

Volume 1: Principles,
Background, and Application

Simplified Signs

A Manual Sign-Communication
System for Special Populations



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3. Deaf Persons and Sign Languages

Before focusing more specifically on the Simplified Sign System that we have developed, it is important to first have a basic understanding of sign languages and the main group of persons who use them — Deaf people. To obtain this necessary background information, we strove to answer the following questions: what is the historical evidence for the use of sign languages among Deaf persons? How did educational programs for deaf students emerge, and what communication approaches did these programs use? How did sign languages gain linguistic recognition? How are individual signs and sign languages structured? How do deaf children typically acquire a sign language and does this acquisition process mirror or differ from hearing children’s acquisition of a spoken language? We felt that without this background information, it would be difficult to understand how we selected, modified, and created signs for our system.

The goal of the Simplified Sign System is to provide signs that are easily learned, remembered, and formed by a wide range of individuals. Some of these individuals may have motor, memory, and/or cognitive disabilities that prevent them from effectively communicating through speech or a full and genuine sign language. Clues about which formational parameters of signs (their handshapes, locations, and movements)¹ are easier to form and to remember, as well as which types of signs typically are more readily recognized, come from a variety of studies of sign acquisition and learning in deaf and hearing children. These clues assisted us in developing signs for our system. Furthermore, the discussions in this chapter about the formational parameters of signs

1 See also the “Ease of Production or Formation” subsection in Chapter 1.

and the general characteristics of sign languages provide the foundation for understanding the Simplified Sign System.

Deaf Education and the Recognition of Sign Languages

Deaf persons have always been part of human society. Because they generally have used manual signs to communicate, their signed communication also has been present throughout human history. Although deaf persons were long known to interact through signs or gestures, very little was known about such signs until relatively recently as systematic investigations of sign languages were lacking. For many centuries, signs were perceived as mostly pantomimic, easily understood, and useful for communication at only a primitive level. An important reason behind this lack of understanding is that the large majority of deaf children are born to hearing parents (Mitchell & Karchmer, 2004). During the Middle Ages in Europe, families with a deaf member often would create signs or gestures to facilitate interaction with that individual. However, because there were no schools or institutions for deaf students during this period, the signs that had been created and learned at home were often lost at the time of that deaf person's death. As for the absence of schools for deaf students, persons born deaf historically were viewed as incapable of being educated by persons with European cultural backgrounds. This notion that deaf and mute persons were not capable of benefiting from formal instruction rested largely on the widely held belief that knowledge was acquired primarily through conventional language: spoken and written words (Knowlson, 1965).

The first systematic instruction of deaf students is credited to Pedro Ponce de León, who lived in sixteenth-century Spain. A Benedictine monk who spent most of his life at the Monastery of San Salvador de Oña (Abernathy, 1959; Chaves & Soler, 1974; Plann, 1997), Pedro Ponce de León would have learned to communicate in signs by using them in his monastic community.² Starting in the mid-1540s, the monastery's abbot entrusted a small number of deaf pupils, the children of Spanish noble families, to Ponce de León's care. He devoted himself to teaching these students to read, to write, and to speak. His pupils' accomplishments

2 See the "Use of Signs by Monastic Orders" subsection in Chapter 2 for more information on the centuries-long use of manual signs and gestures in monasteries.

in these domains were seen as remarkable; previously, deaf and mute youngsters had been viewed as not educable. Unfortunately, Ponce de León's manuscript account of his teaching methods is lost. Others' accounts indicate that he initially focused his instruction on teaching his students to write and that at least some of the children learned to form the letters of the alphabet on their hands (Chaves & Soler, 1974). There is, however, only "circumstantial evidence" (Stokoe, 1978/1987, p. 327) that Ponce de León relied on signs in his instruction.

Chaves and Soler saw the educational situation this way: "In the world of silence of the Benedictine monasteries the lack of speech of the deaf children was less noticeable. It is most likely that Fray Pedro Ponce made use of these [monastic] signs with the Velasco boys [Ponce de León's first deaf pupils]" (Chaves & Soler, 1974, p. 60). Ponce de León's students also likely brought with them the gestures or "home" signs they had used while growing up with mostly hearing relatives.³ The children's homesigns and the monastery's manual signs may have been shared and together contributed to Ponce de León's educational efforts as well as the pupils' general communicative interactions.

Another early milestone in the education of deaf students occurred with the publication of the letters of the manual alphabet. Although Melchor de Yebra's depiction of the appropriate handshapes for each letter was, in the early 1590s, an important step, it was Juan Pablo Bonet's published version in 1620 that received most of the attention and was widely disseminated. Bonet's book resulted in the one-handed manual alphabet eventually spreading across continental Europe and to the Americas. This system enabled persons to spell words from a spoken (and written), alphabetical language on their hands (fingerspelling) by producing the individual letters of those words (Abernathy, 1959; Plann, 1997). Fingerspelling thus helped to tie the education of deaf students to the learning of words from the spoken and written languages of the larger hearing societies in which Deaf persons lived. Fingerspelling also

3 Homesigns, which typically are highly iconic, likely provided the roots for many of the signs that eventually became incorporated into conventional signed languages (Fusellier-Souza, 2006). Contemporary studies of deaf homesigners (see Goldin-Meadow, 2003; Goldin-Meadow et al., 1994) show that they use iconic gestures to communicate and that "gesture affords an easily accessible way to convey action, and suggests that our experimental paradigm is capturing an early stage of an important aspect of language creation" (Fay et al., 2014, p. 10).

enabled people to communicate manually about a person or topic for which no sign was yet available.

Up until the latter half of the eighteenth century, the education of deaf students was available only for the privileged few. This situation changed dramatically in 1760 when Abbé Charles-Michel de l'Épée founded the first school for the education of deaf students, irrespective of social condition, in Paris, France (Seigel, 1969). Abbé de l'Épée's educational approach relied heavily on manual signs, many of which were created and used by French Deaf persons. He also worked in association with his pupils to create signs for concepts that he felt were necessary for their education and development (Knowlson, 1965).

