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A limitation on reading as a source of linguistic input: Evidence from deaf learners

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Abstract

This paper identifies a general limitation on printed text as a source of input for language acquisition. The paper contends that printed material can only serve as a source of linguistic input to the extent that the learner is able to make use of phonological information in reading. Focusing on evidence from the acquisition of spoken language and literacy skills in deaf individuals, the paper explains why print is not an adequate source of input for language acquisition in learners with limited phonological knowledge of a spoken language.

Keywords: input, phonological knowledge, decoding, language acquisition, reading, deafness

This article examines the extent to which printed text might serve as a sufficient source of input for language acquisition through reading. Through a comparison of deaf and hearing learners, the efficacy of print as a source of linguistic input is explored in relation to the role of phonological knowledge in decoding text. Unlike hearing second-language (L2) learners, who have phonological knowledge of their spoken first language (L1), deaf learners often do not have (well-developed) phonological knowledge of a spoken language because they typically rely on vision rather than hearing for the processing of linguistic input.[1] Under these conditions, deaf learners' development of English language and literacy skills tends to be sorely deficient.

Reading often plays an important role in second and foreign language teaching and learning. For hearing learners, who already have phonological knowledge of their L1, reading has been shown to provide an effective source of supplementary, and even primary, linguistic input in L2 learning. For example, using the grammar-translation method, adult learners can acquire a reading knowledge of an L2 by relying almost exclusively on written input (Howatt, 1984; Stern, 1983). Similarly, reading can facilitate the process of L2 acquisition across an array of teaching

methods because it provides access to additional linguistic input. However, because deaf learners of a spoken language often do not have well-developed phonological knowledge, reading would not be expected to serve as an effective source of linguistic input to the same extent that it does for hearing L2 learners.

Vision serves as the primary channel of communication for deaf learners, and many of them rely on a natural sign language, such as American Sign Language (ASL), as their primary means of communication. Acquiring knowledge of the spoken language of the larger community generally presents a formidable challenge for deaf learners because hearing loss significantly limits their ability to process speech. While this paper directly addresses reading and language acquisition in the American deaf community, where the languages in question include English and ASL, the same principles apply equally to deaf communities in other parts of the world.

The purpose of the paper is to identify a fundamental limitation in the ability of printed text to serve as a source of linguistic input. The identification of limiting factors is important for the study of language acquisition and reading because such information can enhance the explanatory power of theoretical models and improve the quality of instructional programs (Koda, 2007). The case of deaf learners is especially pertinent in this regard because it provides tangible evidence of the influence of constraints associated with phonological knowledge and awareness. The paper applies directly to the special case of learners with limited phonological knowledge of a spoken language and may also have implications for other learners reading in languages for which they have limited proficiency. Although contact between spoken and signed languages and their status as L1 or L2 are necessary considerations in a discussion of this sort, the primary focus here is on the learner's ability to process printed text for comprehension and the development of language proficiency.

Deaf Learners

Language and Deafness

In addressing the limitations of printed text as a source of linguistic input, the situation faced by deaf learners is highly relevant because of their reliance on visual information, particularly print, for language processing and acquisition. The development of spoken (English) language and literacy skills is an especially challenging task for deaf learners. Hearing loss restricts the intake of linguistic information through the auditory channel and inhibits the development of the spoken language to the point where deaf children typically have significant deficiencies in the target language and enter adolescence and adulthood without having acquired proficiency in the language of the larger community (Berent, 1996, 2009; Bochner & Albertini, 1988; Swisher, 1989). Particular areas of difficulty include the acquisition of morphology, syntax, and vocabulary (e.g., inflectional affixes, function words, deviations from canonical word order, and limited breadth and depth of lexical knowledge). As occurs in L2 acquisition, fossilization occurs in deaf learners, with error patterns tending to be highly resistant to remediation.

