Writing Signed Languages: What For? What Form?

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Writing Signed Languages: What For? What Form?

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Signed languages around the world have tended to maintain an "oral," unwritten status. Despite the advantages of possessing a written form of their language, signed language communities typically resist and reject attempts to create such written forms. The present article addresses many of the arguments against written forms of signed languages, and presents the potential advantages of writing signed languages. Following a history of the development of writing in spoken as well as signed language populations, the effects of orthographic types upon literacy and biliteracy are explored. Attempts at writing signed languages have followed two primary paths: "alphabetic" and "iconographic." It is argued that for greatest congruency and ease in developing biliteracy strategies in societies where an alphabetic script is used for the spoken language, signed language communities within these societies are best served by adoption of an alphabetic script for writing their signed language.

Keywords: writing, written signed languages, biliteracy, Deaf education, orthography

> After years and years of study, sign language has proven to be extremely valuable. . . . If we had used sign language, it would have been faster to develop the written language . . . faster than the transfer of spoken language to written language.
>
> —Jean-Marc-Gaspard Itard (1821, quoted in Commerson, 2010)

Despite Dr. Jean-Marc-Gaspard Itard's somewhat hypocritical private musings, the development of a conventionally accepted written system for signed languages has yet to take place. Modern Deaf[1] audiences tend to point to the visual-spatial-kinesthetic nature of signed languages as a rationale for why they believe it is not possible to encode signed utterances in a static format such as writing. What is often overlooked, however, is the fact that spoken languages, being transitory (speech sounds "disappear" almost instantly after being produced) and "invisible" (one cannot see speech), are seemingly equally nonviable candidates for encapsulation in the static, visible format of written languages. Although speech is

exceedingly ephemeral, numerous societies have nevertheless developed a variety of ways to encapsulate the spoken word.

What is the advantage to writing? Carl Sagan (2011) put it grandly when he said, "Writing is perhaps the greatest of human inventions, binding together people, citizens of distant epochs, who never knew one another" (p. 232). More prosaically, writing allows the easy recording, storage, and retrieval of records, history, and literature. Writing allows individuals to communicate across distance and time (in the form of postal mail or e-mail), to share thoughts trivial and major—shopping lists or grand treatises, news and gossip, mental notes and manuals, books and folklore, and much more. As Hagege (1988) observes,

> The intangibility of its contents and its dissimilarity to oral language altered many of the normal circumstances of discourse, creating long-distance dialogues where the usual proximity of the communicators was lacking. Yet precisely because of this, knowledge could become accessible to a far greater number of recipients—writing possessed the advantages of both longevity and range. In spreading to different areas and societies it allowed for all the changes, input and variations that any culture would require, permitting the encoding of new words as well as of already existing ones. (p. 72)

In the present article, I will not only advocate the development and dissemination of a written form of signed languages, but will also make a case for the adoption of an alphabetically based system over other potential orthographic formats. Before this can be accomplished, however, the typical objections to written forms of signed languages must be addressed, along with their potential benefits. Following this discussion will come an examination of the history of writing and the various types of writing systems that have been developed (for both spoken and signed languages) to date. Finally, since the American Deaf community (like many, if not most Deaf communities worldwide) exists as a bilingual community, the role of orthographic (writing) styles in the acquisition of biliteracy in biliterate populations will be explored, especially in relation to the impact of the congruency of styles on acquisition of biliteracy in populations that are bilingual in both American Sign Language (ASL) and English.

Objections to and Potential Benefits of Written Signed Languages

Despite the advantages of writing, Deaf communities worldwide have remained predominantly, if not staunchly, "oral," resisting the notion of a written form of their signed language as an impossibility. Over the years, I have seen various iterations of the same objections to the notion of writing signed languages in various online forums such as the Sign Language Linguistics List (SLLING-L, http://listserv.valenciacollege.edu), Teachers of American Sign Language List (TEACHASL, http://listserv.valenciacollege.edu), "vlogs" such as presentations on SI5s by Robert Arnold (2013a, 2013b), and personal conversations with others in forums such as Facebook and in person. These objections are encapsulated below, with each followed by a rebuttal.

1. *Signed languages are not supposed to be written; signed languages are languages in a visual-spatial modality in which elements are presented simultaneously, or nearly so. Moreover, signed languages have features that are not present in spoken languages, such as classifiers and spatial morphology, that cannot be adequately represented in a two-dimensional format such as writing.*

Although, in real time, signs may appear to be occurring in time and space, with multiple syntactic and semantic elements embedded within the movements and facial/body grammar, Liddell (1984) and Liddell and Johnson (1989) observed that there is actually an element of sequentiality within signs themselves. Just as consonants are often followed by vowels in many spoken languages, sign movements can be seen to have discrete components. For example, in even a simple sign like THANK YOU, the hand must first move away from the mouth before beginning its downward (and outward) motion. Therefore, sequential components of signed languages can be identified and recorded in written form.

2. *Signed languages are best recorded by video technology, since signed language is produced in the visual modality; indeed, video recording is sufficient for instructional, linguistic, and social purposes.*

While it is true that video technology is probably the best medium for capturing signed utterances exactly as they are produced, the same could also be said for audio technology. Yet audio technology is relatively little used in comparison to written language. For example, there are audio-recorded books. Even so, with the exception of blind people and drivers with long commutes, most people choose not to listen to a book played on a CD or downloaded. This is primarily due to the fact that audio recordings are simply not as convenient as their written counterparts. One must listen to an audio recording sequentially, investing a

certain amount of time to hear the message, at the pace the message has been recorded. With written works, however, one can skim or read faster than one can listen to the recorded message. Moreover, audio recordings are not easily searchable or scannable; it is difficult to fast-forward through a recording to find a certain word or to search a recording by using a search term to identify instances of a word or phrase. With writing, however, one can easily skim and search through sections of a written work for those desired words or phrases. (This is particularly true of works loaded onto electronic media such as word processor or pdf files, or in e-readers such as a Kindle or Nook.) The same issues are present in video technology: It takes more time to watch a video than it would to read (or skim) a transcribed version of the same video (given the same degree of fluency in the written signed language as the average person has in written English), and videos are also difficult to search and scan through. Although most Deaf people presently would likely say they would prefer to watch a video than to read a written version of it, it is probably true that were they to learn and become comfortable with a written form of signed language, they would likely prefer to read than watch the contents for time-saving purposes.

3. *Developing a written form of signed language will promote the isolation of Deaf people from the "Hearing World"; with a written form of their signed language, Deaf people will not need or even want to learn to read and write English.*

This is a variation of the (monolingual) oralist argument that exposing Deaf people to signed language will hinder or even prevent them from learning English. This premise has long been found to be false. Indeed, research has consistently shown that, on the whole, Deaf children of Deaf adults (whose first language would presumably be a signed language) outperform their Deaf peers in written-language skills (cf. Corson, 1973; Geeslin, 2007; Humphries et al., 2012; Meadow, 1968; Strong & Prinz, 1997; Stuckless & Birch, 1966). If knowing sign language were a deterrent to learning the written form of a spoken language, then one would expect that native signers would not be able to learn how to manipulate a written language. But Deaf people are a small linguistic and ethnic minority (Higgins, 1980; Padden & Humphries, 1988) within the majority "Hearing" society; Deaf people recognize that it is a necessity to be bilingual—to use their signed language for daily communication, yet interact with and contribute to the "Hearing World" through the written form of the majority's spoken language. The same goes for a written form of signed language. Although Deaf people might read Deaf newspapers, books, stories, and more in a written signed language, by necessity they would also need to be literate in the written form of the majority spoken language, for employment and informational purposes. Thus, just as certain linguistic minorities like Hispanics, Chinese, and Jews can be seen reading materials printed in the written languages of their communities, one also sees these same people speaking and writing in English or other languages spoken by the majority around them. Indeed, in modern society, English has become a global lingua franca, and Deaf people will maintain a need to know how to read and write English in order to participate in the global marketplace.