This school would subsequently greatly influence the education of deaf students worldwide, both through its training of teachers, and through the dissemination of signs from its sign language. One of the outstanding Deaf teachers at the school in Paris, Laurent Clerc, traveled to the United States with Thomas H. Gallaudet, an American who had come to Europe to learn about educational programs for deaf children. These two men were instrumental in establishing the first public school for deaf students in the U.S., now known as the American School for the Deaf, in 1817 (Lane, 1984).⁴

Clerc, during his many years of devoted teaching and program development at the American School for the Deaf, relied heavily on his knowledge of French signs. It is probably because of Clerc that many American Sign Language (ASL) signs are clearly related to corresponding signs in French Sign Language (LSF or *Langue des Signes Française*) and gestures from French culture (Shaw & Delaporte, 2010; Woodward, 1978). Some of the pupils who attended this school brought their own native sign-communication systems with them; signs from these systems were added to the emerging ASL lexicon. And, inasmuch as ASL is a living language, new sign vocabulary items were added (and continue to be added) as needs arose.

Although public education for deaf students in the U.S. and much of continental Europe initially embraced signing and fingerspelling as primary vehicles of instruction, this situation was not to last. Instead, various nineteenth-century educators argued that signing should be

4 The first institution for higher learning for deaf students in the world, Gallaudet University, is named in honor of Thomas H. Gallaudet.

prohibited in schools for deaf students and that all efforts should be placed on teaching the spoken language of the hearing society in which the deaf persons lived (Moores, 1996, 2010). This focus on oral-only education emerged as the dominant approach in deaf education in the latter half of the nineteenth century; it was to continue as the principal educational approach for nearly a century (Moores, 2010).

An important reason for the ascendancy of oral-only approaches in the nineteenth century was that many deaf students at that time had lost their hearing after making considerable progress learning to speak. These students' hearing loss was often the product of childhood diseases or accidents (Moores, 1996). Oral language educational programs often were successful in stimulating speech skills in these postlingually deafened and hard-of-hearing pupils.⁵ In making their case, oral-only advocates also argued that signing was not a real language and that its use kept deaf people apart from the larger hearing society (Lang, 2003). However, as advances in medicine and sanitation were made in the twentieth century, the percentage of postlingually deafened pupils among the deaf student population steadily declined with each passing decade. By the latter half of the twentieth century, postlingually deafened students were a small minority. As the proportion of postlingually deaf pupils declined, an increasing proportion of congenitally or prelingually (children who become deaf before 18 months of age) deaf students filled their places. Moreover, it became evident to researchers that the sign-using deaf children of Deaf parents were clearly outperforming other groups of deaf students on a host of measures of academic achievement and social adjustment (Mindel & Vernon, 1971; Vernon & Koh, 1970, 1971). Additionally, a recent report showed that sign-using children of Deaf parents clearly outperformed non-sign-using deaf children of hearing parents in a study that examined intelligence test performance after both groups of children had received cochlear implants (to facilitate their hearing) relatively early in their childhood (Amraei, Amirjalali, & Ajalloueyan, 2017). In light of these changes in population characteristics and the findings of systematic research investigations, the case for prohibiting signing in educational programs for deaf students largely evaporated,

5 Postlingual deafness refers to hearing impairments that develop after the acquisition of speech and language, in contrast to prelingual deafness.

although the legacy of this oral-only approach may continue to impact deaf students in many ways.⁶

Even though the efforts of Abbé de l'Épée and others changed many persons' views about the educability of deaf students, the sign languages used by Deaf persons historically were not regarded as real or genuine languages. Instead, the signs from which these languages were composed often were characterized as consisting mostly of pantomimic gestures. Such gestures frequently were not deemed to be true symbols; spoken words, because they were seen as rarely resembling what they stood for, were considered true symbols. Sign languages also were viewed as having little evidence of grammatical structure. If some regularities in Deaf persons' sign production were discerned, they were interpreted as reflections of the grammars of the spoken languages of the larger hearing societies in which Deaf persons lived. These notions, that individual signs were disadvantaged compared with words because signs were not true symbols and that sign languages did not have their own grammatical systems, helped relegate sign languages to a level beneath that of spoken languages. For many language scholars, the study of sign languages was not seen as a topic worthy of linguistic analysis.

Although the view that sign languages were not real languages was quite long-standing, a dramatic change in perspective has occurred in the last several decades (Baker et al., 2016). Today, linguists accord full linguistic status to the sign languages used by Deaf persons. This recognition of sign languages as full and genuine languages resulted largely from the pioneering efforts of William C. Stokoe. Stokoe's investigations focused primarily on the structure of signs in American Sign Language (ASL), the principal language of members of the Deaf community in the U.S. Stokoe showed that signs in ASL had a distinct linguistic structure and that this formational structure was quite different from the structure of words in English and other spoken languages (Stokoe, 1960; Stokoe, Casterline, & Croneberg, 1965).

There is an important similarity, however, between how words in a spoken language and how signs in a signed language (such as ASL) can

6 *Deaf People Around the World: Educational and Social Perspectives* (Moore & Miller, 2009) provides accounts of the history of the education of deaf students, including changing perspectives on the use of sign languages, in thirty different countries.

be analyzed. Words in spoken languages are composed of phonemes, the smallest units of speech or sound that can signal a difference in meaning of an utterance (for example, the words *pat* and *hat* differ only in their initial sounds, or phonemes, but these differences signal two distinct meanings.) Although each individual word in a language has a definite meaning, the individual phonemes from which words are composed are essentially meaningless (the initial phonemes in the above example, /p/ and /h/, do not have meaning in and of themselves). The different spoken languages of the world vary greatly in their number of phonemes and the specific phonemes they employ. The words of English, for example, are composed from a collection of about forty-four different phonemes. This number, it turns out, is a little above the average for spoken languages. Stokoe applied the same approaches used for determining the phonological structure of spoken languages to determine the structure of ASL signs.