Deaf individuals' spoken (English) language and literacy skills span an extremely wide range of ability, extending from the primitive to the highly refined. The extent of this variation has been

attributed to a complex interaction between factors associated with learner age and the quality and quantity of linguistic input or intake (Bochner & Albertini, 1988), as described in the next section. As is the case with other groups (e.g., foreigners), for deaf individuals, the language of the larger (dominant) community is important for educational, social, and career success. Unfortunately, the development of English language proficiency has become a formidable obstacle for many deaf learners and a barrier to their overall educational and career development.

Issues Common to Deaf and L2 Learners

The L1 of most deaf individuals may be characterized as a partially-acquired or nativized language variety (Bochner & Albertini, 1988; Gee & Goodheart, 1988). The distinction between L1 and L2 in this population of learners, however, is not particularly useful from a practical perspective, especially with regard to the development of reading skills, because the spoken and signed languages in a given community (e.g., English and ASL) exist in a contact situation and have vastly different phonological systems. The phonological system of ASL, for example, is described with reference to sublexical properties of sign formation such as movement, handshape (hand configuration), location (place of articulation) and orientation. These properties are an intrinsic part of the ASL phonology analogous to phonetic features in spoken language phonology (Brentari, 1998; Emmorey, 2002).

Since it typically extends into adulthood and exhibits characteristics of both L1 and L2 learning, the unusual language acquisition situation facing deaf individuals has been characterized as an instance of L1.5 acquisition, a unique combination of L1 and L2 learning (Berent, 1996). Still, it is important to keep in mind that for many of these learners the spoken language is technically their L1. But, it is equally true that for a minority, the spoken language is actually an L2 because their L1 is a natural sign language (e.g., ASL). In general, despite individual differences in the status of their L1 as a spoken or a signed language, deaf individuals' learning outcomes with respect to spoken language and literacy skills are remarkably similar. This similarity results from a complex interaction between learner age and the linguistic environment (input).

The effects of the linguistic environment on language acquisition have been investigated for decades, as have the effects of the learner's age. In particular, *nativization* and the related constructs of *pidginization* and *creolization* have been used to describe language acquisition in a variety of circumstances (Anderson, 1983a, 1983b). These constructs have proven especially useful in describing language learning occurring under conditions of restricted input or intake, including the acquisition of English and ASL by deaf individuals (Bochner & Albertini, 1988; Gee & Goodheart, 1988). Relying heavily on data concerning the development of pidgin and creole languages, Bickerton (1977, 1981, 1984) has proposed a provocative account of language development and evolution (also see Givon, 2009), an account which comports well with language acquisition and variation in the deaf population (Bochner & Albertini, 1988; Gee & Goodheart, 1988; also see Aronoff, Meir, Padden, & Sandler, 2004; Fischer, 1978).

Clearly, the learner's age can have a major impact on language learning (Birdsong, 2006; Fischer, 1998; Newport, 1990, 2002), with the effects of age especially noticeable in atypical learning situations. Supported by data on the linguistic abilities of children and adults recovering from brain lesions and language learning under other exceptional circumstances, including language

development in deaf individuals, the concept of the critical period (Lenneberg, 1967a, 1967b) has been one of the most powerful and influential constructs in the study of language acquisition. In L2 acquisition, age is an important consideration because of its influence on the learner's attainments in the domains of phonology (or pronunciation), morphology, and syntax (Birdsong, 2006), as well as on general differences between child and adult language learning (Krashen, Scarcella, & Long, 1982). For deaf learners, however, it is important to recognize that a complex acquisition process beginning in childhood and extending into adulthood is typical, and the process frequently involves two languages (e.g., English and ASL in America) and an exceptionally wide range of learning outcomes.

While the range of variation among learners is considerable, the general description of deaf individuals' language and literacy attainments provided in this paper nevertheless holds true for the vast majority of learners who experience severe to profound hearing loss prior to about 30 months of age. These learners are classified as *prelingually* deaf, and their linguistic attainments are remarkably similar despite a wide range of individual differences in their age at onset and degree of hearing loss and their exposure to a natural sign language. Within the population of prelingually deaf individuals, variables such as age at onset and degree of hearing loss and exposure to ASL correlate with learners' language and literacy attainments; but, the correlations are not especially strong, making it impossible for all practical purposes to establish a simple causal relationship between learners' attainments and their developmental, language background and audiometric characteristics (Bochner, 1982). For example, it has been shown repeatedly that degree of hearing loss is inversely related to measures of spoken language and literacy skills, especially reading (Allen, 1986; Quigley & Paul, 1986); but, hearing loss alone does not account for a particularly large share of the variance in reading achievement.