4. *There is no conventionally accepted form of written signed language; moreover, since there is no significant community of written signed language users, there is no need to learn and use a written form of signed language.*

It is true that there is no conventionally accepted form of written sign language, and it is equally true that there is no significant community of written signed language users. However, this argument is somewhat circular: Effect implies cause implies effect. All writing had to be developed at some point, and had to find a community of adopters. Because of the utility of writing, it became conventionalized among early human communities. One can also look to more recent innovations in writing. In 1821, Sequoyah developed his syllabary for use with the Cherokee language. Although his efforts to disseminate this writing system among his tribe were initially resisted, the value of writing their language was realized in less than 10 years, and a community of writers and readers of written Cherokee quickly formed. Similarly, Louis Braille's system for encoding written English into a form accessible by blind people had its early detractors, but today is a standard for blind people nearly worldwide.

5. *It is hard enough to learn English without having to learn and use some newfangled signed language writing system.*

It has been argued by advocates of ASL/English bilingual education that English functions as a second language, rather than a first language, for most Deaf people (Grushkin, 1998; Israelite, Ewoldt, & Hoffmeister, 1992; Johnson, Liddell, & Erting, 1989). Consequently, any difficulties with developing fluency in written English can be somewhat comparable to the dysfluencies of expressive English displayed by second-language learners (Berent, 2009; Berent & Kelly, 2008; Berent,

Kelly, & Schueler-Choukairi, 2012; Charrow & Fletcher, 1974; Strong, 1988). It is well known that children learn to read and write in their first language upon entering school (if not before), and with time, practice, and exposure, most become adept at manipulating the written form of their language. Although Deaf people may experience difficulties manipulating written English as a second language, these difficulties might not be evident with written signed language, given familiarity and practice with this form of their native (or natural) language.

6. *Deaf students need to learn the state-required curriculum; instruction in written ASL takes time away from learning English.*

A primary argument of advocates of ASL/English bilingual/bicultural education has been that as a first (and natural) language of Deaf people, ASL should be used for "through the air" instruction. Krashen (1996) summarizes the rationale for this as follows:

> When we give students quality education in their primary language, we give them two things:
>
> 1. Knowledge, both general knowledge of the world and subject matter knowledge. *The knowledge that children get through their first language helps makes the English they hear and read more comprehensible*.
> 2. Literacy, which transfers across languages. (p. 55, emphasis added)

A number of studies, such as that of Koda (1988), indicate that cognitive skills developed in reading a first language do transfer to reading in a second language. Or, as Krashen (1996) says, "Once you can read, you can read. The ability to read transfers across languages" (p. 55). He explains this as a natural consequence of learning in a first language: "We learn to read by reading, by making sense of what we see on the page. . . . *If we learn to read by reading, it will be much easier to learn to read in a language we already understand*" (p. 55, emphasis added).

Although most efforts currently focus on pushing Deaf students to read in English, these efforts are somewhat counterproductive, since, as Krashen (1996) indicates, Deaf students are being taught to read in English, their second language, without first developing literacy skills in their first, primary language: ASL. If Krashen and his adherents are correct, then it makes sense that Deaf students should instead learn to first read and write in ASL before beginning instruction in written English. It is entirely possible to develop a body of work in written ASL (literary and academic) that can be used to bolster Deaf people's linguistic and cognitive development in that language. Although their development in English would be deferred to a later point in their education, this delay would likely be more than compensated for by increased competence in written English deriving from their increased competence in written and signed ASL.

7. *Written signs cannot adequately record prosody (speed), stress, or accents*.

Writing is a limited medium. As many have found, most writing cannot capture all the possibilities that one might see in a spoken text (Olson, 1993). Despite this, writers have often found ways to convey at least some elements of spoken languages through nonstandard forms (Frishberg, 1983). The use of words like *shouted*, *screamed*, or *blurted* gives clues to the speaker's tone. A young girl might be depicted as saying "OMIGODJOHHNYCALLED MEANDHEWANTSTOGOWITHMETO THEPROM!," which conveys a sense of talking fast; the use of capitals also gives clues to the loudness of the speaker's voice, or the stress the speaker may place on certain words. The underlining of the word *is* at the beginning of this paragraph is another device to convey stress. Accents are shown through nonstandard spellings such as *y'all*, *youse*, or *pahk your cah*. A well-developed system of written signed language would also develop ways that would be conventionally understood to convey elements of signed utterances that would otherwise not appear in the static, two-dimensional format of written language.

8. *Most, if not all, signed languages utilize classifiers, which are often novel forms and might not be understood in writing.*

Written language can introduce novel words and forms that are understood through context (Cain, Oakhill, & Elbro, 2003; Jenkins, Matlock, & Slocum, 1989; Nagy, Herman, & Anderson, 1985). One only needs to read Lewis Carroll's poem "Jabberwocky" for an example of written language utilizing a large number of lexical inventions that nonetheless are understood by their syntactic and semantic roles, as well as through the use of metacognitive strategies such as making use of context. Classifiers in a signed language can be treated in the same way: Readers would use their skills in decoding written signed language to grasp the new word being presented and would likely use metacognitive skills to recognize that the writer/signer was likely making reference to a description of the item's size, shape, actions, and other attributes.

Benefits of Developing and Accepting Written Signed Language

Now that it has been shown that the typical objections to written signed languages are mostly without merit, it is time to address the potential benefits of developing and accepting a written form of signed language.

1. Elevation of the Status of ASL

ASL, like many signed languages, exists within a diglossic-like situation (Ferguson, 1959; Ramsey, 1989; Stokoe, 1969, 1985; Woodward, 1980) in which the majority spoken language enjoys the status of "prestige language," while ASL and other signed languages are disfavored, or even suppressed, largely as a result of the efforts of oralists such as Alexander Graham Bell (Baynton, 1996; Winefield, 1987) and his successors. Adding to the denigration of ASL is its current status as an unwritten, "oral" language. It is largely true that Western society values literacy, and languages that do not possess a written tradition are often scorned as being inferior to those with written traditions (Graff, 1986). Developing a conventionalized and accepted form of the language will place it in the ranks of written languages, and this will remove a major argument for the rejection of ASL as an academic as well as social language (cf. Frishberg, 1983).

There are some who will point out that many, if not most, of the world's languages do not have a written form, yet speakers of unwritten languages can become bilingual in two or more languages. Though this is a commonly recognized fact, some people, such as Mayer and Wells (1996), have argued that commonly accepted principles, such as the Linguistic Interdependence Theory (Cummins, 1979), cannot apply to ASL/English bilingual education, since ASL does not have a written form. That is, they argue that while it is true that literacy skills in a first language may transfer into a second language, it then stands to reason that when there are no literacy skills to be developed in a first language due to its unwritten status, there are also no skills to be transferred to the second (written) language. Developing a written form of signed language will go a long way toward eliminating this argument as well. Indeed, this point will be addressed in more detail later in the present article.