After systematically examining numerous ASL signs, Stokoe proposed that there were three formational aspects that differentiated any one ASL sign from another (Stokoe, 1960; Stokoe et al., 1965). These three aspects were the place or location where a sign was made, the shape or configuration of the hand(s) while making a sign, and the action or movement of the hand(s) in forming a sign. Although Stokoe identified these three aspects as a sign's *tabula*, *designator*, and *signation*, they are more commonly referred to as *location*, *handshape*, and *movement*.⁷

Stokoe's systematic analysis of ASL sign structure showed that each of the three formational parameters (or aspects) he had identified consisted of a limited set of elements. For ASL, he identified twelve different locations on or near the signer's body where signs were made, nineteen different handshapes used in forming signs, and twenty-four different types of sign movements. Altogether, according to Stokoe's model, there were fifty-five different formational parameters from which all the signs in ASL were composed. These fifty-five different formational elements (*cheremes* in Stokoe's terminology) functioned in a structural manner largely analogous to that of phonemes in spoken languages. In fact, many investigators use the term *sign phonemes* to designate these sublexical formational elements or *cheremes*. Although

7 In more recent years, the word *parameter* often has been used by sign language linguists in preference to Stokoe's term *aspect* (Valli, Lucas, & Mulrooney, 2005).

individual phonemes of spoken languages traditionally have been considered essentially meaningless, it should be noted that the same claim should not be made about individual sign phonemes, as where a sign is made, the handshape used, and the movement involved can be assigned meaning to a significant extent and can convey representational features in a way that vocal phonemes do not.

In the years since Stokoe proposed his model of sign structure, other parameters have been advanced to define signs more precisely (i.e., palm orientation⁸ and non-manual or facial expression), but most researchers have continued to use the three parameters first described by Stokoe as the basic formational units of signs. Stokoe's approach of identifying the location, handshape, and movement parameters of ASL signs also has been used effectively to analyze the structure of signs from other sign languages. These investigations have shown that although there is substantial overlap in the sign phonemes used in many different sign languages, sign languages also differ in the particular handshapes, movements, and locations they employ. Stokoe's structural analytic approach also has been used to document the problems various individuals experience when they are learning how to form signs. Indeed, we used this same approach to sign structure during the development of signs for the Simplified Sign System (see Chapter 8) and in the descriptions of how these signs are formed (see Chapter 11, Volume 2).

8 A recent study (Koulidobrova, Luchkina, & Palmer, 2019) of deaf participants who were learning ASL as a second language and of non-signing hearing speakers of English involved a discrimination task between matched ASL sentence pairs that differed in only a single parameter (handshape, orientation, movement, or location). This study revealed that orientation and location were significant contrastive features for both groups, suggesting that orientation is a more important articulatory feature than previously suggested. Other researchers consider orientation to be a subordinate category of the handshape parameter (Sandler, 2012; Sandler & Lillo-Martin, 2006; van der Hulst, 1993; van der Kooij, 2002). It should be noted that in the written descriptions of each of the signs in the Simplified Sign System (see Chapter 11, Volume 2), we include both the orientation of the palm as well as the orientation of the fingers/knuckles of the hand(s). We found that providing this information helped to clearly specify the formation of each of our signs. In addition, this information sometimes disambiguates between related signs that have similar formations.

Sign Production

As a person starts forming a sign, there is essentially a simultaneous production of that sign's location, handshape, and movement phonemes. This simultaneity of production of sign phonemes differs somewhat from the sequential production of spoken language phonemes. That is, phonemes in spoken languages are uttered over time from the beginning of a word to its end. In signed languages (also known as visual-motor or visual-gestural languages), most of the information needed for a sign's recognition (its location, handshape, and movement) occurs at nearly the same time (Vermeerbergen, Leeson, & Crasborn, 2007).⁹ Moreover, the information necessary for a viewer to recognize a sign typically becomes evident once the direction of the movement parameter is established at the beginning of the sign action (ten Holt et al., 2009).

Although Stokoe emphasized the simultaneous characteristics of ASL signs, he also described some of their sequential characteristics. In particular, he noted the sequential nature of the movement parameter. Movements include such actions as up-and-down movement of the hands and arms, nodding or bending of the wrists, and wiggling of the fingers. In the sign notational system developed by Stokoe, it is possible for a sign to have up to three movement phonemes. These sequential or consecutive movements may create a rhythm in a sign that is similar to syllables in spoken words. An outgrowth of this interest has been a series of explorations into the sequential segments and syllable-like structure in sign phonology (Coulter, 1990; Hildebrandt & Corina,

9 We should note that the location, handshape, and movement components of a sign's production correspond to some extent with the location, shape, and movement components of the speech apparatus (such as the tongue) during a word's production. However, most hearing people who use spoken languages do not typically concentrate on or even consciously perceive this oromotor information (an exception occurs for those hearing, hearing-impaired, or deaf persons who rely on speech-reading or lip-reading skills in certain situations). Perhaps it is the more clearly visible nature of signs that makes their various components or parameters appear more simultaneous than their less visible speech counterparts. After all, much of the speech apparatus is internal and concealed, whereas the sign apparatus (the hands, arms, face, head, and body) is external and easily seen. In the case of persons who are deaf and blind, this externally available information can still be perceived through laying their hands on top of the signer's hands. Signs can thus be distinguished through the sense of touch (Mesch, 2013). Some deaf and blind persons may also perceive speech through putting their hands on a speaker's mouth and jaw.

2002; Johnson & Liddell, 2010; Liddell & Johnson, 1989; Sandler & Lillo-Martin, 2006; Wilbur, 1993, 2011). This emphasis on the sequential nature of sign production suggests that there are additional important parallels between sign production and that of sequentially produced speech.¹⁰

In Stokoe's system of sign structure (1960; Stokoe et al., 1965), sign locations are designated primarily by the part of the body where the sign is made; for example, on the chin, chest, forehead, or arm. Not all signs, however, are made on or near a part of the signer's body. Some signs are made in the area directly in front of the signer; this area is known as the *neutral space* or *neutral place*. In addition, some signs are made on the signer's stationary hand, and some may require movement from one location to another (Battison, 1978).

Stokoe identified nineteen different handshapes from which ASL signs are composed. To designate these different handshapes, Stokoe used the letters from the manual alphabet and numbering system that most closely corresponded with the handshapes. For example, the C-hand, the 5-hand, and the L-hand are the terms he used to identify three different ASL handshapes. Many of the handshapes that are found in ASL may also be found in other sign languages; however, it is important to note that different sign languages make use of different handshapes and variations of those handshapes (Eccarius, 2008; Fischer & Gong, 2010, 2011; Sandler, 2012; Tang, 2007). Some signs require only a single handshape whereas others may involve a change in the handshape of one or both hands while making the sign (Battison, 1978; Sandler, 2012).