Reading and Deafness

The study of reading has been the subject of numerous investigations in both hearing and deaf children (National Reading Panel, 2000; Perfetti & Sandak, 2000). The early stages of reading development in hearing children are largely involved with learning the sound-symbol associations involved in decoding print (Adams, 1990; Gillon, 2004; Stanovich, 2000; Troia, 2004). Having limited proficiency in the spoken language, deaf learners are confronted with a seemingly impossible task in learning to read. Since spoken language input is not fully accessible to them, deaf learners typically are in a situation where they are acquiring grammatical knowledge of the target language and simultaneously learning how to read. To complicate matters further, for many learners the spoken language of the larger community is in contact with a natural sign language. Since sign languages do not have a written form, this situation might be construed as somewhat analogous to a non-literate or semi-literate L2 learner (e.g., a learner whose L1 does not have a written form) attempting to simultaneously acquire proficiency and literacy in the target language. However, unlike hearing L2 learners, deaf individuals tend to possess limited phonological knowledge of any spoken language.

Importance of Written Input for Deaf Learners

Even though face-to-face interactions in social contexts are necessary for language acquisition in children and reading is not an inherently interactive or social form of communication, the need

for accessible linguistic input is so great that printed text frequently is introduced to deaf children during the preschool years and is generally considered a primary source of linguistic input in deaf learners. Nevertheless, despite the strong emphasis placed on print as an accessible source of input, the median reading comprehension for deaf 18-year-olds in America is approximately 4.0 grade equivalents (Traxler, 2000). Obviously, access to natural language input is a critical factor in the linguistic development of deaf children, and it has been a major concern in the education of deaf people for centuries. Unfortunately, the efficacy of print as a source of input for language acquisition has not been examined critically in the academic literature and, as a result, the limitations of written input may not be fully understood.

As mentioned previously, parallels between deaf and L2 learners have long been recognized. Moreover, approaches to language teaching focusing on the grammatical structure of the target language, including adaptations of L2 methods and materials, have been used with deaf students for decades (Berent, Kelly, Aldersley, Schmitz, Khalsa et al., 2007; Fitzgerald, 1926; Goldberg & Boardman, 1974; Wing, 1887). Similarly, ESL assessment tools have been used with deaf learners for many years, and the results of studies conducted on large samples of postsecondary students have shown moderately high correlations between scores on the Michigan Test of English Language Proficiency and measures of reading and writing ability (Albertini, Bochner, Dowaliby, & Henderson, 1997; Bochner & Walter, 2005). These facts, combined with the effectiveness of the grammar-translation method (Howatt, 1984; Stern, 1983), suggest that printed text might be able to serve as a source of linguistic input for deaf learners, much as it can in hearing L2 learners.

In a detailed study of reading processes and their relationship to the processing of grammatical information and learning a language through reading, Lichtenstein (1998) has presented the most explicit and comprehensive treatment of print as a source of English language input for deaf learners. Building upon the earlier work of Conrad (1979), Hanson (1982) and others (e.g., Hanson & Lichtenstein, 1990; Lillo-Martin, Hanson, & Smith, 1992), Lichtenstein attributed deficiencies in deaf children's acquisition of English syntax, in part, to the capacity of their working memory and the extent to which they are able to use a speech-based code to maintain written material in working memory (also see Kelly, 1996).

