Baby sign, mind-mindedness and language development

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Highlights

- Infants participating in baby sign do not use more gestures than those who do not participate, nor is their vocabulary development any faster.
- Baby-signing mothers respond similarly to non-signing mothers, although they do produce more internal state terms in their responses to infant gestures.

Baby sign

- A set of gestures symbolising words such as 'milk' and 'tired' taught to hearing babies.
- Increasingly popular activity amongst parents and their pre-verbal infants in the UK.
- Claimed to improve language development and enhance parent-child bonding, but not clear whether/how this works.
- If using baby sign causes mothers to perceive their infants as capable of intentional communication at an earlier age, they may be more likely to acknowledge their child's gestures (e.g. points, reaches), and to provide more mental-state terms in response to these gestures.
- Limited research on impact of baby sign, but current findings suggest positive effects on maternal responsiveness and attunement (e.g. Góngora & Farkas, 2009; Vallotton, 2012; Kirk et al., 2013).
- Other research suggests that infants' gestures elicit mental-state terms from mothers (Olson & Masur, 2011), and that mothers use more mental-state labelling (*see*, *want*, *like*) when they see their children as volitional agents (Slaughter et al., 2009). Use of such terms may reflect mothers' 'mind-mindedness' (e.g. Meins et al., 2001).

Figure 1. Display boards for task 1.

Research questions

Bringing together current research, we investigate the following questions:

1. **Do infants who participate in baby sign produce more pointing, reaching and object extension gestures than non-signing infants?** This may be the case if they have learnt that they can communicate effectively through gesture in a meaningful way.
2. **Are baby-signing mothers more likely to provide a contingent, verbal response to these gestures than non-signing mothers?** We would expect this to be the case if baby sign causes mothers to be more likely to view their child as capable of intentional communication.
3. **Are baby-signing mothers more likely to respond using internal state terms (*see*, *want*, *like*) than non-signing mothers?** Again, we would expect this to be the case if baby sign causes mothers to be more likely to view their child as capable of intentional communication.
4. **What contribution do these factors (baby sign, gestures, maternal responses) make to infants' vocabulary development?**

Figure 2. Point, reach and object extension gestures.

Methods

- Participants drawn from the Language 0-5 Project – a longitudinal project following the language and communicative development of children from the Merseyside area of North West England over the first 5 years of life. A subset of 46 children was chosen, half of whom participated in baby sign.
- Participants filmed at 11 and 12 months interacting with their mothers in two tasks (e.g. Cameron-Faulkner et al., 2015):
  - Task 1: looking at interesting objects on display boards (5 minutes at each age; Figure 1), designed to elicit pointing and reaching gestures.
  - Task 2: play session (2x 9-minute sessions at each age), designed to elicit object extension gestures (e.g. showing, giving)
  - Sessions were video recorded and coded offline.
  - Vocabulary measured at 11 and 18 months of age (CDI).
- Sessions coded using ELAN:
  - Following Olson and Masur (2011), infants' gestures coded for points, reaches and object extensions (Figure 2).
  - Mothers' verbal responses to gestures were transcribed and coded for content, also following Olson and Masur (2011). Categories were: object label (*duck*, *ball*), action term (*shake*, *throw*), internal state term (*see*, *want*) and non-label (*wow*, *good girl*).
  - Internal state terms were also coded for the following sub-categories: perception (*see*, *touch*), volition (*want*, *need*), cognition (*think*, *know*) and disposition (*like*, *happy*).

Results

To address our research questions, data were analysed in *R*.

1. Number of gestures (points, reaches or object extensions) produced by infants:
   - *t*-tests show no difference between baby sign and control groups, either overall (baby sign $M = 81.00$, control $M = 63.57$; $t = 1.53$, $p = 0.13$) or for individual gesture types.
2. Contingent responses to infant gestures (points, reaches or object extensions):
   - Mixed model shows no difference between baby-signing and non-signing mothers in proportion of contingent responses ($\beta = 0.11$, $p = 0.63$; Figure 3).
   - *t*-test also shows no difference in number of contingent responses ($t = 1.57$, $p = 0.12$).
3. Internal state responses to infant gestures (points, reaches or object extensions):
   - Mixed model shows no difference between baby-signing and non-signing mothers in proportion internal state (*see*, *want*) responses ($\beta = 0.51$, $p = 0.12$).
   - *t*-test shows baby-signing mothers produced a higher number of internal state responses overall (baby sign mean = 11.83, control mean = 7.78; $t = 2.26$, $p = 0.03$).
   - Mixed model shows baby-signing mothers significantly more likely to produce a response containing a volition term (*want*, *need*) (baby sign $M = 0.09$, control $M = 0.07$; $\beta = 1.23$, $p = 0.006$).
   - Significant group by gesture type interaction shows baby-signing mothers are more likely than non-signing mothers to respond object extension gestures with a volition term (Figure 4).