2. Preservation of Deaf History, Literature, and Language

Written language has provided historians, writers, and linguists with vast amounts of data from which insights can be gained into past lives, thoughts, and ways language was used. Yet, for Deaf people, the lack of a conventionally accepted writing system has led to the loss of an incalculable quantity of similar data on Deaf lives. As Bauman (2002) states,

> Tracing early Deaf history is a bit like tracing the path of fireflies. The field is mostly dark, except for scattered moments of illumination. The darkness results in part because manual languages have had no written system, no way of preserving thoughts beyond the moment of utterance. One is always haunted by the sense of how much may have occurred among Deaf individuals and communities throughout history but was never recorded. (p. 452)

Similarly, DeFrancis (1989) observes that writing allows people to "revisit" the earlier forms of their own language. It is well known that in 1913 George Veditz collected $5,000 from the Deaf community to produce a series of films through which the Sign Language, as it was called then, might be preserved. Yet, with this money, he was able to produce only seven samples of ASL as it existed at that time. If a written form of ASL had existed, one can only dream of how many samples, as well as the variety of samples, that we might have today through which we could better understand the origins of ASL and the changes that have occurred in it over the past 200 years!

With writing, ASL poetry, stories, plays, and other forms of ASL literature can be created and preserved on paper or electronically, as well as on video-recorded media. It is even possible that new forms of signed language literature might arise with the development of a writing system, forms that might not be entirely possible to create "through the air."

3. Enhancement of ASL Instruction

The benefits of a written signed language system do not extend solely to Deaf people; nonsigners, both Deaf and hearing, have the potential to gain from the introduction of written signed language into signed language instructional curricula. There are two ways in which this would happen.

First, many teachers, following the lead of several different sign language curricula, teach signs and sometimes signed language grammar through the use of "glossing," which is the representation of words in one language in another. Thus, the French sentence *Il fait chaud* would be glossed as "It makes hot," since this is a direct, one-to-one correspondence between the meaning of the lexical terms in French and that of the equivalent English words. This French-English example illustrates a primary problem with glosses: There is often not a true one-to-one correspondence in meaning between languages; one must often make certain adjustments (translation)

if an utterance in one language is to make full sense in another. For signed languages, glosses are more problematic due to the diglossic-like setting in which they are frequently situated (Colonomos, 2007; Frishberg, 1983; Hoiting & Slobin, 2002; Johnston, 2010; Pizzuto & Pietrandrea, 2001; Slobin, 2008; T. Supalla & Clark, 2015). While most people understand that languages such as French and English are separate entities, people often take signed languages to be a form of the majority spoken language. The representation of signed language lexical items in the written system of the majority language only compounds this mistaken impression (Frishberg, 1983; Hoiting & Slobin, 2002; Slobin, 2008). Further, due to the grammatical differences between spoken and signed languages, glosses of signed languages make them appear to be ungrammatical and incomplete, and therefore inferior to the spoken language. To illustrate, the signed sentence "I will go to the store, and afterwards, I will come home and take a shower" might be glossed as ME GO STORE, FINISH, COME HOME SHOWER. Although the gloss captures the order of the signs, without facial grammar (nonmanual signals) and directional information contained in some verbs and other signs, understanding of the semantic intent of the signed utterance is frequently rendered incomplete.

For learners of signed languages, glossing also tends to "lock" students into a one-to-one correspondence between the gloss and the sign, whereas a sign can often have more than one synonymous meaning in English, especially when modified by nonmanual signals and other information. In addition, the glosses are represented in what is usually the students' first language. As a result, signed language students are often led to maintain their thinking in their first language rather than attempt to make the mental translation into the second language (Switzerlood, 2010). Most sign language dictionaries reinforce this English-dominant pattern by establishing a spoken-language (gloss) meaning as the primary means by which a sign can be identified. With a writing system, signed vocabulary can be taught and learned through signs first, before students are provided with a possible range of semantic equivalents in their own language; this enables students and instructors alike to break free of what Slobin (2008) has termed the "Tyranny of Glossing."

One notable ASL curriculum, Signing Naturally (Lentz, Mikos, & Smith, 1988; Mikos, Smith, & Lentz, 2001; Rosen, 2010; Smith, Lentz, & Mikos, 1989), deliberately avoids the use of glosses as an instructional tool for much the same reasons outlined above. Teaching is instead conducted through a notional-functional approach, in which vocabulary and grammar are presented through illustrations and modeling by the teacher. While this approach is effective in its own right, students often do not recognize or remember the grammatical elements being taught and instead maintain their spoken-language grammatical patterns (Rosen, 2010). Moreover, while students may make the semantic connections between a sign as taught "through the air" and their own cognitive understandings of a concept, they may have a limited range of semantic equivalents to draw from, and therefore may attach an incorrect semantic meaning to the sign. With a written system for signed language, the signs could be taught, with a resource list of the vocabulary provided from which students could study to reinforce their learning. Moreover, students could be provided with work sheets or a textbook with which their learning of grammatical concepts could be taught and reinforced through written explanations and exercises.

4. Communication in the Language of the Community

As members of a linguistic minority situated within a majority group that often does not speak or know our language, Deaf people are frequently taught to read and write in the language of the majority. While this is worthwhile in its own right, it often relegates signed languages to a lesser place, even in the minds of those who value and support the use of their signed language. Most Deaf people feel more comfortable communicating in a signed language; indeed, due to ineffective instructional practices emphasizing spoken-language dominance in almost all areas of a Deaf person's educational experience, Deaf people are commonly not comfortable with using the spoken language, in its spoken or written form (Berent & Kelly, 2008; J. H. Bochner & A. M. Bochner, 2009). Even those who are comfortably bilingual in signed language and the written (majority) language often find themselves wishing at times to express ideas or concepts that are present in their signed language but lacking a sufficiently adequate English translation of the sign (Arnold, 2010). Further, Deaf people often report a disconnect and struggle with expressing and writing about themselves in English, a language that many feel does not represent their identities and daily lives, yet have no other way of accomplishing a cognitively congruent means of doing so in writing (Harmon, 2007; Lindgren, 2012). As a result, one often has to resort to glossing (with all its attendant problematicity, as discussed earlier) or resort to a crude means of conveying which sign was intended. For instance, there is a Facebook page titled "ORANGE-THROAT," a gloss that references an ASL sign whose meaning

has nothing to do with oranges or throats in general. With a written system of signed language, Deaf (and hearing) signers could communicate with others in their preferred language. Although other technology such as video does exist and can be used, writing offers a quick and easy means of communication that video technology cannot always match, as discussed earlier under Objection 2.

5. Discussion of Signed Language *in* Signed Language

Since Stokoe (1960/1993) identified ASL as a language with linguistic principles equivalent to those found in spoken languages, Deaf signers have developed a newfound pride in their language, and today there are frequent discussions in the community about signs and signing. Yet too often these discussions (when they occur on the Internet, as in chatrooms and social media) occur in English, with its inherent limitations in representing signed language. In bringing up or referencing a sign, people often resort to a gloss of the sign or provide a lengthy description of the sign such as "hand in 'claw' handshape at throat, palm inwards, hand closes into a fist." In these situations, an extended discussion typically follows in which people ask for clarification of what is meant by the gloss or the linguistic parameters of the sign. With a written system for signed language, the sign could be raised in written signed language, and discussions about the sign could start immediately; furthermore, the discussions could be entirely in the language under discussion. That is, instead of allowing English to maintain its colonization (Ladd, 2003) of signed languages, Deaf audiences could decolonize through their use of their own languages in video and written media without using English.