Specifically, Lichtenstein demonstrated that many deaf people routinely apply various combinations of speech-, manually-, and visually-based coding schemes in processing printed material. Speech-based coding (i.e., decoding into a phonological or articulatory representation) is strongly associated with the most efficient processing. However, since many deaf children have limited knowledge of English phonology, they tend to rely on manually- and/or visually-based alternatives to phonological coding. Manually-based coding involves decoding print into a manual representation consisting of signs and/or fingerspelling, and visually-based coding involves the representation of print in terms of the visual configuration (shape) of graphemes. Unfortunately, as Lichtenstein has shown, data indicate that the manual and visual coding alternatives are generally inadequate for efficient processing. Lichtenstein then proceeded to use his findings concerning the processing of print to help explain why English language development is such a formidable challenge for deaf children, arguing that their English language proficiency would be much better if only they could process print in a more efficient manner. Presupposing that printed material can serve as an adequate source of linguistic input for

deaf learners, Lichtenstein's argument is essentially that deficiencies in their English language and literacy development can be attributed, in large part, to the inefficient processing of print.

Other theorists and educators have explicitly suggested that printed text can provide direct access to morphological, syntactic, and semantic levels of language structure, and facilitate English language and literacy development in deaf learners without the need for transforming graphemes into a speech-based code for processing. For example, arguing that phonological coding is not required for efficient processing, Wilbur (2000) has suggested that deaf children can rely on printed input and manually- or visually-based coding schemes to develop English language and literacy skills within the context of L2 acquisition and a bilingual-bicultural approach to education (also see Israelite, Ewoldt, & Hoffmeister, 1992; Johnson, Liddell, & Ertig, 1989; Livingston, 1997; Rodda, Cumming, & Fewer, 1993).

In advocating a *morphographic* approach to the comprehension of written material, Gaustad (2000) has cited several potential advantages of visually-based coding for deaf learners, proposing that visual-orthographic coding and analysis into morphemes can in theory provide an alternate route to word identification. The morphographic approach is based on the direct recognition of visual-graphic representations of morphemes in print in order to circumvent the necessity for phonological coding. This approach is intended to facilitate the development of word identification skills in deaf learners by establishing direct associative connections between the visual stimulus and meaning.

Finally, citing the work of A. G. Bell in the 19th century and G. Delgarno in the 17th century, Steinberg (1993, p. 85) proposes what he calls the *written language approach*, in which deaf children can acquire knowledge of the spoken language of the larger community "through an association of written forms with environmental experiences." Much as sounds are associated with meaning in spoken language, this approach is intended to create an association between print and meaning. Steinberg's approach is based firmly on the premise that in providing access to a visual representation of the spoken language, print is a fully adequate source of linguistic input.

Statement of the Problem

Although written material can serve as input for the acquisition of a foreign language and language learning in deaf individuals has been shown to resemble L2 acquisition, it remains somewhat of an enigma why printed text is not a more effective source of input for deaf learners. The situation is especially puzzling because, as a physical signal, printed text is capable of transmitting linguistic information, and it is fully accessible to the visual channel. However, writing differs in specific ways from other linguistic signals, and such differences might limit its efficacy as a potential source of input.

One obvious characteristic of writing that distinguishes it from other linguistic signals is the fact that, unlike speech and sign language, print generally does not involve face-to-face communicative interactions in social contexts. However, there is yet another, more fundamental difference. The most important characteristic that distinguishes print from other linguistic signals

pertains to the nature of writing as a visual-graphic representation of speech (DeFrancis, 1989) and to the requirements necessary for processing printed material. Specifically, reading requires printed representations to be decoded into phonological representations. The ability to decode print, however, presupposes prior phonological knowledge. In other words, the learner must possess phonological knowledge as a precondition for effectively decoding print. Clearly, the acquisition of phonological knowledge poses a challenge for deaf learners. Thus, the question arises, to what extent can printed material serve as a source of input for language acquisition in situations where phonological knowledge is limited, specifically in situations where the learner has limited phonological knowledge of any kind with respect to spoken languages? The remainder of this paper addresses this question.

