# THE LONGTERM IMPACT OF SYMBOLIC GESTURING DURING INFANCY ON IQ AT AGE 8

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The term "language development" as applied to hearing children typically refers to communication in the verbal modality. However, focusing only on verbal communication ignores another avenue available to hearing infants, the use of simple gestures to represent objects (e.g., sniffing for "flower"), conditions (e.g., blowing for "hot"), and desires (e.g., finger tips tapping for "more"). Results of a case study (Acredolo & Goodwyn, 1985) and cross-sectional and longitudinal studies (Acredolo & Goodwyn, 1988) have shown that infants between 10 and 20 mos. are so highly motivated to communicate that they often spontaneously recruit such "symbolic gestures" as a way around the obstacle posed by the articulatory demands of verbal words.

In 1989 a longitudinal study was undertaken to determine whether actively encouraging babies to use this type of preverbal communication would have an effect on subsequent language and cognitive development. To this end, three groups of infants were assessed in laboratory sessions at 11, 15, 19, 24, 30, and 36 months. Relevant to the current study are the Sign Training Group (ST Group: N = 32), whose parents were instructed to promote the use of symbolic gestures by consciously modeling them along with their verbal equivalents, and the Non-Intervention Control Group (NI Group: N = 37) whose parents were told nothing about gesturing. Three main results of this training study are particularly important to the current report. First, the study indicated that infants would, in fact, use symbolic gestures if encouraged to do so by their parents ( M = 20.3, Range: 9-61). (See Table 1 for examples). Second, the results of the various verbal language assessments indicated an advantage for the ST over the NI children in both receptive and expressive development (Goodwyn & Acredolo, 1998). Third, the ST children scored significantly higher than the NI children on the Bayley MDI at 24 mos.

The purpose of the present study was to extend these group comparisons into the elementary school years. Specifically, all of the original ST and NI children who could be re-located (19 of 32 ST children and 24 of 37 NI children) were assessed using the WISC-III during the summer following their second grade year. The results indicated that the ST children were indeed continuing to outperform the control children, even 6 years after the original intervention. As indicated in Table 1, an ST advantage was found for the Verbal Sub-Scale ( $F [1, 41] = 9.45$, $p=.0038$) and the Performance Sub-Scale ( $F[1, 41] = 6.19$, $p=.017$), in addition to the Full IQ ( $F [1, 41] = 12.06$, $p=.0012$). Analyses to rule out attrition effects as contributors indicated (a) no differences for either the ST or NC groups between the returnees and non-returnees in Bayley MDI scores at 24 months, (b) no difference between the ST returnees and non-returnees in the number of symbolic gestures used during infancy, and (c) no differences between the returnee groups in maternal education or age. The results outlined above are exciting, surprising, and have both important theoretical and practical implications.

**Table 1.**
**Examples of Symbolic Gestures in Sign Training Subjects' Repertoires**

| Referent Gesture | Example | Usage |
|---|---|---|
| Drink | Thumb to mouth | DS: To ask for bottle |
| More | Index fingers tapping | BH: To ask to have picture taken again |
| Monkey | Scratching arm pits | KA: To alert dad to very hairy stranger approaching |
| Hat | Patting top of head | BH: To Grandma with towel around her head |
| Cheerios | Index fingers to thumbs | MR: To request more Cheerios |
| Fish | Smacking lips together | KA: To fish toy in tub and goldfish crackers |
| Water | Rubbing palms together | CH: With FISH gesture to fish in pond |
| Book | Open/Close with palms | AT: With MORE gesture to ask for another book |
| Pig | Tap nose with finger | TA: To potbelly pigs at county fair |
| Camera | Hooked hand to eye | BH: With MORE to ask for photo to be taken again |
| Fan | One finger up & circling | ZB: To helicopter |
| Gentle | Petting back of one hand | MB: When legs held too tight during diapering |
| Smelly | Finger to wrinkled nose | AZ: To comment on Grandma's bad breath |
| Afraid | Pat chest repeatedly | ZW: In response to barking dog approaching |
| Out | Knob-turning action | PB: With DOG gesture for "Dog wants out" |
| Giraffe | Hand around neck | MR: To giraffes in books and at the zoo |
| Tractor | Steering wheel action | NP: When his farmer Dad drives up in his tractor |
| Where? | Palms up | KA: When airplane disappeared into the clouds |

**Table 2.**
**Mean IQ Scores (and Percentile Ranks) for ST and NI Children At Post-Second Grade Testing**

| GROUP | FULL IQ | VERBAL IQ | PERFORMANCE IQ |
|---|---|---|---|
| ST ( N = 19) | 114 (75%) | 116 (75%) | 109 (70%) |
| NI ( N = 24) | 102 (53%) | 103 (55%) | 101 (52 %) |

**Note. All scores based on the WISC-III Intelligence Test**