

## FINAL REPORT

### Sequencing the Developmental Trajectory of Fingerspelling of Young Children who are Deaf or Hard of Hearing

*Submitted to the Woodcock Institute for the Advancement of Neurocognitive  
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#### Purpose of the Study

The purpose of this study was to examine how Deaf parents/caregivers in dual language (American Sign Language and English) homes use fingerspelling when communicating with their infants, toddlers and preschool children before they enter kindergarten. The study gathered Deaf parents/caregivers' beliefs regarding fingerspelling as a component of bilingual language development and the contextual factors and specific strategies used in supporting emergent literacy development.

#### Background

Since the beginning of deaf education in the 1500s, fingerspelling has been used to educate school-age deaf and hard of hearing (D/HH) students. The fingerspelling alphabet that is used in the U.S. and Canada as well as other countries in the world originated in Spain and is referred to as the Latin one-handed fingerspelling alphabet. Each of the 26 letters in the alphabet corresponds to a unique handshape. Fingerspelling is not an isolated spelling skill; it is embedded into American Sign Language (ASL) in complex ways. Although fingerspelling has been used during communication in ASL and in the academic preparation of school-aged children, little is known about the use of fingerspelling with children acquiring ASL during early childhood. Anecdotally, Deaf parents/caregivers have reported using fingerspelling with their children at an early age along with other strategies that expose their children to both ASL and English before they enter early childhood programs. Padden, (1990, 2006) described fingerspelling acquisition in young children as a process during which D/HH children learn to fingerspell twice: Initially, fingerspelling is seen as a sign instead of individual letters, and at a later age children learn that fingerspelling is made up of handshapes that correspond to letters of the alphabet. Another study by Erting et al. (2000) investigated the timing and the nature of exposure to fingerspelling by observing two young Deaf siblings' communication captured by video over a developmental period. They reported that "Deaf parents mediate English print, ASL, and fingerspelling simultaneously within developmentally appropriate contexts" (p 52). More recent research has suggested that fingerspelling may be an important part of emergent literacy in young D/HH children (Allen, 2015; Allen & Morere, 2020; Anderson, 2006; Stone, et al. 2015), yet little is known about how fingerspelling is used by parents/caregivers who are fluent signers of ASL.

## **Significance of the Study**

Discovering how the phenomenon of fingerspelling unfolds within the natural environment of the home could lead to advances in the delivery of early intervention services to families with children who are D/HH. Fingerspelling has been considered by some linguists as a linkage between ASL and English and may serve as a foundational skill for later acquisition of reading. Neuroscientists have supported this theory. Waters et al. (2007) conducted a study of the left mid-fusiform gyrus or Visual Word Form Area (VWFA) to determine its sensitivity to orthographically structured input when using the two-handed British Fingerspelling Alphabet. Waters et al. reported that when the input was fingerspelling, the VWFA was engaged. This study was replicated by Emmorey et al. (2015) who investigated whether ASL and the one-handed Latin Fingerspelling Alphabet would produce the same results. Using fMRI to identify the neural regions that support comprehension of fingerspelled words, printed words, and ASL signs they found that Deaf signers engage a very similar neural circuit when processing fingerspelled and printed words for meaning. This finding yields support for the hypothesis that fingerspelling can provide a mediating link to support literacy and vocabulary acquisition in Deaf readers. Both printed and fingerspelled words activated the VWFA, suggesting that this region plays a general role in mapping orthographically structured input onto lexical representations.

But there remain many unknowns about fingerspelling use during the period of birth to five years of age when language development takes place. Drawing from a hearing-centric framework, one would expect D/HH to have sufficient vocabulary development by 36 months of age to transition to early childhood programs where formal education begins. Yet, most D/HH children with hearing parents experience significant language delays, and by the time they enter early childhood programs and later kindergarten, the children are well behind D/HH peers with Deaf parents who generally perform better on assessments of language performance. These children of Deaf adults tend to have stronger vocabulary, are better readers, and have stronger overall academic performance than D/HH children of hearing parents (Anderson, 2006; Kyle & Harris, 2010; Padden & Ramsey, 2000). The results of this study may promote a significant shift to using more fingerspelling in home intervention programs.

## **Methodology**

Using a qualitative descriptive research design, we explored the phenomena of fingerspelling use by Deaf parents/caregivers. The study involved two parts: Part 1 used semi-structured interviews to develop a better understanding of Deaf parents/caregivers' belief systems regarding the use of fingerspelling and the ways in which the Deaf language models use fingerspelling when communicating with their infants and young children. During Part 2, which occurred over a six-month period, Deaf parents/caregivers submitted weekly reports to document the words they fingerspelled with their children, how they intuitively scaffolded ASL and English bilingual language acquisition, and the contextual factors and activities they initiated to increase fingerspelling skills and emergent literacy in their young children.