Importance of Decoding

Beginning Readers

Since writing systems encode speech into graphic symbols, the development of reading skills is strongly associated with decoding print into a phonological representation for language processing and comprehension. The convergence of data from dozens of studies has led to a strong consensus among researchers that phonological knowledge and awareness are necessary prerequisites for the development of word identification abilities in beginning readers (Adams, 1990; Frost, 1998; Gillon, 2004; National Reading Panel, 2000; Stanovich, 2000; Trioa, 2004). As they attain fluency, however, readers become less dependent upon phonological decoding for word identification. That is, skilled adult readers frequently are able to recognize printed words directly by means of visual-orthographic processing (Coltheart, 1978; Ehri, 1991; Rummelhart & McClelland, 1986). Even though fluent readers have access to a visual route to word recognition (i.e., sight word recognition), they still use phonological information for comprehension. As Stanovich (2000, p. 213) has pointed out, “virtually all theorists agree that phonological codes in working memory play some role in supporting comprehension processes.”

Deaf Readers

Data indicate that many deaf readers do, in fact, use phonological information for processing written material (Alegria, 1998; Dyer, MacSweeney, Szczerbinski, Green, & Campbell, 2003; Luetke-Stahlman & Corcoran Nielsen, 2003; Perfetti & Sandak, 2000). Manually- and visually-based coding also are quite prevalent in deaf readers but do not provide an effective means of processing printed text as mentioned previously. Hence, even though they have limited access to the speech signal and their phonological representations are likely to be underspecified, deaf learners’ development of reading skills nevertheless is associated with their ability to use phonological information for processing print (Alegria, 1998; Lichtenstein, 1998; Musselman, 2000; Paul, 1998; Perfetti & Sandak, 2000).

It is important to distinguish the ability to construct phonological representations from the ability to perceive and produce speech sounds. Speech perception and production entail the ability to construct phonological representations; however, the converse is not necessarily true. That is, the ability to construct phonological representations does not necessarily entail the sensorimotor

ability to perceive or produce intelligible speech. For example, deaf individuals with limited speech perception and/or production abilities can still make use of phonological information in reading (Lichtenstein, 1998; Padden & Hanson, 2000; Padden & Ramsey, 2000), and some develop highly refined and fluent reading skills (Scouten, 1984). Similarly, L2 learners with limited pronunciation skills are able to decode material written in the target language and develop fluent reading skills despite their nonnative pronunciation.

Phonological Knowledge as a Limiting Factor

The ability to construct phonological representations typically is developed in the course of experiencing speech as a sensorimotor event. Speech signals generally are perceived through the auditory channel and produced by neuromuscular activity associated with vocal articulation. The situation with deaf learners, however, is slightly different in that they may also rely heavily on alternative or supplementary forms of communication for processing speech, such as speechreading (lipreading), non-vocal articulation (mouth movement) and, for some, cued speech (a system of manual signals produced near the mouth indicating features of articulation). These alternatives can, in principle, facilitate the transmission of linguistic information and the development of phonological knowledge and awareness.

Since decoding printed text requires knowledge of spoken language phonology, individuals cannot process print unless they have attained a sufficient level of phonological knowledge of a spoken language. Consequently, writing can only serve as a source of target language input to the extent that the learner has acquired sufficient linguistic competence to apply phonological information to the task of processing print. The effectiveness of the grammar-translation method supports this assertion by demonstrating that knowledge of L1 phonology can serve as a basis for L2 reading and acquisition. Even though grammar-translation is not widely used today, it has been documented as an effective pedagogical approach. More generally, it is known that learners can become reasonably fluent in L2 reading without acquiring comparable proficiency in speaking and listening skills. Evidence from English language acquisition and the development of reading skills in deaf learners is consistent with this reasoning and sheds light on the limitations of print as a source of linguistic input.

