sharply increased by 14 months.

Discussion

- ❖ We predicted that infants with a hand use preference would exhibit increased building skill over infants with no hand use preference. As shown in Figure 1b, male infants with a left hand use preference did exhibit greater mean structure height than those with no preference, although this was not seen in right handed infants.
- ❖ Although the female trajectories are more ambiguous across months, this may change with more infants. Both male and female infants exhibit an overall increase in building skill with age.
- ❖ In addition to increasing sample size, we intend to examine older infants and toddlers to see if infant handedness patterns influence the development of other problem solving and construction skill during early childhood.