## **Recruitment of Participants**

A convenience sample of Deaf parents/caregivers was obtained from North America. Participants were recruited using a flier distributed through email, posted on social media outlets, and through word of mouth. A video explaining the study in ASL was linked to the flier as well as QR code that linked to a google registration form. The registration form consisted of 14

multiple choice or short answer responses requesting contact and other background and demographic information.

**Selection Criteria**

The selection criteria included the following: 1) at least one parent must be culturally Deaf, 2) the Deaf parent/caregiver must use ASL as their primary language), 3) the Deaf parents must use both ASL and English in the home with their children who are under age five. Children could be Deaf, hard of hearing, or hearing Child of Deaf Adults (CODA).

Fifty-one Deaf parents/caregivers registered to participate. Before beginning the study, an informed consent form was distributed to the registrants that included a video in ASL explaining the informed consent process. Of the 51 applicants, 31 signed the required informed consent form. The families that completed the informed consent form resided in eleven states and one province in Canada. They resided in the Northeast including Canada, on the West Coast, in the Midwest and Southwest. No families registered from the Southeastern U.S.

Table 1  
*Geographic Distribution of Families*

Ontario, CA	CA	CO	DC	IA	IN	KS	MA	MD	MI	PA	TX
1	3	1	1	2	1	1	1	4	1	2	13

Educational levels as reported by the participants reflected a group of highly educated parents/caregivers. Eighty-four percent held Masters degrees or higher, four percent held a BA/BS degree or had some college. The remaining chose not to report their educational levels.

**Race/ethnicity of Participants**

The race/ethnicity of the participants was predominantly White (87%).

**Number of Children in the Study**

The parents/caregivers reported having 38 D/HH children that met the criteria: 27 were D/HH, four of whom had an additional disability (Autism, Attention Deficit Hyperactivity Disorder, Attention Deficit Disorder, and Developmental Delay), and 11 children were Children of Deaf Adults (CODAs). Ages of the children ranged from one year to five years.

**Data Collection**

Two research Assistants (RAs) one a CODA and one Deaf, both of whom were fluent in ASL, initiated the study. The study was conducted in two parts.

***Data Collection Part 1***

The first part of the study involved using semi-structured interviews with parents/caregivers as informants to gather information about their use of fingerspelling with their children, contextual factors, and specific strategies used (e.g., age when they began fingerspelling with their children, how they incorporated fingerspelling in their children's daily

lives, use of chaining and/or sandwiching strategies, and age when parents/caregivers noticed their children's emergence and use of fingerspelling in expressive language). The RAs conducted the interviews in ASL over zoom and participants were asked for permission to record the interview. After the interview was conducted, the RAs translated the recorded interview responses into a summary form. Parents/caregivers were allowed to post additional comments in ASL or in writing following the interview. ASL comments were translated into narrative text to supplement the interview data. If requested, parents/caregivers were allowed to review the data to confirm and expand on the text before it is entered in the database.