The results of various studies indicate that deaf learners who have relatively good reading skills use phonological information for processing printed text (Alegria, 1998; Dyer et al. 2003; Lichtenstein, 1998; Luetke-Stahlman & Corcoran Nielsen, 2003; Musselman, 2000; Paul, 1998; Perfetti & Sandak, 2000). However, their reading ability and use of phonological coding tend to be weaker than in normal-hearing peers (Lichtenstein, 1998). These findings combined with the pervasive English language and literacy deficits characterizing most deaf learners (Berent, 1996, 2009; Bochner & Albertini, 1988; Paul, 1998; Swisher, 1989) indicate that printed material is not a sufficient source of linguistic input for them and support the general contention that printed text can only be used as a source of input for language acquisition to the extent that the learner is able to apply phonological information in reading. In contrast to conventional instances of L2 reading in which learners can draw upon their knowledge of L1 phonology and L1 reading proficiency, most deaf individuals have neither a strong knowledge of spoken language phonology nor L1 reading proficiency. Therefore, the acquisition of spoken language and

literacy skills presents a formidable challenge for them.

Additional support for the importance of phonological knowledge and awareness in acquiring a language through reading comes from the development of language and literacy skills in deaf individuals in China. Unlike English and other languages which have an alphabetic writing system, written Chinese has a logographic script. Therefore, decoding Chinese written characters is less dependent upon phonological information than decoding an alphabetic script. If deaf individuals in China generally attain levels of reading fluency approaching hearing norms, it would diminish the arguments presented in this paper. Conversely, if the development of reading skills in deaf Chinese individuals resembles that of deaf Americans, it would support our arguments. A recent study by Yang (2008) addresses this issue and provides strong evidence that the reading abilities of deaf individuals in China resemble those of deaf Americans.

Referring to phonological and orthographic awareness, as well as motor programming (for producing written characters) and *pinyin* (the Romanized form of Chinese writing), Yang shows that "the acquisition of written Chinese by deaf individuals is a complex process" (p. 305). Importantly, she cites evidence from numerous studies published in China indicating that "like deaf children in other countries, many Chinese deaf learners perform poorly and experience difficulty in reading and writing" (p. 303). Yang's description is consistent with reports of "low student achievement in deaf education" in China (Johnson, 2003, p. 54) and conditions implied by Fung, Chow, and McBride-Chang (2005). Additionally, Yang points out that the alphabetic script (pinyin) and the manual Chinese phonetic alphabet are important tools for teaching Chinese to deaf students. Therefore, evidence from the development of reading skills in deaf Chinese students supports the contentions presented in this paper.

Implications for Deaf Learners

The connection between print and phonological representations has important implications for the development of spoken language and literacy skills in deaf individuals. Even if their speech perception and production abilities are severely limited, the acquisition of phonological knowledge is important because it enables deaf learners to better use print as a means of refining their knowledge of the spoken language and because it serves as a basis for the development of literacy skills. The development of phonological knowledge, however, is not independent of the development of knowledge in other linguistic domains, even when auditory access to the speech signal and the development of speech perception and production abilities are severely limited. Therefore, deaf learners cannot simply bypass phonology and acquire knowledge of spoken language morphology, syntax and semantics through direct exposure to print. Even deaf readers of a logographic script such as Chinese are not able to bypass phonology, as mentioned previously.

Since deaf learners rely heavily on visual and printed input to acquire spoken language and literacy skills, it is important for teachers to take advantage of every opportunity to facilitate their students' visual processing of linguistic information. One approach involves focus-on-form teaching methods such as input enhancement (Doughty & Williams, 1998). Berent and colleagues (Berent et al., 2007) conducted a study in which specific features of printed English

were enhanced to draw learners' attention through the use of bold type, italics, underlining, color, and explicit presentation of grammar rules. The results of this study showed that visual input enhancement proved to be an effective pedagogical tool with deaf college students.