Some signs in the sign languages used by Deaf persons are made with a single hand, whereas other signs are made with both hands. In some two-handed signs, the handshape and movement parameters are identical, with one hand the mirror image of the other. These signs often are referred to as two-handed symmetrical signs. In other two-handed signs, the handshapes may differ or one hand may be primarily involved in the movement or action (the *active hand*) while the other hand serves mostly as a stationary base (the *stationary hand*) for the other hand's action. These signs often are referred to as two-handed asymmetrical

10 An important difference across language modalities is that most signs in a signed language are monosyllabic (Brentari, 1998), unlike words in spoken languages.

signs. Recent investigations have shown that, across a wide range of sign languages, two-handed signs often convey lexically plural concepts (Östling, Börstell, & Courtaux, 2018).

In forming one-handed signs or two-handed asymmetrical signs, a signer typically uses his or her dominant hand to perform the sign's movement. In most persons, this is the right hand. Sometimes, however, the right arm and hand may be temporarily occupied and not immediately available for signing. This may occur, for example, when a person is carrying a baby or a bag of groceries in his right arm. In such circumstances, a typically right-handed individual will likely switch and use his left hand to sign. There does not appear to be any appreciable loss in intelligibility caused by switching hands for native signers. An individual whose left hand is dominant typically will use his left hand as the active hand in one-handed signs and two-handed asymmetrical signs. Again, the use of the left hand does not appear to confuse the viewer.¹¹

In some cases, serious bodily injury may result in the loss of use of a hand or arm that is relatively permanent. Such a serious injury may greatly limit the signer's ability to control her arm and hand movements. For one-handed signs, this limitation is not usually a problem: the signer simply uses the other hand and arm to produce the sign. For two-handed symmetrical signs (the handshapes, movements, and locations are mirror images of each other), the signer makes the sign with the available hand and the viewer imagines the other hand performing the same action with the same handshape in the mirror-image location. Two-handed asymmetrical signs, however, are more problematic. The signer uses her available hand to perform the critical action or movement parameter of the sign. In many instances, the injured or impaired hand and arm (or an available surface such as a counter, table, or desk) may be used as the stationary base for the sign's action. That is, the signer

11 The same, however, may not be true of naïve signers or persons unfamiliar with a sign language when trying to copy another person's signs. Meier (2019) reports that perceptual problems may come into play when a viewer is opposite a signer and must perform a spatial transformation in order to correctly copy a sign (as opposed to when he or she is standing or sitting to the side of a signer, where each person's body and hands are oriented in the same direction). Spatial transformations can be difficult for signing deaf children with autism spectrum disorder (Shield & Meier, 2012) and for adult learners of ASL (Chen Pichler & Koulidobrova, 2015; Rosen, 2004; Shield & Meier, 2018).

may make the sign directly on the injured limb (or available surface) and the viewer will need to imagine that the injured limb (or available surface) is in the correct location and has the correct handshape.

Sign Formation and Meaning

Contrary to popular impression, there is no universal sign language used by all Deaf persons. Rather, Deaf persons in most countries have their own distinct sign language, which has its own unique vocabulary and grammar.¹² In recent years, much has been learned from systematic studies of the world's different sign languages. These studies have shown that there are various general characteristics or tendencies present in the formational parameters of signs that are evident in many different sign languages from around the world. For example, the location of where a sign is made on or near the signer's body often is related to the meaning of the sign. Signs made on or near the forehead generally pertain to cognitive processes. Signs made near the heart often are connected to different emotions. Signs made near the abdomen or the body's midsection frequently have sexual or eliminative connotations.

In a relatively recent study, Cates et al. (2013) systematically probed the relationship between the location where a sign in ASL was formed and the meaning of the sign. Examination of hundreds of ASL signs showed that the location parameter of signs often was critical in conveying information about the signs' meaning. As examples, ASL signs made on or near the eyes typically encoded information related to vision (e.g., EYEGASSES), signs made near the ear often were related to hearing (e.g., HEARING AID), and those signs made on the legs frequently were used for items of clothing for the lower body (e.g., SKIRT).¹³ Although the location parameter alone would not be sufficient

12 Some examples of the various sign languages of the world include Kenyan Sign Language (KSL), Warlpiri Sign Language, Japanese Sign Language (JSL), Taiwanese Sign Language (TSS), Persian Sign Language (PSC), Czech Sign Language (CSE), Portuguese Sign Language (LGP or Língua Gestual Portuguesa), Quebec Sign Language (LSQ or Langue des Signes Québécoise), Argentine Sign Language (LSA or Lengua de Señas Argentina), Mexican Sign Language (LSM or Lenguaje de Señas Mexicanas), and Australian Sign Language (AUSLAN). A number of countries have now recognized their national sign language(s) through legislative action (De Meulder, 2015).

13 As noted in the Introduction, sign glosses, or their closest translations, are denoted in upper case throughout this volume.

for someone to guess the precise meaning of a particular sign, the location of where a sign was made evidently often provided important information about the meaning of a sign. These observations about the iconicity of the location parameter of manual signs hold for a variety of sign languages (Östling et al., 2018).

The handshape used in the formation of a particular sign is often related to the meaning of that sign (Pietrandrea, 2002). Signs made with a flat handshape (the hand is flat with the fingers together and extended) frequently refer to objects that have a flat surface. A fist handshape (the hand is clenched to form a fist) might be used in signs to convey roundness or a grasping action. From these instances and many others, it becomes clear that in sign languages there is often an association between the form of a handshape used in a particular sign and the meaning the sign conveys.

Various characteristics of the movement parameter of signs also are related to the meanings of signs in signed languages. In signs used to convey bigness, the distance between the signer's hands typically is quite large. In contrast, the hands are much closer together in signs used to convey smallness. Whether a sign is repeated or not may be important; repetition may indicate plurality. In ASL, the sign CHILD becomes CHILDREN if it is repeated. Repetition of a sign for an action may indicate the continuation of that action over an extended period of time rather than a single instance of the action. In ASL, if one repeats the movement in the sign TEACH, then the notion conveyed is TEACHING. Another characteristic tied to the movement parameter of a sign is the force or energy with which a sign is made. A sign that is made slowly might connote weariness, leisureliness, or boredom. A sign that is made forcefully commands the viewer's attention and underscores its importance. To a considerable extent, the speed and energy with which signs are produced correspond with the use of vocal inflections in spoken languages (Schein & Stewart, 1995). Signers, by making these variations in sign size, repetition, force, and speed, may noticeably expand the range of meanings that they are able to convey. This increased richness in meaning, however, also entails some additional complexity in sign formation.

