

The Relation of Infant Handedness to Parental Handedness

Julie Campbell, Iryna Babik, Olha Taras & George F. Michel

Introduction

Although many authors have proposed "genetic" models to account for the frequently observed relation of parent handedness and offspring handedness, Annett's (1972, 1978) "right-shift" model is the most popular in the literature. Her large scale genealogical studies have revealed that offspring handedness is more closely associated with mother's than father's handedness and that the offspring of two left-handed parents are more likely to be right-handed than by chance.

Michel and colleagues (2002), have demonstrated that the right shift in handedness may be the result of prenatal and postnatal postures of the infant that constrain perceptual-motor experiences between the hands.

Michel and Harkins (1988) found that infants are more likely to display left-handedness in parent dyads in which the mother displays left-handedness, even if the father does not.

In contrast to much of the literature (Annett, 1994 and McManus, 1985) using similar samples, Hicks and Kinsbourne (1981) found that among college students, the handedness of parents was not as closely associated with the offspring's handedness. Specifically, mothers' handedness was no more associated with their children's handedness than was the fathers'.

According to Corballis (2009), Annett's and McManus's model of handedness would predict that 9.5% of offspring from two right preference parents will be left-handed. Parent couplings in which one parent is left-handed and one is right-handed, will yield 19.5% of offspring with a left hand preference, and finally, 26.1% of children from a homogeneous set of left-handed parents will be left-handed.

Methods

Infant handedness:

- 221 infants (96 females) tested monthly from 6 to 14 months of age (9 visits)
- validated handedness assessment (Michel, Ovrut, & Harkins, 1986)
- ratio of number of right-hand acquisitions divided by the sum of right- and left-hand acquisitions ((R/(R+L)) across the 34 toy presentations
- 95% confidence interval on the proportion of right-hand acquisitions across 9 visits.
- If this confidence interval for a particular infant crossed the 50% ratio, the subject was assigned to the "no preference" group; above 50%, the subject was assigned a "right-hand preference" status; below the 50% ratio, "left-hand preference" status.

Parent handedness:

- 422 parents (217 mothers)
- Briggs and Nebes Questionnaire Inventory (1975)
- Totalled scores ranged from +24 to -24 (positive – more right, negative – more left)
- Left-handed: Score ≤ -9
- No preference: $-9 < \text{Score} < +9$
- Right-handed: Score $\geq +9$

Infant and Parent Handedness

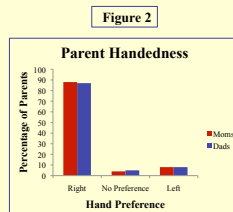
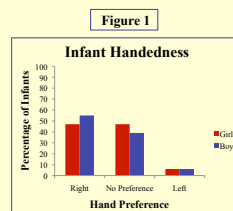
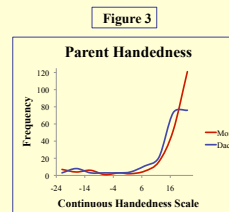
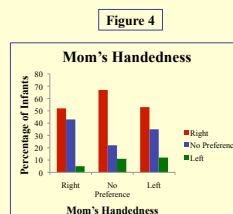


Table 1

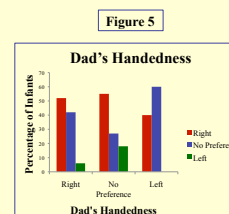
Per cent left-handed offspring	Parent Handedness	
	RR	RL
Observed in the current study	5.8	6.9
McManus' prediction	9.5	19.5



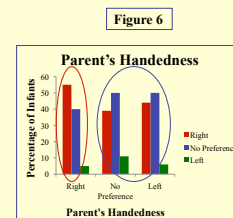
Parent – Infant Handedness Interaction



$\chi^2 (4, N=214) = 2.907, p = 0.573$



$\chi^2 (4, N=205) = 5.504, p = 0.239$



$\chi^2 (4, N=218) = 3.106, p = 0.540$

For the right-handed parents, the difference between the number of right-handed and no preference infants is $\chi^2 (1, N=159) = 3.930, p = 0.047$.

For the no preference parents, the difference between the number of right-handed and no preference infants is $\chi^2 (1, N=30) = 0.134, p = 0.714$.

For the left-handed parents, the difference between the number of right-handed and no preference infants is $\chi^2 (1, N=16) = 0.250, p = 0.724$.

Results

Figure 1 illustrates the distribution of infant handedness in our sample. 52% of infants manifest right handedness, 42% - no preference, and another 6% are left-handed. Interestingly, the exploratory analysis suggests that female infants are less lateralized than male infants.

Table 1 shows the observed vs. the predicted percent of left handed infants resulting from either homogeneous or heterogeneous parent dyads.

Figure 2 demonstrates a sharp skew in adult handedness with 87.7% adults being right-handed, 4.7% having no preference, and 7.6% being left-handed.

Figure 3 shows the distribution of scores in the continuous handedness scale. We should note that adult females may seem to be more lateralized because they are more likely to choose the extreme answers in any questionnaire.

Figure 4 shows the interaction between mom's and infant's handedness. The graph illustrates that mom's handedness does not correlate with infant's handedness.

Figure 5 suggests that dads with left hand-use preference are more likely to have infants with no preference while right-handed dads and dads without a hand preference tend to have more right-handed infants. The chi-square analysis showed that these effects were not significant.

Figure 6 illustrates the parent-infant handedness interaction treating the mom-dad dyad as a "parent". According to this diagram, parents with right handedness tend to have right-handed infants while parents without hand preference and left-handed parents tend to have no preference infants (however, chi-square analysis revealed that those results are not significant).

Discussion

Although the last figure suggests that there might be a relationship between infant and parent handedness, the chi-square test was not significant. Perhaps this is the result of the unequal number of subjects in different parent-infant combinations - infants with left-hand preference as well as adults both with left-hand preference and those without a preference are vastly underrepresented in our sample. This reduced the power to find difference among those groups.

The analysis also shows that 42% of infants have no preference in their hand-use while the majority of adults have an established handedness. To explain this difference, we propose that some infants are still in the process of establishing their hand preference after the first year of their lives. To evaluate this proposal, it would be necessary to follow these infants longitudinally. Into childhood.

Another problem associated with this study is that the questionnaire may not effectively represent the distribution of handedness in adults. A procedure for testing parent handedness in which performance of hand use can be assessed and observed may be more revealing of the adult's handedness than the questionnaire. We plan to implement Annett's (1985) peg-moving task, as well as Tapley and Bryden's (1985) dot-filling task, in order to assess parental handedness.