For deaf children acquiring a natural sign language such as ASL as their native language and a spoken language such as English as an L2 (i.e., deaf children enrolled in bilingual-bicultural educational programs), the situation is complicated by the fact that the phonology of sign languages is not associated with speech sounds or a conventional writing system. Most approaches to bilingual-bicultural education for deaf students have relied heavily on the distinction between cognitive-academic language proficiency (CALP) and basic interpersonal communication skills (BICS) described in Cummins' (1983, 1991) linguistic interdependence model. Thus, in situations where a natural sign language such as ASL is the L1, it is argued that proficiency in the signed language can support and facilitate the development of literacy in the L2, the spoken language of the larger community (e.g., English). Mayer and Wells (1996), however, have shown that ASL and English are not linguistically interdependent and, as such, the necessary conditions required for Cummins' model do not apply in the case of deaf learners whose native language is ASL. Among the arguments employed by Mayer and Wells is the fact that native users of ASL do not have a foundation in L1 literacy upon which to construct L2 (English) literacy skills. The general arguments presented by Mayer and Wells and their educational implications have been refined and extended in subsequent papers (e.g., Akamatsu, Mayer, & Hardy-Braz, 2008).

The arguments advanced in this paper and elsewhere (e.g., Mayer & Wells, 1996) predict that the acquisition of ASL as an L1 cannot serve as an adequate basis for L2 reading in English (or any other spoken language) unless the child also has acquired sufficient knowledge of English phonology by exposure to significant amounts of fingerspelling. Fingerspelling, which sometimes is referred to as the manual alphabet, is a system for representing letters of the alphabet with manual signals (handshapes) generally accompanied by vocal or non-vocal articulation. In fingerspelling, each letter of the alphabet is associated with a unique handshape. Fingerspelling can be used to express individual words, such as *C-A-R*, *B-U-S*, and *T-R-U-C-K*, as well as phrases and entire sentences. The manual alphabet is typically used with ASL, and fingerspelled words are frequently interspersed throughout ASL discourse. Deaf children enrolled in bilingual programs generally are exposed to significant amounts of fingerspelling in the course of their education. Since it provides a visually accessible orthographic representation of English and it is associated with speech through vocal or non-vocal articulation (as well as lipreading), fingerspelling creates an implicit connection between the signed and the spoken language (represented in an alphabetic, sound-based script) and provides a potential foundation for the development of literacy. As such, in principle, fingerspelling may be able to serve as a bridge to literacy development for deaf children enrolled in bilingual-bicultural programs (see Marschark, Lepoutre, & Bement, 1998; Padden & Hanson, 2000; Padden & Ramsey, 2000; Scouten, 1967). Despite the benefits of fingerspelling, however, the development of English language and literacy skills in bilingual programs still remains a formidable challenge for deaf learners.

Conclusion

General descriptions of language learning and reading ability in deaf individuals combined with the effectiveness of grammar-translation as a method of foreign language instruction strongly suggest that printed text can only be used as a source of linguistic input to the extent that the learner is able to apply phonological information in reading. Like hearing L2 learners, deaf learners engage in reading a language in which they have limited proficiency. However, since hearing L2 learners have knowledge of L1 phonology (and likely possess L1 literacy skills, as well as some knowledge of L2 phonology), they are in a much better position to take advantage of print as a source of input for language acquisition.

Although Lichtenstein (1998) maintained that reading processes and strategies are partly responsible for the English language and literacy deficits commonly found in deaf learners, the arguments advanced in this paper indicate that their reading processes and strategies are far more a symptom than a cause of the problem. In other words, it is the incomplete development of English that explains deaf learners' reading processes and decoding strategies, not the reverse. The difficulties deaf learners experience in acquiring knowledge of the spoken language, including obtaining sufficient access to phonological information, lead to related difficulties in the development of literacy skills. In order to address the root causes of these difficulties, attempts to bypass spoken language phonology should be replaced by methods that facilitate the development of phonological knowledge in deaf learners. In particular, communication methods that foster meaningful face-to-face social interactions should be encouraged. Such methods include speechreading, fingerspelling, and cued speech, and they should be accompanied by strategic exposure to printed input in the classroom. The arguments presented in this paper strongly suggest that this general approach offers the best opportunity for enhancing knowledge of the spoken language and improving literacy learning outcomes for deaf persons.

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Note

1. As used in this paper, the term *spoken language* does not imply deaf learners' use of speaking skills. The term refers to the language of the larger (hearing) community and is distinguished from signed language.

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