Another characteristic of all or nearly all signed languages is their use of classifier constructions (Emmorey, 2003a; Engberg-Pedersen,

1993; Glück & Pfau, 1999; Marshall et al., 2015; Schembri, Jones, & Burnham, 2005; Sutton-Spence & Woll, 1999). A classifier construction is a sign that often is used in place of a noun or pronoun that has already been mentioned in a sign sentence or conversation. Classifiers typically consist of particular handshapes that symbolically represent classes of objects, such as vehicles or animals (or people), and convey the location and movement of these objects (or people) in space. For example, if a signer wanted to convey to another person that the route he took that day in his automobile was a very winding or meandering one, he might first establish that he had gone for a drive in his car and then subsequently use his classifier sign for vehicle to demonstrate his meandering route. It would probably be formationally easier for the signer (and more understandable for the viewer) if he moved his classifier handshape for vehicle in the desired motion than if he repeatedly made his sign for car along his path of movement. In many instances, classifier constructions are employed by signers when they wish to convey motion events or spatial relationships among objects (or people). In addition to the type of classifier that refers to objects or people (as described above), other types of classifiers exist that specify size, shape, handling, and other important characteristics of a referent.

In light of these observations, it appears that there are many underlying similarities across signed languages in how signs are formed and used that are related to the meanings of those signs. Furthermore, it is possible that these similarities may make communication in signs among signers from different nations more readily accomplished than is usually the case for people who communicate in different spoken languages.

Different Sign Languages and Obstacles to Sign Communication Worldwide

Over the last few decades, various sign languages used by Deaf peoples throughout the world have been at least minimally studied and documented. There is not, however, a fully comprehensive inventory of all the different sign languages in the world. One effort (Harrington, 2006; Harrington & Hamrick, 2010) at compiling a list of all known sign languages has resulted in the identification of 271 sign languages,

sign dialects, and sign systems in the world.¹⁴ Whether a particular sign system is a full and genuine sign language, a dialect of a sign language, or a signed version of the spoken language of the larger hearing society may still be a source of contention in some instances. Information on lesser-known sign languages is often scarce and difficult to find.

Despite a continuing need for research into the sign languages of the world, it is already apparent that there is great variety within the realm of sign languages worldwide. Likewise, a particular sign language may display additional complexity through regional variations that are akin to dialects in spoken languages. Deaf people may also adjust their sign vocabulary and register (i.e., level of sign formality) depending on the communicative setting, their communication partners, or other sociocultural factors such as age, gender, or race. Finally, sign languages, much like spoken languages, can be influenced by contact with other languages. In fact, sign languages can be affected by spoken languages. Some signs may have been created to represent concepts or specific words found in the hearing society's spoken language. Deaf people also create signs as new technologies and cultural expressions arise. Lastly, sign languages can be influenced not only by a related sign language (such as ASL was influenced by French Sign Language), but also by unrelated sign languages.

Throughout history, Deaf people of various countries have interacted; this exposure has offered Deaf people multiple opportunities to borrow or adopt signs from "foreign" sign languages. The expansion of technology (starting with video, then the internet, computer software applications, and now extending to smart phone apps) has also given Deaf people the opportunity to learn sign languages or communicate with Deaf people from other countries without actually physically traveling to those countries. This does not mean, however, that there is not a need for a sign language or a sign-communication system that transcends national boundaries. In the past, Deaf people have devoted a substantial amount of time to creating such a system. Deaf persons frequently meet in international settings; providing interpreters for

14 The *Gallaudet Encyclopedia of Deaf People and Deafness* (Van Cleve, 1987) also provides basic information on a number of sign languages. For videos of how specific concepts are signed in over two dozen sign languages from around the world, visit the *Spread the Sign* website (European Sign Language Centre, 2018) and/or download the *Spread Signs* app (available for iPhone/iPad and Android).

each country's participants at these events often is both costly and time-consuming. Deaf persons also travel as tourists to other countries where they may encounter Deaf persons whose sign languages are quite different from their own and which they do not understand.¹⁵

International Sign

Deaf people long ago recognized that the presence of many distinct national sign languages could prove an obstacle to effective communication in international settings (Moody, 2002). After years of committee work trying to resolve this problem, the efforts of a commission, whose members were British, Danish, Russian, American, and Italian, culminated in the publication in 1975 of *Gestuno: International Sign Language of the Deaf* (World Federation of the Deaf, Unification of Signs Commission, 1975). The reactions of many Deaf persons to *Gestuno*, however, were not positive. According to Moody (2002, p. 16), "Deaf people soon began complaining that the signs in the *Gestuno* lexicon were not iconic enough to be readily understood." Another concern was that the signs in *Gestuno* were predominantly from a small number of European sign languages and American Sign Language and relatively few were from African and Asian sign languages. Thus, the signs in the lexicon did not represent the diversity of the world's sign languages nor the diverse interests and perspectives of the Deaf persons who used them.

In the years that followed *Gestuno*'s unpromising debut, various individuals have continued to work on codifying a limited number of signs for Deaf persons' use worldwide. This effort has resulted in a system known as International Sign (Rosenstock & Napier, 2016). Rather than having a committee or commission decide somewhat arbitrarily which signs to include in the system, the inclusion of a particular sign has been allowed to occur naturally. If a sign is useful, easily learned, and easily formed, then it is likely to be included in the system. This approach of waiting until there is consensus about the inclusion of a particular sign

15 Typically, Deaf persons are quite adept at negotiating understanding in these situations. However, using a lexicon of signs that are iconic and more easily understood than most of the signs from full and genuine sign languages may present another option for Deaf travelers when interacting with Deaf (and hearing people) from another country.

in International Sign has meant that the size of the lexicon of agreed upon signs has grown rather slowly over the years. The relatively small vocabulary size and lack of familiarity with the system may contribute to the noticeably longer time that it takes signers to convey information in International Sign than it does in their native sign languages (Allsop, Woll, & Brauti, 1995).