6. Standardized Understanding of What "ASL" Is

Due to the colonization of signed language, especially ASL by English through the introduction of English-based sign systems such as Signing Exact English (SEE2; Gustason, Pfetzing, & Zawolkow, 1972) and the push for English monolingualism through oral instruction, ASL, like many other signed languages, has undergone significant changes that some would not consider to be a part of the "natural" evolutionary process all languages undergo (Kuntze, 1990; Lucas & Valli, 1992; Ramsey, 1989; Reagan, 1995; T. Supalla & Clark, 2015). When this process is considered in conjunction with the fact that most Deaf people are not exposed to signed language at an early age, or, if exposed to sign language, are not using a "natural" sign language (such as ASL), but, rather, a signed version of the majority spoken language, one quickly realizes that most Deaf (and hearing) signers are not native users of ASL or other natural signed languages (Kuntze, 1990). As a result, the expressive fluency of signers often varies widely, from native fluency to signing that is heavily influenced by spoken language, with most signers falling somewhere between the two extremes. Lucas and Valli (1992) argue that these varieties are expressions of language contact between English and ASL, and some have taken this to mean that all ASL signing, whether English-influenced or not, is "ASL." While this may be true, the use of written ASL, like the use of other signed languages, could go a long way toward standardization and understanding of what "grammatically correct" ASL is, especially among the non-native signing population.

7. Reduced Expenses

Writing, for all its drawbacks, is still far less expensive than any other recording medium. Video and audio technology requires the purchase of equipment to produce and play back recorded information, which can cost hundreds to thousands of dollars. Writing, on the other hand, requires only pen and paper, at a cost of less than a dollar per unit.

Literacy and Biliteracy

Many researchers studying the issue of reading skills development in Deaf readers have stressed what they view as the need for phonological encoding strategies for this population. They argue that this is important because, like those of many other alphabetically written languages, the letters of written English represent the phonology of spoken English. S. Supalla, Wix, and McKee (2001) note that for Deaf readers, the focus on English phonology (and therefore the sound base of the English language) is problematic, since Deaf readers do not have full access to the sound system of English, yet "[English] is an alphabetic system, even the visual form of English refers to sound; that is, English graphemes represent phonemes" (p. 178). In response, others have supported alternative strategies for use with Deaf readers, such as whole language and visual and cognitively based approaches to understanding the written English word (cf. Grushkin, 1998; Hoffmeister, 1999; Livingston, 1997; Padden & Ramsey, 1999; Simms, Andrews, & Smith, 2005).

If it is indeed true that the development of phonological awareness is important in reading, especially reading in alphabetic languages like English, then it might make more sense for Deaf readers to develop phonological en/decoding skills in their first (or natural) language, ASL, which then (according to Cummins's Linguistic Interdependence Theory) would likely be more easily transferred toward the en/decoding of written English. Thus,

the development and use of written ASL would afford opportunities to study how Deaf readers can learn to read in their first, natural language. Alternatively, it might be that phonological encoding is not a requirement for reading in signed languages, in which case the emphasis on phonological en/decoding in English would need to be de-emphasized in favor of lexical, syntactic, and metacognitive strategies for learning to read and write English, as many have advocated (e.g., Grushkin 1998; Hoffmeister, 1999; Livingston, 1997; Padden & Ramsey, 1999; Simms et al., 2005). An example of such a strategy is the sequential presentation of ASL and English in order to provide comparisons and contrasts between the grammatical structures of the two languages. While this strategy can be effective, it can be rendered even more so by making the same contrasts using the two languages in a static format, such as writing. To date, most people have attempted to write ASL in gloss format; however, as discussed earlier, this introduces confusions regarding the relationship between ASL and English. The use of a written form of ASL would provide the benefit of the comparison/contrast approach, while eliminating the potential for confusion as to the nature of ASL. Written ASL can also be a useful tool for developing vocabulary in English as well as signed language, such as through bilingual dictionaries. Most current dictionaries only allow for a unidirectional approach to learning: from English to ASL. *The American Sign Language Handshape Dictionary* (Tennant & Brown, 2010), although it does not utilize written signed language, provides an insight into how Deaf signers (or signed language students) can use a signed language dictionary in a bidirectional manner (from sign to spoken language or vice versa), using the handshape as a primary organizing principle for the ordering of signs.

In any case, the development and use of a written system for signed languages would present a means toward a transformation of Deaf educational pedagogy allowing educators to, as educator Cecilia Flood said in an interview,

> capitalize on language abilities, not language problems. To provide a medium that potentially may enhance linguistic and cultural identity and self-empower Deaf and hard of hearing students. To record the experiential stories of Deaf and hard of hearing . . . learners that will significantly inform perspectives on the academic literacy learning experiences of Deaf and hard of hearing students, *in their own words*. (Han, 1999, p. 2)

Flood, a teacher of the Deaf who uses a written signed language called SignWriting (discussed in the following section), added that

> using a yet-to-be tapped resource, SignWriting, deaf and hard of hearing students will not only become better signers, but also better readers and writers, plus they will attain membership in the growing club of bilingual readers and writers in the USA. (Han, 1999, p. 2)

History of Writing and Writing Signed Languages

Diamond (1994) observes that there are three basic strategies used by the writing systems of the world that differ in the size of the speech unit signified by a written symbol: a single basic sound (phoneme), a whole syllable, and a whole word. Phonemic systems are typically conventionalized as alphabets, such as found in Hebrew, Cyrillic, and the English (Latinate) alphabet. Within these systems, certain sounds such as /k/, /s/, and /i/ are typically represented by certain written symbols, which we refer to as letters. In contrast, in other systems, such as Chinese and Egyptian hieroglyphics, a specific symbol will holistically represent a specific word in its entirety. For example, the Chinese character 大 can mean "large," "oldest," or, depending on the pronunciation, "doctor." Such systems are referred to as logographic systems. A third, less common approach is to represent words syllabically; that is, syllables such as *ba, be, bo,* and *bu* are each given a character, and written words are formed through the combination of syllables. Thus, a word like *family* might be represented as *fa-mi-ly* (Diamond, 1994); examples are the Cherokee writing system developed by Sequoyah and the Japanese kana. It is important to note, as Diamond does, that although writing systems typically utilize one of these three main strategies, no writing system uses these strategies exclusively. Rather, elements of other strategies are often seen in writing systems; for example, English uses logograms such as letters and arbitrary symbols ($, %, &, etc.) that do not represent phonemes, while Japanese, which primarily uses logograms (derived from Chinese writing) called kanji, also utilizes a syllabary called kana as an aid to comprehension of certain words in kanji that are harder to read, and Chinese ideograms often contain an element that provides information about the phonology of the word.

As stated earlier, to date there has been no conventionally accepted written system for signed languages. This does not mean there is no need for one or that it cannot be done. Indeed, Fok, Van Hoek, Klima, and Bellugi (1991) not only provide evidence that Deaf people have an instinctive desire

to represent their own language in writing, but also evidence of the means by which it might be done. In a study of young Deaf Chinese and American writers, Fok et al. found instances in which these children attempted to create writing for words or concepts they did not know in their respective languages using principles from their signed languages. For example, one Deaf child created a representation of the handshape or movement found in the sign DUCK, and at another time attempted to illustrate the two-handed ASL sign PIE through two drawings, one representing the nondominant base hand of the sign and the other showing what appears to be the movement path of the dominant hand. In another case, a Chinese child, given a stimulus picture of a girl opening a door, wrote the Chinese root for *person* next to the character for *door*; this was similar to how he might have signed it, using classifiers and signs in Chinese Sign Language. At another time, this child, writing about a rocket launching, wrote the character for *airplane*, but added a couple of extra upwards squiggles to the ideogram, likely to express the upward path and motion of a rocket as it launches, as he might have signed it. These examples indicate that Deaf signers (those without any preconceptions about the nature of writing) do understand the elements of their language, and do have some desire to record their thoughts using their primary language.

