



Fingerspelling and Phonological Awareness: An Intervention to Improve Phonological Awareness in Fingerspelling as an Alternative Pathway to Literacy in Deaf and Hard-of-Hearing Children

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Phonological awareness refers to the ability to manipulate these sounds at the word, syllable, and phoneme levels. Phonological awareness and letter-sound knowledge have been repeatedly shown to be an important skill for learning to read among hearing children (see Rayner, et al., 2001). Hearing children must learn the alphabetic principles that underlie the decoding of words. These are the rules that link our cognitive phonological representation of words to the printed orthography.

A major barrier to literacy for many DHH children is decoding skills and vocabulary. Even though early identification and better technologies have improved outcomes in DHH children, there are still many children who have limited ability to use hearing to access spoken language and their functional hearing abilities are poor. DHH children with limited functional hearing frequently have either weak or non-existent spoken phonological representations of words.

However, signing DHH children have a phonological representation of fingerspelling. In order to fingerspell or to understand fingerspelling, a person needs to engage their mental phonological representation of fingerspelling. This mental phonological representation must be developed, in much the same way that hearing children develop an understanding of their phonological for spoken words. Fingerspelling may provide a non-auditory phonological representation of the internal structure of written words to aid decoding. It is also important to note that fingerspelling is phonological. Like

spoken English and ASL signs, we have cognitive representations of fingerspelled words. By building children's ability to fingerspell, we are also increasing the quantity and quality of their mental fingerspelling phonological representation. The mental fingerspelling phonological representation can then link to a mental orthographic representation – the printed word.

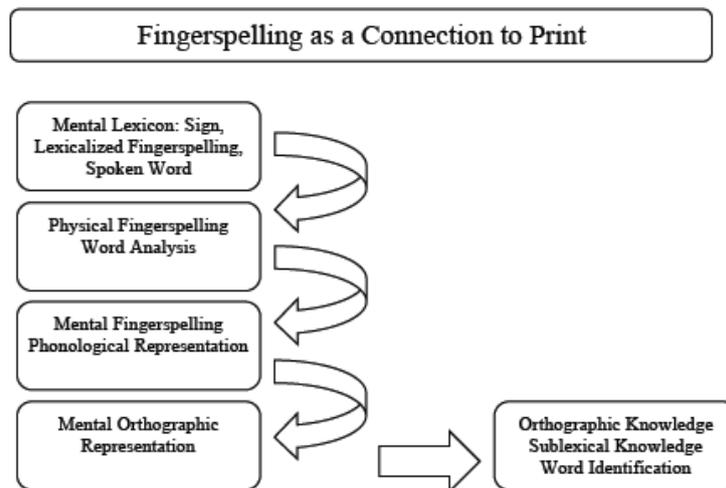
There is growing evidence that fingerspelling may provide a pathway to decoding words and strengthening print recognition by building phonological awareness and providing a one to one direct relationship between fingerspelled words and printed English words. This program provides an alternative to relying on sight word memorization, which is an ineffective way to learn how to read.

Fingerspelling is an integral part of the American Sign Language (ASL) lexicon with approximately 12-30% of a Deaf adults' signing consisting of fingerspelled words (Padden & Gunsauls, 2003). Many English words, such as names, places, and words without a specific sign, are commonly fingerspelled. Fingerspelling is often used to represent English technical terms, such as in science. Fingerspelling is also used to show emphasis and may be paired with the sign.

Deaf parents fingerspell to their children very early and often without regard to the length of the fingerspelled word, often when the children are infants and toddlers. Children of deaf parents typically begin fingerspelling at a very young age, as early as 24 months of age. They spell a word, not individual letters. They focus on the movement patterns and shapes of the overall word. Around the age of four, children will start to explore the relationship of fingerspelling handshapes to printed letters. They begin to become aware that there are individual handshapes in fingerspelled words (See Padden, 2006).

The diagram below is a model of fingerspelling as a connection to print. All children, hearing or deaf, have a mental lexicon, or vocabulary. The mental lexicon may be a sign, a lexicalized fingerspelled word, or a spoken word stored in their cognitive system. We believe that as the children start to physically

fingerspell and analyze the fingerspelled words, breaking them down into parts, it will lead to a stronger mental fingerspelling phonological representation. Then, when they link the fingerspelling phonological representation to the mental orthographic representation, that leads to orthographic knowledge, sublexical knowledge (the parts or chunks of a word), and ultimately word identification of printed words



Our research shows a strong relationship between fingerspelling skills and word identification of printed English words. In our own study of nearly 350 DHH children (5 – 9 years of age), confirmatory factor analysis showed that fingerspelling and reading were strongly related. We found that fingerspelling phonological awareness predicted 93% of the variance in reading for children who only sign and for children who sign and speak. For DHH children who only use spoken English, spoken phonological awareness predicted 92% of their reading skills. The relationship between fingerspelling and reading is virtually identical to spoken phonological awareness and reading in children who use spoken English.

Because of the results of this research we developed a new intervention that focuses on improving fingerspelling and reading in DHH children in kindergarten, 1st, and 2nd grade. Fingerspelling Our Way to Reading is a literacy program that supplements a school's literacy curriculum. There are two

components to this year-long program, a 3-day/week fingerspelling program and a complementary 2-day/week reading comprehension program. The fingerspelling program enhances phonological awareness of fingerspelled words, which increases expressive and receptive fingerspelling skills and identification of printed words. The reading comprehension program provides additional reading opportunities using fingerspelling words in sentences and stories that are developed through each unit.

The intervention used a word family approach, where the children analyze words into onset and rime or the first letter(s) and last 'chunks'. Children identified onset and rimes using only the fingerspelling at first, with print being introduced after two days of fingerspelling word analysis. The table below shows some examples.

Word Family Approach							
Entry Level		Level 1A		Level 1B		Level 2	
get	bell	back	drip	our	brick	jacket	action
met	fell	black	flip	hour	click	packet	addition
pet	sell	pack	ship	sour	slick	racket	motion
vet	tell	rack	trip	flour	stick	bracket	vacation
wet	well	sack	chop	own	trick	basket	subtraction
		lock	crop	down	thick	locket	education
		rock	shop	gown	bring	pocket	discussion
		sock	drop	town	cling	rocket	caution
				brown	sting	picket	fiction
				frown	string	ticket	lotion

There are four different levels of the fingerspelling program: Entry Level, Level 1A, Level 1B, and Level 2. The Entry Level addresses the kindergarten goals and objectives and is designed for kindergarten students or any student reading at kindergarten level or below. The first-grade goals and objectives apply to both the Level 1A and Level 1B. Level 1B was developed to offer a bridge into the Level 2 program.

Level 2 is designed using the second-grade goals and objectives and incorporates more challenging words.

Each level is divided into 12 units with each unit consisting of six 25-minute lessons. The first two lessons are focused on expressive and receptive fingerspelling and fingerspelling phonological awareness. Starting on the third lesson, fingerspelling of the target words is linked to print and analysis of the printed word. The final two lessons are focused on writing the target words and reading the target words in isolation and in connected text.

Results of a year-long study with 5 to 9 year olds showed that children learned both the fingerspelling of a word and could recognize the printed word nearly 100% at the end of the year. Data also show that the intervention particularly helps struggling readers.

Last year, we conducted a year-long randomized controlled trial across the U.S.A. Nearly 300 children participated in the research. Classrooms were randomly placed in the intervention group or a control group who did not receive the intervention. Children were assessed before and after the intervention.

This year, we are conducting a study of the combined fingerspelling and reading comprehension program

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