In recent years, investigators have conducted examinations of how International Sign is interpreted and have compared its linguistic content and structure with that of various natural sign languages also being interpreted. One major difference was that International Sign interpreters made much more frequent use of pointing signs in comparison with the natural sign language interpreters (Whynot, 2016). International Sign interpreters also made abundant use of depicting signs (illustrating the event or object encoded), indicating verbs (showing who was doing what to whom), and gestures in general (Stone & Russell, 2016; Whynot, 2016). In the future, more systematic comparisons between International Sign and other natural sign language interpreting will need to be conducted to help determine how best to achieve interpreter quality and audience comprehension.

Although International Sign remains a “work in progress,” various concerns have been expressed about this emerging system (Rosenstock, 2004). One concern is the aforementioned problem that the lexicon of International Sign is rather limited in size. A second concern is that, like Gestuno before it, a substantial majority of the signs come from ASL and European sign languages. Also, although some signed languages may have arisen from the interactions of deaf persons in Indigenous communities around the world, in a number of instances western missionaries and educators may have exported their national sign languages to different countries (Green, 2014). This latter occurrence has meant that some sign languages from different parts of the world are closely related even though their spoken languages are not.

A third concern is that there is not clear agreement as to the grammatical and syntactic structure of International Sign. In fact, efforts at standardizing International Sign have focused almost entirely on its lexicon and not on its grammatical structure (Hiddinga & Crasborn, 2011). Moreover, it will probably be important to make extensive use of iconicity or iconic aspects in grammatical and syntactic components as

well (Rosenstock, 2008). Although reliance on ASL and European signs and sign structures may not have been an especially large communication obstacle for many participants at international meetings in past decades, the communication hurdles may increase in magnitude in the future. In recent years, there has been increasing participation by representatives from Asian and African countries at international conferences and sporting events. The concern is that sign communication that is viewed as transparent in meaning to signers from many western countries may not be readily understood by signers from quite different cultural backgrounds. However, it is important to note that this is also true in the other direction — signs grounded in various Asian and African cultures may not be readily understood by persons from western countries. These observations reflect a general acknowledgement that some amount of exposure to a culture may be necessary in order to understand the significance of signs (or gestures) originating from that culture (see Ortega, 2017).

Unique Aspects of Sign Languages

The sign languages used by Deaf persons, despite many functional similarities with spoken languages, often convey information in quite different ways. For example, the visual-gestural modality of signed communication enables individuals simply to point to the referents that they are discussing rather than explicitly naming them (Meier, 2002). Another characteristic of sign languages that has no parallel in spoken languages is that certain signs may be produced simultaneously. For example, a signer might shake her head to indicate NO (or negation) while simultaneously making another sign with her hands. In contrast, words in spoken languages are produced sequentially. There is also a nonmanual component to signing that usually occurs simultaneously with the production of the manual component (Herrmann & Steinbach, 2013). Facial expression, together with head, eye, mouth, and upper body movements, combine with the manual component to constitute a multi-channel system. For sign language users, these different nonmanual components contribute at all levels of grammar and meaning (Dachkovsky & Sandler, 2009; Nespor & Sandler, 1999; Reilly, McIntire, & Bellugi, 1990; Sandler, 2012; Sandler & Lillo-Martin, 2006). In spoken

languages, facial expression and body movements play important roles in conveying how an utterance should be interpreted, but do not appear to play a syntactic or grammatical role.¹⁶

Many of the differences between signed and spoken languages appear attributable to their different modes of production and reception (the language modality). Sign languages rely on the visual and manual (or gestural) modes to convey meaning effectively. Changes in speed, direction, location in space, and size of the signs produce variations in meaning (Fischer, 1973; Fischer & Gough, 1978; Liddell, 2003; Valli et al., 2005). Some signs (e.g., verbs like HIT, GIVE, and SHOW) vary their direction of movement to indicate who is performing the action, who is the recipient of the action, and where the action takes place (Hou & Meier, 2018; Lillo-Martin & Meier, 2011; Schembri, Cormier, & Fenlon, 2018; Schembri et al., 2005). In spoken languages, such information might be conveyed by word order or vocal inflections, but not by changing the direction of one's voice!

Signed languages take advantage of space and spatial relations to convey meanings (Campbell & Woll, 2003; Poizner, Klima, & Bellugi, 1987) in a way not possible with spoken languages. To do this, signers utilize the physical space in front of them (their signing spaces) to facilitate their communication. One way this might be done would be for a signer to develop a sort of topographic map in his signing space of the information that he wished to transmit. For example, if the signer wished to depict a particular farming scene to another person, the signer might establish where key items or elements in the scene were located. That is, a silo might be located near the barn, a tractor next to the barn, and so on, with the signer allocating each item a position in his signing space according to its location in the actual scene. A likely outcome of this effort would be that the viewer would obtain an accurate mental picture of the key elements of the scene that the signer was trying to convey. Another way that space might be effectively used would be for signers to locate agents and referents in their signing space without specifically tying them to their real-world locations. In this approach, a signer might

16 Visual short-term memory limitations appear to constrain the number of simultaneously articulated sign and non-manual components to a maximum of four independent propositions (Napoli & Sutton-Spence, 2010). Spoken languages, of course, can increase the number of simultaneous propositions they convey by accompanying their words with gestures.

establish the location of an agent and a recipient in his signing space and then denote the relationship between the two by directing the action from the agent to the recipient of the action on this imaginary stage. Or a signer might place absent objects in different locations in his signing space and, during a conversation, refer to those objects by pointing to their recently established locations in his signing space.

Many sign languages also use space to convey temporal relations. Often, an imaginary time line runs forward from the signer's cheek to indicate events in the future and behind the signer to indicate events in the past. As examples, the ASL sign WEEK arcs forward to indicate NEXT WEEK or a week from now and arcs backward toward the shoulder to indicate LAST WEEK or a week ago. In British Sign Language (BSL), the sign for TOMORROW moves forward whereas the sign for YESTERDAY moves backward (Marshall, Denmark, & Morgan, 2006). Events that are in the present or are just occurring are made relatively close to the signer's body. Furthermore, ASL verbs that refer to actions in the future tend to have forward movement whereas verbs with references to the past tend to have backward movement (Fischer & Gough, 1978).