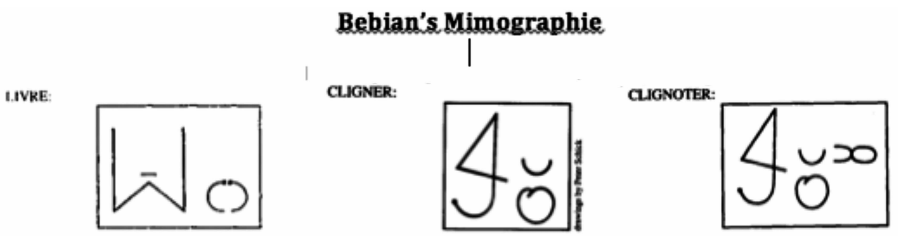
With the onset of the linguistic study of modern signed language, several transcription systems have been developed for the purpose of recording and analyzing signed languages, such as Stokoe Notation (Stokoe, 1960/1993), the Hamburg Notation System (HamNoSys; Prillwitz, 1989), and the Liddell-Johnson Movement-Hold model (Liddell & Johnson, 1989). However, notation or transcription systems are different from writing in that they are designed to encapsulate fine phonemic differences within a language for the purpose of linguistic study; as a whole, they tend to be too cumbersome, if not arcane, for the average layperson to use on an everyday basis. Writing, on the other hand, tends not to attempt to encapsulate every element of an utterance within a language (such as intonation, prosody, or variations in regional accents), but, rather, to encode just enough elements for comprehension within a static format through which languages were not developed to be expressed (Graff, 1986). In this way, writing encodes sufficient information for the transmission of ideas between members of a linguistic community without becoming too overwhelming for users to learn and manipulate. Or, as Tzeng and Hung (1988) state,

> As we look back at these historical changes [in writing systems], we see that the evolution of writing seems to have taken a single direction at every advance, the number of symbols in the script decreases, and as a direct consequence the abstractness of the relation between script and meaning increases and the link between graphemes and phonemes becomes clearer. (p. 275)

Although there is no conventionally accepted written system for signed languages, this is not to say that there have been no attempts to create written signed language. One of the earliest known attempts was by Roch-Ambroise Bebian, who, as godson to Roch-Ambroise Sicard (the second director of the Royal National Institute for the Deaf, in Paris), grew up with Deaf people and became an educator of the Deaf himself (Cuxac, 1990; Fischer, 1995; Lane, 1984a, 1984b; T. Supalla & Clark, 2015). Several examples of Bebian's writing system are presented in Figure 1. In the 1970s, Valerie Sutton modified the DanceWriting system used to develop dance choreography for use with signed language (Sutton, n.d.). The system that resulted, SignWriting, consists of drawn symbols representing handshapes, orientations, locations, and movements, and can be modified to portray perspective and other nonstandard changes in a sign as well. This writing system has been utilized in several different countries and in a few school programs in the United States (Nover, 2000; Senghas, 2015). An example of SignWriting is presented in Figure 2.

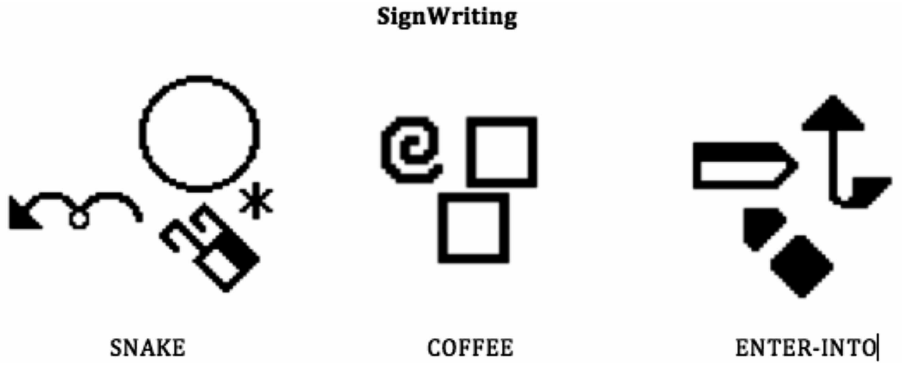
Since the development of SignWriting, a few others have made attempts to design a written signed language system. In the 2000s, Robert Arnold created Si5s (Arnold, 2010, 2013a, 2013b), which has gained some traction due to

Figure 1
Examples of Bebian's Mimographie



Notes. Livre, "book." *Cligner*, "to bat the eye" (transitive). *Clignoter*, "to wink" (intransitive).

Figure 2
Examples of SignWriting



his strong promotional efforts. Because of disagreements about how signs should be written, a member of Arnold's initial group, Adrean Clark, developed a variation on Si5s, which she calls "ASLwrite." Examples of Si5s and ASLwrite are provided in Figure 3.

What is interesting about all of these systems is that they do not appear to conform to the three basic writing styles identified by Diamond (1994): logographic, syllabic, or alphabetic. Rather, due to the visual-kinesthetic nature of signed languages, their creators have chosen to represent signs in a manner that might be best described as "iconographic." That is, these systems employ pictorial (iconic) ways of expressing the elements of a sign, although it should be noted that most, if not all, of these do appear to include some phonological information within their "iconograms."

However, it may be possible to encode signed languages more traditionally (at least according to most Western educational mores), utilizing an alphabetic approach. Samuel Supalla and his colleagues working with Deaf children at a Tucson charter school program developed an alphabetic-like system for writing ASL signs based on ASL "graphemes" representing handshapes, locations, and movements to be used as a bridge toward English literacy (S. Supalla et al., 2001). Unlike Stokoe's earlier work, in which signs were also represented through a set of symbols, some of which were based on English (Latinate) orthography, Supalla's symbols were based on the appearance of the handshape itself, and were unique to this system. Thus, in a break with earlier (notation) systems, Supalla and associates achieved a decoupling of ASL from English orthography, whether partial, as in Stokoe Notation, or whole, as in glosses. However, Supalla did not appear to envision his system being used as a means of transmitting extended texts, but rather simply as something of a "starter" system toward acquiring English. As a result, the signs are frozen at the lexical level, without much, if any, extension toward the syntactic and discourse levels. Drawing upon Supalla's work, I have developed a similarly unique set of symbols representing handshape, orientation, location, movement, and nonmanual morphemes to be arranged horizontally in a manner similar to those of English and other orthographies, which I have named SignScript (Grushkin 2010a, 2010b, 2010c, 2010d). Unlike Si5s, however, this system has not been widely disseminated at this time. Examples of SignScript are provided in Figure 4.