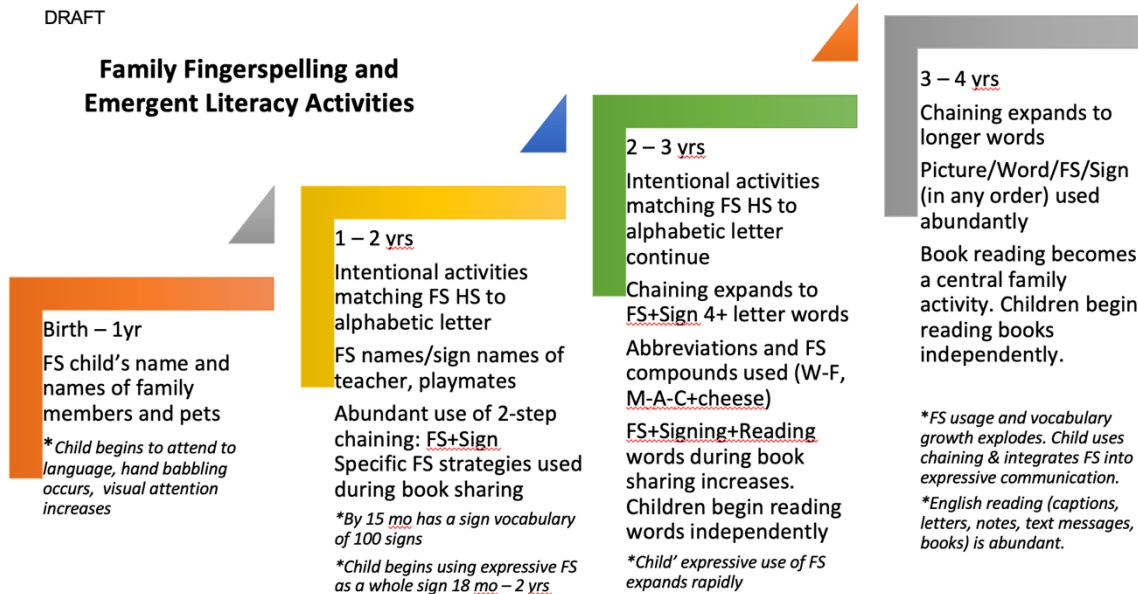
### ***Data Collection Part 2***

At the conclusion of the interview, Deaf parents/caregivers were given the option to continue participation in the research study by tracking and submitting weekly reports of their use of fingerspelling with their children. Twenty families (65 %) of the original group participated in Part 2 of the study. They were asked to submit weekly reports of their use of fingerspelling over a six-month period. The RAs communicated with the parents/caregivers on a weekly basis to provide encouragement and to answer questions that the participants might have about the process. The questions to which parents/caregivers were asked to respond were: *This week, what words did you notice that you fingerspelled to your child? Please describe the context and activities occurring when you used fingerspelling.* The university's secure PsychData system was set up to collect weekly responses. However, we did not want data reporting to be a barrier to participation. As a result, parents/caregivers were given options in how they reported based on the technology readily available to them. As a result, data were collected in a variety of ways: Participants could answer in ASL and post the link to their ASL video on Weekly Caregiver Reports forms. We also created individual google docs as an option for reporting fingerspelling usage. Some parents/caregivers texted us the words, others took pictures of written descriptive narratives and words on a paper. As participants reported the vocabulary they used, a spreadsheet was created of the fingerspelled words and the context and activities during which the vocabulary words were used.

### **Findings**

The overarching finding was that Deaf parents/caregivers use fingerspelling with their infants from birth, beginning with the child's name and family member's names. After family names, exposure to fingerspelling consists of words without a sign equivalent (e.g., B-U-S). As children's visual attention increased, Deaf parents/caregivers begin using chaining, adding fingerspelled words coupled with sign equivalents (e.g., fingerspell C-A-R + sign CAR) for the purpose of encouraging bilingual language development by exposing children to both English and ASL. In addition, to increase letter knowledge, Deaf parents/caregivers use intentional activities to help their children learn letter and handshape correspondence and, to support emergent literacy, Deaf parents/caregivers reported that they expose their children to written language at a very early age and use specific book sharing strategies. Figure 1 reveals preliminary findings from this study and reflects the developmental acquisition and use of fingerspelling as reported by participants in the study.

Figure 1  
 Graphic Representation of Fingerspelling Development of Young Children Acquiring ASL and English



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## Discussion

The present study explored Deaf parents/caregivers’ belief systems about fingerspelling, descriptions of how they use of fingerspelling, fingerspelling strategies, and parents/caregivers’ perceived benefits of fingerspelling for D/HH and CODA children birth to five. The results provide insights from a Deaf-centric framework of how fingerspelling and fingerspelling strategies are used within family contexts. The study involved parents/caregivers geographically dispersed across the U.S. and Canada although with a concentration of families residing in the State of Texas. We do not believe that this concentration affects the study’s validity as many of the families have relocated from different states. No families residing in the Southeast U. S. participated, which we feel is a weakness. Other weaknesses were identified. A major weakness of the study pertains to the way in which parents/caregivers reported their use of fingerspelling. There is no equivalent to the LENA device, which records hearing families spoken language output. Filming Deaf families use of sign language is the only way to capture language interactions in real time. Given the budget constraints, filming was deemed impractical. We had to rely on data collected and reported by parents/caregivers. Demographically, the parents/caregivers did not reflect a racially diverse sample, and they were a highly educated group with 84% holding Masters degrees or higher. In reviewing registrations we discovered a potential barrier to participation within the data set. As we reviewed the number of parents/caregivers who did not complete the informed consent form, we found that 38% who registered did not complete the process. The ones failing to complete the process reflected a more diverse, less educated group. Simplifying the process and using an electronic signature platform may have increased participation.

## Impact of the Findings

Although there were weaknesses in the study, the findings present new information which parents/caregivers and service providers may find helpful pertaining to language services for young D/HH children. Language and cognitive development are closely tied. Studies suggest that D/HH children who develop strong language skills, whether signed or spoken, tend to perform better in tasks related to memory, problem-solving, and reasoning. Yet, little research has been conducted about how Deaf parents/caregivers facilitate bilingual language development in their young children or to identify specific strategies leading to enhanced emergent literacy in this population. The findings from this study may be informative to early intervention providers and early childhood educators working with families of children who are D/HH.

## Future Research

A manuscript describing the study and the findings is currently under development. We anticipate publication of the manuscript within the next twelve months. This study concludes the first phase in the creation of a fingerspelling curriculum, which is important for early intervention and early childhood services as fingerspelling holds great promise to alleviate impoverished language and improve emergent literacy outcomes of D/HH children.

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