Developmental Trajectories for Fully Role-Differentiated Bimanual Manipulation in Infants
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Background and Aim
• Fully role-differentiated bimanual manipulation (fRDBM) is characterized by clear and distinct roles for each hand. One hand supports the object for the other hand’s action.
• Prior work found that toddlers (18 to 24 months) exhibit one of three stable hand use patterns for fRDBM: (1) right-handed with a mild amount of left hand use (2) right-handed with a moderate amount of left hand use (3) left-handed with a moderate amount of right hand use
• The origin of these patterns at fRDBM onset is unknown.
• Aim: To track the emergence of fRDBM during infancy in the same sample of typically developing children.

Methods
• 79 infants were assessed at monthly intervals for fRDBM.
• fRDBM Assessment: Two types of toys were presented to elicit fRDBM: (a) movable and (b) removable (Fig. 1). Toys were presented individually at the midline over 28 trials.

Fig. 1. Examples of toy types: (a) moveable and (b) removable.

• Analyses: The Noldus Observer software was used to score fRDBM frequency at each monthly assessment from videotape. A mixed measures ANOVA was conducted with monthly fRDBM frequency of the right hand as the within-subjects variable (9 to 14 months) and toddler fRDBM class as the between-subjects variable (class 1, class 2, class 3).

Results and Discussion
• Preliminary results found a main effect of toddler fRDBM class on infant right hand fRDBM frequency, $F(2, 76) = 9.857, p < .001, \eta^2_p = .206$ (Fig. 2).
• There was also a significant interaction between toddler fRDBM class and time, $F(10, 380) = 5.211, p < .001, \eta^2_p = .121$ (Fig. 3).

Fig. 2. Children in class 1 were significantly different from those in classes 2 and 3 ($p < .01$). Classes 2 and 3 were not different from each other, $p = .575$.

Fig. 3. Differences in infant right hand fRDBM frequency over time by toddler fRDBM class. Classes 1 and 2 increased linearly across all time points while class 3 increased to asymptote at 12 months.

Take-Away Points:
✓ Infants differ in their hand use for fRDBM across the time period when this motor skill is emerging.
✓ Variability in infant fRDBM hand use maps onto stable patterns of fRDBM hand preference in toddlers.
✓ Future work will examine whether these differences in early hand use predict later language ability.

References and Acknowledgements
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