Figure 3
Examples of Si5s and ASLwrite

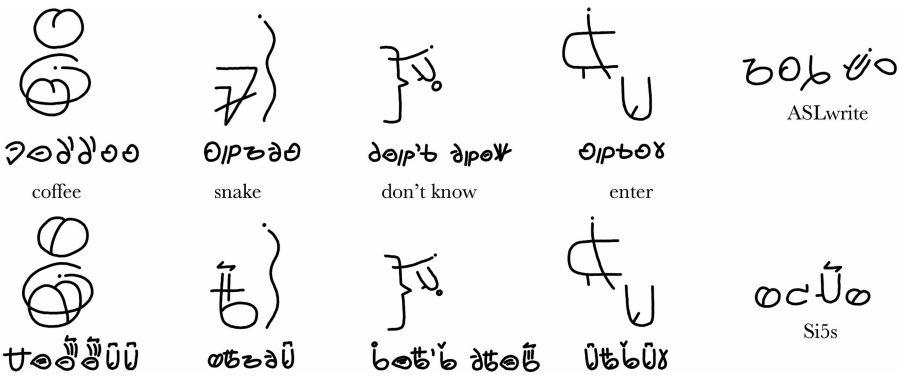


Figure 4
Examples of SignScript

Orthography and Biliteracy

If the Deaf community were to develop and accept a system of written signed languages, what then, would be the best approach—iconographic or alphabetic? More important, what would be the impacts on the learning of English if signed languages were written by means of a non-Roman writing (or orthographic) system? Would any differences in orthographic structure negatively affect the acquisition of English as a second (written) language? Perhaps the best way to answer these questions is to examine what happens when bilinguals learn to read and write in two different languages, especially when the languages are written in dissimilar orthographic formats. There are two main areas of concern and exploration: The first is whether the writing provides readily accessible information to the phonology of the language ("shallow orthography") or the relationship between the language's phonology and the written word is more opaque ("deep orthography"). The second relates to the transfer of reading strategies learned in one language to reading in a second language, especially when divergent orthographies may require the development of different reading strategies.

Hung and Tzeng (1981) note that every orthography transcribes sentences at the level of words, and that this transcription is achieved in a morphemic way. While this is certainly true, differences in the type of script do affect the learning of the script, as well as how readers may process different types of scripts, especially after having learned a differing script type. For example, Geva and Siegel (2000) found that when a script is less complex (in that the relationship between phonology and graphemes is more direct, or "shallower"), children develop word recognition skills with relative ease in comparison to when they are working with more orthographically complex scripts. However, Hung and Tzeng also found that these effects are somewhat limited: While human visual information processing is affected by orthographic variation, this occurs only at lower levels, which are data-driven (or "bottom-up") processes. At higher levels of reading (concept-driven, or "top-down," processes), reading appears to be immune to orthographic variation.

Reading English involves using an alphabetic orthographic system. An advantage of alphabetic orthographies is that, as Tzeng and Hung (1988) observe, these systems map onto the spoken (or signed) word at the level of the phoneme. Therefore, with alphabetic writing systems,

> in the ideal case, someone can read words he has never before seen. It is obvious, however, that one can do this only insofar as he is able to map the internal structure of the written word onto the segmental structure of the morphophonological representation of the spoken word he holds in his personal lexicon. (I. Lieberman, A. Lieberman, Mattingly, & Shankweiler, 1980, p. 149)

Although there are advantages to the alphabetic format of writing, not all alphabets are created equal. For example, Hebrew's alphabet is more "squarish" compared to the Latin alphabet; that is, the letters are more blocklike, with more horizontal and vertical strokes and fewer curves and diagonals than are present in the Latin alphabet. As a result, it may take readers of Hebrew slightly longer to recognize differences in letters compared to those reading in English (Share & Levin, 1999). In addition, although alphabetic orthographies do map onto the phonemic level of language, readers have to be taught to make the connection between the phonemes of a language and the graphemes that represent these phonemes. This task can be complicated in languages such as English, which has a "deep orthography." That is, one phoneme in English can often be represented in multiple ways. To illustrate, the sound /f/ can be represented as "f" (*fish*), "ff" (*quaff*), "ph" (*phony*) or "gh" (*cough*); likewise, the sound /n/ can be represented as "n" (*need*), "kn" (*know*, *knife*), "pn" (*pneumonia*), and "gn" (*sign*). As a result, beginning readers can experience difficulty decoding English when taught through an explicitly phonics-based approach, which is why Goodman (1993, 1994) advocates the use of whole language approaches instead.

In comparison to alphabetic systems, there are logographic systems, such as Chinese ideograms or Japanese kanji (which were borrowed from the Chinese logographs). Whereas alphabetic systems stress the phonemic level of language, reading in logographic systems is primarily established at the lexical (vocabulary) or semantic (meaning) level, since each logogram typically represents a single word or concept (Tzeng, 1983; M. Wang, Perfetti, & Liu, 2003). Since logograms represent single words or concepts, learning to read in Chinese involves making associations between the vocabulary in one's linguistic base and the written characters representing the lexical item or semantic concept. Ultimately, this necessitates the memorization of thousands of separate characters. Hung and Tzeng (1981) observed that initially, readers learning logographic systems may have initial success at this task as long as the characters to be learned are distinctly different; however, with the introduction of additional characters, similarities to previously learned characters will begin to appear. At this point, purely visual strategies will become less effective,

and the reader must develop other memory strategies to maintain the reading process. Nevertheless, Tzeng and Hung (1988) hypothesized that since Chinese logographs contain more symbols with similar sounds but different meaning, and since there are often minor differences between logographs, processing of a logographic script would involve more visual/spatial memory than is the case for processing alphabetic scripts. Indeed, Tzeng and M. Wang (1983) found this to be the case: Processing logographs does involve more visual memory than occurs in the reading of alphabetic systems. Although the sheer number of logograms to be memorized appears daunting and perhaps cumbersome, Noda (1995) posits one advantage of logographic scripts:

> The phonetic representation systems of Japanese call for a linear approach that slows down the reading process and correspondingly delays understanding of the content, whereas the globality of the logogram means that it can be immediately recognized and understood once it has been memorized. (p. 25)

Advantages and drawbacks of individual orthographic strategies become less clear when one discusses bilingual learning and strategy transfer between languages and scripts. More specifically for our purposes here, what are the effects of nonalphabetic or non-Latinate scripts on learning of an alphabetic, Latinate script such as that of English?

Kenner, Kress, Al-Khatib, Kam, and Tsai (2004) observed that young children, even without prior instruction, can develop understanding of how writing systems operate and can differentiate among multiple orthographies. Further, Kenner et al. found that orthographic knowledge and reading or writing strategies may transfer between languages, even in children who are just beginning to learn to read and write. However, they caution that bilingual literacy development is not a standard one-way path: For each child or person, the process of literacy development can take individual pathways while he or she is learning about script.

In their experiment, Tzeng and Hung (1988) found some evidence that reading strategy interference does exist for Chinese-English bilingual readers. They attribute this to a transfer of logographic reading processes that were (ineffectively) applied to English (alphabetic) reading. However, Lee, Wee, Tzeng, and Hung (1992) conducted Stroop interference tests (in which subjects are asked to name a color when the word for it is presented in a different color) among bilingual subjects whose languages were written in different orthographic systems. Although they hypothesized that a greater difference in orthographic structure would lead to a reduction of interference effects during language switching, they found that orthographic structure by itself was unrelated to the degree of the interference effect.

Interestingly, Tzeng and Hung (1988) cite research from the Salk Institute in which Chinese and American Deaf readers were compared in their use of reading strategies. According to the Salk investigators, Chinese Deaf readers tended to explore the spatial layout of logographs, while American Deaf readers focused on the linear arrangements of letter strings. When Deaf readers were studied in the course of research on acquisition of a signed language, Tzeng and Hung noted that Deaf Chinese enjoyed an easier transition from their sign language to the reading of logographs than the Deaf Americans did in transitioning from signing to reading an alphabetic script. This finding has significant implications for the development of a written signed language system, and will be examined in greater detail later in the present article.