These modality differences in how information is effectively transmitted probably resulted in the emergence of quite different grammatical systems for spoken and signed languages. By their very nature, spoken languages are linear in the sense that words are produced sequentially. Signed languages differ in that certain signs may be produced simultaneously and that signed languages make extensive use of space to convey grammatical relations. Also, signers often first establish the topic of their utterances and then comment on or elaborate on this topic (Holcomb, 2013). This phenomenon of first establishing the topic of a conversation at the beginning of a signed sentence is known as topicalization.¹⁷ Even when the general word and sign order are similar, as in English and ASL (i.e., subject-verb-object), there are important differences in how syntactic relations are indicated. Slobin (2008) pointed out that whereas in English the pronouns convey who is the subject or object, this information is instead indicated by the verb in ASL. Furthermore, while word order is recognized as critical for the

17 It should be noted that English does have some flexibility and variation in word order that allows writers and speakers to make use of topicalization as well, particularly with regard to poetic forms and interrogatives. However, such constructions tend to be more prevalent in archaic texts than in daily modern usage (Wikipedia, 2020).

accurate transmission of meaning in English and is relatively fixed, there is considerable debate about the relative importance of sign order in signed languages. Another difference is that signed languages do not make use of the verbal form known as the copula *be* in English (Pfau & Bos, 2016).¹⁸ This difference is hardly unique to signed languages, however, as various spoken languages (e.g., Mandarin Chinese) also do not have such a copula verb form.

The observations of our acquaintances who are fluent in both speech and a signed language suggest that it is either extremely difficult or impossible to simultaneously use the grammar of a spoken language and that of a signed language used by Deaf persons. For example, the two modalities of speech and sign enable one to produce a word and a sign essentially simultaneously. However, because the grammars of spoken and signed languages are quite different, it does not appear possible to simultaneously generate sentences in both. Rather, what often happens when one needs to communicate simultaneously in speech and sign, as when addressing an audience composed of both deaf and hearing individuals, is that one takes the signs from the particular sign language used by the Deaf persons and puts them in the word order of the spoken language as one speaks.

It should be noted that there have also been a number of special sign-communication systems designed to reflect the grammatical structure of a society's spoken language. These sign systems often were developed with the goal of teaching the spoken language's grammar to deaf students. Signed English, for example, puts ASL signs in English word order. In Signed English, the handshape parameter of the ASL signs is often modified to denote specific English words; in these cases, the handshapes frequently reflect the beginning letters of the English words. The signs may also be further modified to denote plurality or verb tense (e.g., -s, -ed, -ing) (Bornstein, 1974; Bornstein, Saulnier, & Miller, 1984). Signed English, although it borrows signs from ASL, should be considered a visual or manually coded form of English, rather than a natural sign language used by Deaf persons, because it reflects English grammatical structure.

18 A copular verb expresses either that the subject and its complement denote the same thing, or that the subject has the property denoted by its complement (e.g., "the grass is green").

Iconic Signs

Another important difference between signs and words is that a number of signs resemble the concepts they denote, whereas the relationship between spoken words or sounds and their meanings is often less apparent. That is, quite a few signs are at least somewhat visually iconic in nature, while relatively few words clearly resemble their underlying concepts from an aural perspective as in onomatopoeia (see Dingemanse, 2012 for a more expansive view of onomatopoeic words and ideophones in diverse spoken languages). A sign is considered iconic if it bears a close resemblance to the action, object, or characteristic it represents (Armstrong, 1983; Klima & Bellugi, 1979). Some iconic signs consist of actions that represent themselves; these signs are considered highly iconic and are often labeled *pantomimic* signs. For example, the ASL sign for KNOCK is made by producing the action involved when knocking on a door (Stokoe et al., 1965). Other highly iconic signs may emphasize certain salient features of objects or actions and use these specific features to represent the whole. For example, the ASL signs for CAR and DRIVE are made by having the signer's hands grip and move an imaginary steering wheel (the movements of the two signs are related, but different). Although only one prominent feature of a car or of the action of driving is used — gripping an imaginary steering wheel — this feature represents the entire car or the action of driving (Stokoe et al., 1965). Most individuals would probably easily tie the mimetic action of gripping and turning a steering wheel with the concept of driving a vehicle.¹⁹

While the resemblance of a sign to its referent is evident in many signs, it should be noted that highly iconic or pantomimic signs constitute only a small proportion of signs in sign languages. In the case of ASL, 10–15% of signs were rated as highly iconic (Lloyd, Loeding, & Doherty, 1985), with most signs viewed as having low iconicity values (Caselli et al., 2017). This low level of iconicity may not, however, have always been the case. A study of historical changes in ASL signs has shown that when

19 Because highly iconic signs typically are more easily recognized, learned, and remembered by hearing persons than less iconic signs, we have tried to make many of the signs in our Simplified Sign System highly iconic. This should benefit a wide range of sign-learning individuals, including persons with ASD, an intellectual disability, cerebral palsy, or aphasia, not to mention the teachers and caregivers who interact with them.

signs change over time, they typically move away from their imitative or pantomimic origins to more arbitrary or less transparent relationships with their referents (Frishberg, 1975). This change in a sign from iconic to arbitrary may be driven by such factors as ease of sign formation and a tendency by experienced signers to concentrate sign lexical information on the hands and away from the face and body.

Although only a minority of signs in Deaf sign languages are highly iconic in the sense that they closely resemble their referents and their meanings are readily apparent to the untrained observer, this does not mean that there is not an iconic component or base in many of the remaining signs. We have seen previously that where a sign is made, the handshape used, and the movements involved often are related to some extent to the meaning that a particular sign conveys (Cates et al., 2013; Östling et al., 2018; Pietrandrea, 2002; Schein & Stewart, 1995). Also, some signs may be based on relatively minor features or unexpected characteristics of their referents; Stokoe et al. (1965) categorized these signs as *metonymic*. Although the meanings of these signs may not be immediately apparent to most people, it cannot be said that these signs are not iconic to some degree. Indeed, those signs with no discernible ties whatsoever between the signs and their referents (*arbitrary signs*) probably constitute only a minority of the signs in the sign languages used by Deaf persons. In light of these observations, sign iconicity probably should be seen as extending across a wide range of form to meaning relationships, with “various types and degrees of iconicity” (Deuchar, 1990, p. 175). Other researchers have supported the theory that there is a continuum of iconicity in which some signs are more clearly iconic than others and that the forms and types of iconicity may vary based on the language involved (Emmorey, 2014; Klima & Bellugi, 1979; Meir et al., 2013; Ortega, 2017; Padden et al., 2013, 2015; Perlman et al., 2018).