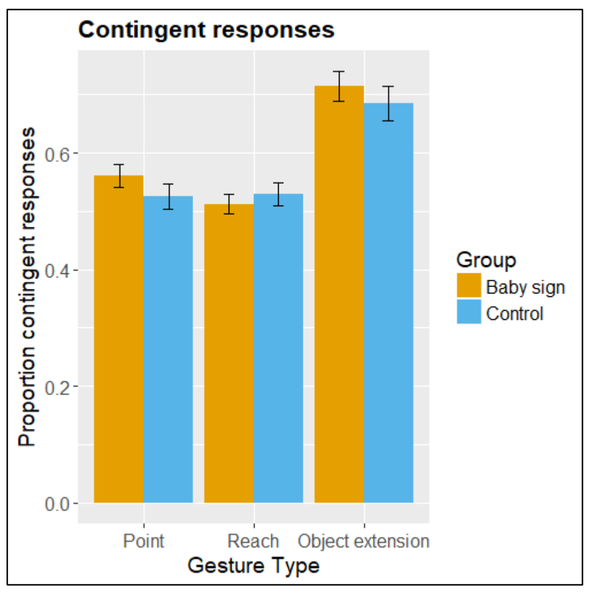

Figure 3. Plot of contingent responses.

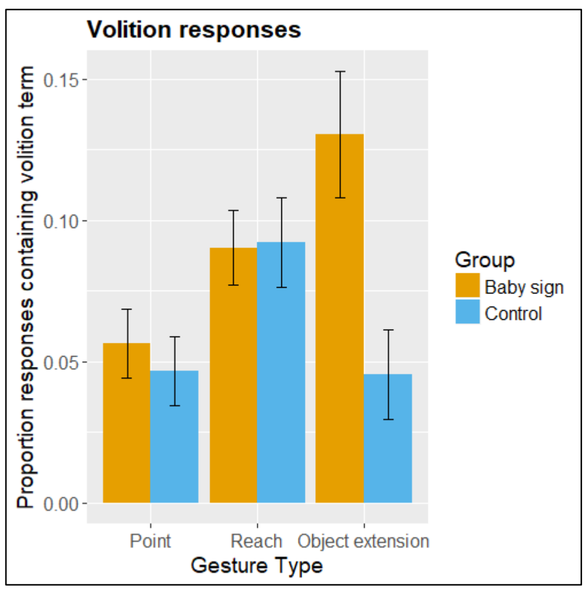

Figure 4. Plot of responses containing volition terms.

4. Vocabulary development:
   - Regression shows infants' vocabulary at 18 months not predicted by any factors under investigation (use of baby sign, number of gestures produced, contingent responses or content of responses).

Discussion

- Baby-signing infants did not produce more pointing, reaching or object extension gestures than infants who had not participated.
- Baby-signing mothers responded to gestures similarly to non-signing mothers; nevertheless, some differences were found.
  - Baby-signing mothers used more internal state terms in response to infants' gestures (although the proportion of these responses did not differ from non-signing mothers).
  - Baby-signing mothers were significantly more likely to respond to gestures, particularly object extensions, using volitional terms.
  - Together, these results suggest that baby-signing mothers are more likely to see their infants as volitional agents (e.g. Slaughter et al., 2009) and may be more 'mind-minded'.
- Lack of relationship between gesture use and vocabulary development may seem surprising given the findings of previous papers (e.g. Iverson & Goldin-Meadow, 2005). However, these studies do not usually control for the infants' initial vocabulary levels, as we have done.
  - Possible that gesture development does not precede vocabulary development but that both reflect a general communicative ability; children who use gestures more, and earlier, also learn vocabulary more quickly, but this is not *caused by* their gesture use.
- Lack of relationship between baby sign and language development is in line with several previous studies (e.g. Kirk et al.,2012; Zammit & Atkinson, 2017).
  - Mounting evidence against claims made by companies promoting baby sign that participation improves language development, at least in typically-developing children.

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