Since English script is based on alphabetic principles, and alphabetic writing is strongly associated with the phonemic structure of a language, it comes as no surprise that educators in English-speaking countries, among others, typically stress the need to develop phonemic awareness in readers of English. Indeed, Holm and Dodd (1996) state that the development of phonemic awareness requires alphabetic literacy, not just literacy in general. This assertion is corroborated by both Hanley, Tzeng, and Huang (1999) and Cheung, Chen, Lai, Wong, and Hills (2001), who indicate that the phonological awareness of Chinese readers is bolstered by the learning of an alphabetic system. These findings are attributable to the fact that logographic systems, which map onto meaning rather than sound, do not provide readers of these systems with experience in consciously identifying the phonological segments of a word—a skill (among others) needed for fluent reading of alphabetic scripts (Holm & Dodd, 1996). This means, according to Holm and Dodd, that those from nonalphabetic written-language backgrounds may have difficulties with new or unfamiliar words encountered in English. However, Holm and Dodd caution that this need for phonological awareness is not absolute, since English spelling can be acquired without phonological awareness, by means of a "global" strategy, as whole language advocates such as Goodman (1993, 1994) have insisted. Further, there are indications that even when children learn to read highly contrasting writing systems, there is still some phonological transfer between languages (M. Wang, Perfetti & Liu, 2003). Interestingly enough, potential conflicts be-

tween reading strategy and learning of a second written system does not appear to be bidirectional: M. Wang et al. (2003) found that readers of alphabetic writing systems were able to grasp the orthographic structure of a logographic system such as Chinese fairly quickly, applying their perceptual skills and the mediation of their first language toward the acquisition of Chinese writing.

In a study with implications for written signed language and English biliteracy, M. Wang, Park, and Lee (2006) investigated the development of biliteracy in children whose first language was written in a non-Roman alphabetic system (Korean) who were learning to read English as a second language. The study presents an interesting case because written Korean ("Hangul") has an alphabetic component in which the graphemes correspond to phonemes, as in English; however, Hangul is laid out in a nonlinear format, like Chinese. This nonlinear aspect is somewhat comparable to the nonlinear aspects of some written signed languages, such as Si5s and SignWriting. It has been established that phonological skills in one language tend to be highly correlated with phonological skills in a second language, and these skills typically contribute to word-reading skills in a second language (Cummins, 2006; Mayer & Trezek, 2014). Additionally, it is known that weak expressive language proficiency in the second language tends to limit the ability to rely on phonological processing for some learners of second languages (Allen, Letteri, Choi, & Dang, 2014; Grushkin, 1998; McQuarrie & Parrila, 2014). For many Deaf people, English functions as a second, rather than first, language (Grushkin, 1998; Wilbur, 2000), and, in addition, is less accessible for Deaf people in comparison to signed languages, since Deaf people do not typically have complete exposure to English in any form except through writing. What M. Wang et al. (2006) found was that orthographic skills in English and Korean were not significantly correlated; that is, orthographic skills in Korean did not predict English word reading more than possession of English phonological and orthographic skills. The authors suggested that this was potentially due to the difference in visual form and orthographic transparency of the two languages. In other words, since English utilizes a linear layout and has a "deep" orthography, whereas Korean has a nonlinear layout and a "shallow" orthography, skills developed in Korean did not transfer well to reading in English. In another interesting note, the authors cited recent neuroimaging work on Chinese-English bilingual adults that indicated that these adults experience more activation in the brain areas responsible for coordinating and integrating visual-spatial analyses of logographic Chinese characters in comparison to what was seen when they were reading English. Similar results for visual-spatial brain activation have been found in Deaf subjects during signed language discourse (Emmorey et al., 2005; MacSweeney et al., 2002).

Conclusion

In conclusion, the questions must be asked: Does the development of writing for signed languages hold any true benefits for Deaf people, as individuals and as a community? If so, what type of orthographic format should written signed language take, especially when ASL-English biliteracy is a goal?

It is a long-standing truism that age of acquisition is one of the best predictors of ASL fluency among the adult Deaf population: The earlier one is exposed to ASL, the greater one's expressive command of the language (Boudreault & Mayberry, 2006; Mayberry, 1993; Newport, 1991; Newport & T. Supalla, 1990). Yet even though exposure to ASL is a necessity, simple exposure is not sufficient for mastery. As Singleton, S. Supalla, Litchfield, and Schley (1998) caution, informal exposure to ASL outside the classroom does not guarantee that a Deaf child will attain a high level of ASL fluency. As is the case with English, Deaf children must be formally taught the structure and rules of the language they use.

Some teachers of the Deaf have experimented with a variety of ways to provide this formal exposure to ASL. Some, like Snoddon (2010), have turned to video technology in conjunction with a storytelling/writing approach in which student narratives are signed in ASL and then transcribed into English texts which are then revised according to feedback from the teacher. While effective in promoting English literacy, this approach maintains an English-centrism in that not only is English the primary focus for improvement, but ASL is not accorded an equal status because it is unwritten. In a similar approach, Mozzer-Mather (1990) used glosses to improve and expand written English narratives. In addition to the problems with glosses discussed earlier, the use of glosses, as in Snoddon's work, also maintains English primacy by representing ASL words in English-seeming format. While the basic technique does foster cognitive comparisons of the structural similarities and differences between the two languages, it is almost certainly the case that written ASL would be more effective at capturing elements that are not easily represented through glosses, and would achieve a true separation between the two languages in the minds of students. Moreover, this would go a long way toward removing the cognitive disconnect Deaf writers feel in trying to put their lives and thoughts in writing in English, as Harmon (2007) and Lindgren (2012) have observed.

S. Supalla et al. (2001) offer the interesting observation that movement in ASL is comparable to the role of vowels in spoken languages. While it is possible that this statement may prove true, it does seem clear that the ability to truly write a signed language offers multiple potentials for developing other insights into the nature of signed languages that might otherwise remain "invisible" to the casual observer. Development of a written system for signed languages also offers alternative ways in which speakers of these languages can examine and stretch the boundaries of their languages. For example, spoken languages have visual poems and forms of linguistic play such as acrostics and rebuses that are only made possible by being written down. It is reasonable to speculate that the development of written signed language would enable new avenues for exploring the potentialities of signed languages.

The development of written signed language also allows Deaf speakers of signed languages to communicate with one another in their native/natural language. As one example, social media such as Facebook allow users to switch fonts so that they can express themselves in their preferred language. The development of a written signed language font, especially if the font were alphabetic, would allow Deaf interactants to converse with one another, and more important, allow discussions about ASL to be made in ASL without confusions about the sign referents or the signer's intent.

The most "popular" strategy for writing signed languages is the "iconographic" approach, which utilizes a set of icons representing the parameters of any given sign such as location, movement, and handshape. Like the logographic strategy, iconographic approaches are highly visual in nature, which appeals to Deaf people due to their visual orientation to the world. Noda (1995) notes one advantage of the logographic strategy:

> The phonetic representation systems of Japanese call for a linear approach that slows down the reading process and correspondingly delays understanding of the content, whereas the globality of the logogram means that it can be immediately recognized and understood once it has been memorized. (p. 25)

Evaluation of the several iconographic scripts currently in existence reveals that these systems also present information in a global manner, and therefore hold the potential for more rapid decoding of the sign compared to other possible approaches, such as alphabetic ones. Tzeng and Hung (1988) and Tzeng and M. Wang (1983) found the processing of logographic scripts to require more visual memory than the processing of alphabetic scripts. If iconographic scripts functioned similarly, they would be well suited to Deaf individuals, for whom visual memory tends to be a strength. Indeed, the Salk Institute research cited by Tzeng and Hung in which Deaf Chinese evidenced an easier transition from signed language to reading logographs than Deaf Americans making the same transition to alphabetic script suggests that Deaf signers might experience an easier transition from sign to iconograph.

The visual nature of iconographic scripts does allow for some variation in layout, however. While Si5s is arranged in a more familiar (for readers of English) left-to-right pattern, its characters are not placed linearly, as is done in English. Another system, SignWriting, appears to be written in a vertical layout. This is slightly problematic, since Hung and Tzeng (1981) point out that studies in perceptual development indicate that writing horizontally, which allows for horizontal scanning, results in faster processing than vertical layouts and scanning. Iconographic scripts, like logographs, may also create problems when readers of these systems attempt to make the transfer toward reading the alphabetic system of English. As Tzeng and Hung (1988) state,

> Because logographs represent units of meaning rather than units of sound, it has been suggested that logographic orthographies allow more rapid access of meaning than phonetic orthographies . . . although phonetic orthographies may allow more rapid access of names. Thus, reading Chinese may involve different cognitive processes than reading English. (pp. 277–278)

Indeed, Hanley et al. (1999) found that students from Hong Kong were less likely to utilize the alphabetic information provided in English, preferring to engage the visual strategies learned from reading Chinese logographs. It follows, then, that like Chinese readers, Deaf readers of iconographic writing systems might develop visual strategies for reading these systems that would not be readily transferable to reading English.

Since English is an alphabetic system that naturally stresses a phonemic relationship between language and writing, it might make more sense, then, to employ an alphabetic approach to writing signed languages in order to facilitate greater transfer of reading skills in the first language (signed) toward the second language (English). Educators of the Deaf have long emphasized what they view as a necessity for Deaf readers to develop awareness of the phonological underpinnings of the majority written language; indeed, almost every issue of the *American Annals of the Deaf* and

other Deaf education journals contains at least one article addressing this concern and its pedagogically associated strategies such as Cued Speech and Visual Phonics (e.g., Allen et al., 2009; Mayer & Trezek, 2014; Paul, Y. Wang, Trezek, & Luckner, 2009; Syverud, Guardino, & Selznick, 2009; Y. Wang, Trezek, Luckner, & Paul, 2008), despite the counterintuitive nature of promoting sound-based phonology in the reading process for Deaf readers (Grushkin, 1998; McQuarrie & Parrila, 2014). As Schwarzer (2001) notes, students can read and write in a second language, even at the beginning of their oral development in that language; speaking is not necessarily a prerequisite for literacy development, especially in a second language. Wilbur (2000), like Holm and Dodd (1996), corroborates Schwarzer's observation, asserting that "the absence of an alphabetic writing system, and hence the absence of awareness of individual phonemes, is no detriment to literacy (for Deaf readers), as reflected by the Chinese situation" (p. 88).

Yet if phonological awareness is important in reading English, might it not make more sense for Deaf readers to develop phonological awareness of their first language (ASL), so that whatever skills were developed from reading in this language would be more easily transferred toward the reading of English? Although iconographic systems do contain some elements of signed language phonology, just as Chinese logographs do, it stands to reason that an alphabetic system would make these phonological elements more explicit. Indeed, Hanley et al. (1999) suggest that phonological awareness in Chinese readers is bolstered by learning an alphabetic system such as the Chinese pinyin system. Thus, since English is alphabetic and based on phonological principles, it appears logical that if signed language writing were based on signed language phonological principles, there would be positive transfer effects toward reading skills in both languages, although, of course, due to the different orthographies and phonologies, such transfer would not be entirely direct. This notion is corroborated by a finding by Akamatsu (1999) that the written-language coding mechanisms of bilinguals for reading in a second language are positively influenced by the orthographic characteristics of their first language. Another point of consideration in favor of employing the alphabetic principle for signed language writing is the claim by Goswami (1999) that code acquisition occurs more rapidly in highly transparent orthographies (where phoneme/grapheme correspondences are consistent) than in less transparent orthographies. When one considers that iconographic writing systems do not make the phoneme/grapheme relationship as explicit as an alphabetic system, it seems that the development and use of an alphabetic system would be of more utility for Deaf readers (with English and other alphabetic orthographies), especially when one takes into account the need for development of signed language/spoken language bilingual abilities.

Diamond (1994) observes that writing systems, consciously designed by trained linguists, are continually coming into existence. While this can be a good thing, Hagege (1988) warns that

> the introduction of writing into the heart of an oral society does require certain precautions. Writing has been a progressive rather than a spontaneous development, and important cultural differences separate societies that are literate from those that are not. The latter have over many years developed on the basis of oral language their own modes of expression, their own systems of exchange and balance. To avoid the risks of a dangerous intervention of writing into an oral milieu, these societies must design for themselves the paths through which they hope eventually to accede to the rewards of literacy. (p. 81)

The Deaf cultural community has long functioned as an "oral" culture, even as English is used in the community for interaction among its members and with others outside the community. In order to gain acceptance, a writing system must be seen to meet the needs of the community in a variety of ways. Selection of the wrong format would be detrimental to this goal. As Diamond (1994) asks, "Do sub-ideal writing systems really make it harder for adults to read, or for children to learn to read? Many observations make clear that the answer is yes" (p. 113). It has been demonstrated that reading skills developed in one orthography may not be needed in a different orthography, especially if the two orthographies have different script-utterance mapping rules. Thus, as Tzeng (1983) asserts, "instructional programs for bilingual children whose first language has a nonalphabetic orthography should be carefully designed to facilitate positive transfer and minimize negative interference due to the orthographic factor" (p. 92). If an iconographic system becomes the standard, Tzeng's warning will need to be attended to. Of course, this issue would be drastically mitigated if an alphabetic strategy for written signed languages were chosen by the community.

In sum, a written signed language system should (ideally) meet the following conditions:

1. The written script should be arranged horizontally.

2. The script should be alphabetic, for maximal congruence with English-learning strategies.
3. The script should not attempt to contain every possible variation in handshape, movement, and location.
4. The script should have a phoneme/grapheme relationship that is as clear as possible.
5. Bilingual instructional strategies should be developed to maximize the ability of a written signed system to induce linguistic transfer toward English literacy.

Because of my arguments for an alphabetic approach to writing signed languages, the reader may at this point have obtained an impression that iconographic approaches are ineffective in comparison to alphabetic approaches. This is far from the case. Although I have some additional "quibbles" (which are beyond the scope of the present article) about elements of the iconographic approaches created to date, there is no doubt that as writing systems, these approaches do work. It is in the area of biliteracy and skills transfer toward alphabetic languages such as English that the iconographic approach is being questioned. While the present article does advocate an alphabetic approach, it may be the case that the community will prefer to adopt an iconographic approach such as Si5s or ASLwrite. If this does come to pass, Deaf readers can still acquire the biliteracy skills between their signed language and written majority language. However, educators will need to take extra steps in guiding the transition toward learning the written system of the majority, as Tzeng (1983) points out. It is believed, however, that no matter what form of written signed language the Deaf community does adopt, Itard's conclusions about the benefits of signed language could be restated in this way:

> With this accomplishment (writing signed languages), the Deaf community could embark just as rapidly on the vast career that this discovery (sign language) opened to its members' intelligence.

Note on Terminology

1. It has become a matter of convention in the fields of Deaf cultural studies and Deaf education to use a *d/Deaf* designation to delineate culturally Deaf from medically deaf. However, this designation is increasingly coming to be considered divisive and imprecise, and to be based on a citation (Woodward, 1975/1982) that does not in fact use such a distinction. In support of asserting an ethnicity perspective of Deaf people (see also Canadian Cultural Society of the Deaf, n.d.; Lane, 2005), an uppercase D is stylistically applied throughout the present article to refer to all persons with hearing ability below "normal" hearing levels, regardless of cultural affiliation or chosen mode of communication. The only times "deaf" and "hard of hearing" will be used will be in direct quotations of authors who have chosen to employ these terms.—*The Author*

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