Even those signs that are considered clearly iconic in sign languages often involve a degree of cognitive processing by the observer for the signs to be understood. In many semantic categories (e.g., trees, houses), the individual members of a category do not look alike — they vary substantially in appearance. For example, although pine trees and oak trees have certain features in common, they differ noticeably in their sizes and shapes. For such semantic categories, a useful iconic

sign would need to depict the shape or structure of an especially good instance or exemplar of that category (Taub, 2001). In ASL, the sign HOUSE is made by having the signer's hands first touch at the imagined peak of a roof, then separate and move diagonally down to convey the slope of the roof, and finally move straight down to portray the sides or walls of the house.²⁰ The observer needs both to perceive the sign that has been produced as resembling the form of a particular instance or exemplar of a semantic category and to understand that the particular exemplar stands for the semantic category as a whole. Furthermore, the signer and the observer need to understand the correspondences between the sign they are producing or viewing and what it represents in the real world, a task involving conceptual integration skills (Napoli & Sutton-Spence, 2011). It should be noted that some very young or non-speaking sign learners may not have attained the level of cognitive functioning necessary to consciously understand these relationships (Griffith, Robinson, & Panagos, 1981; Ortega, 2017).

Although scholars often have used the term *pantomimic signs* to refer to signs that clearly resemble their referents, it would be incorrect to convey the impression that the performance of pantomime and the production of pantomimic signs are the same thing. Highly iconic or pantomimic signs differ from pantomime or mime in at least two important ways. One readily observable difference is that the mime artist may employ his whole body in imparting information through a series of image-evoking movements or actions. In reality, this means that the mime artist is free to move about a stage and often produces motor actions that involve the entire body in generating realistic movements. In contrast, a signer typically is much more stationary, usually sitting or standing upright. A less observable difference is that highly iconic or pantomimic signs in a particular sign language are composed from the same limited collection of sign phonemes (locations, handshapes, and movements) from which all other signs in that sign language are composed. That is, highly iconic signs in a particular sign language must be composed of phonetically acceptable forms from that sign language (Taub, 2001). In contrast, in pantomime, the artist is free to use any conceivable gesture or movement to transmit the desired image.

20 Many ASL users will form this sign without including the downward movement for the walls of the house.

When one looks at highly iconic or pantomimic signs from a sign language with which one is not familiar, one may be able to accurately guess some of their meanings. Such signs are considered to have transparent meanings (Hoemann, 1975), and the degree to which their meanings can be discerned is known as their *transparency*. It should be noted, though, that perception of sign transparency may vary depending upon one's particular background. The transparency of some signs seems to be essentially universal, with virtually everyone correctly discerning their meanings; however, some experience in a particular culture may be necessary to correctly guess the meanings of other signs (Grosso, 1993; Ortega, 2017; Pizzuto & Volterra, 2000).

Most hearing people with little or no formal sign language training find it difficult to accurately guess the meanings of many signs used in the sign languages of Deaf persons. When one has learned the meaning of a particular sign, though, it is often possible to discern how the sign and its meaning are related. The extent to which the relationship between a sign and its meaning can be discerned "after the fact" is called the sign's *translucency*. Many more people report that they can perceive the relationship between a sign and what it stands for after the sign's meaning has been explained to them (its *translucency*) than can accurately guess the meaning of an unfamiliar sign (its *transparency*) (Bellugi & Klima, 1976; Emmorey & Sevcikova Sehyr, 2018). Having the tie between a sign and its referent explained also can help many individuals in their initial learning and longer-term retention of signs (see "Step Six: Memory Aids" in Chapter 8). Although the transparency and translucency of some signs may make them easier to learn and remember, it is important to note that such an iconic aspect is not readily evident in a number of signs, especially those used to refer to abstract concepts (Meier, Cormier, & Quinto-Pozos, 2002).

Although it might be easier for signers in different sign languages to generate iconic signs for many objects or observable actions, this does not mean that iconic signs are restricted solely to the domains of concrete objects and observable actions. Rather, sign languages are capable of incorporating iconic signs for a number of more abstract concepts, including emotions and ideas. The key component present in iconic signs for abstract concepts is the tying of an abstract notion to a concrete representation or form (Taub, 2001). For example, a sign for

the concept of being angry might involve the forceful shaking of one's fist or depicting fire or flames in one's belly. By using such an approach of tying abstract concepts to concrete forms, sign languages are able to express some abstract notions both iconically and effectively.

Because certain concepts (e.g., *house*, *throw*) are easier for people to depict iconically than others (e.g., *honor*, *imagine*), there may be highly iconic signs for many of the same concepts across a number of different sign languages. Even when the signs for a particular concept are clearly iconic in several different sign languages, however, this does not mean that the signs in each language will closely resemble each other. The reason for this is that different characteristics or features of the concept may be emphasized in different languages. As an example, let us take various signs for the concept *tree* (Klima & Bellugi, 1979). Signers in China curve their index fingers and thumbs into arcs to indicate the roundness of a tree's trunk and then move their hands up to show the tree's height. Signers in Italy, Argentina, India, and Japan use a similar formation according to videos on the *Spread the Sign* website (European Sign Language Centre, 2018). Signers in the U.S., Mexico, Spain, and Greece use their upright forearm to indicate the tree's trunk and their spread fingers to convey the notion of branches and/or leaves. Signers in other countries may vary this formation by curving their fingers to represent the top of the tree or by adding a chopping motion with a flat-hand to mimic cutting down a tree. The point of this example is to underscore that even when signs from different sign languages are iconic or physically resemble what they represent, these signs may still vary substantially in how they are formed from one sign language to the next.

Various contemporary investigators have examined more closely the different types of iconicity present in manual signs (Emmorey, 2014; Padden, Hwang, Lopic, & Seegers, 2015). Among the different strategies that signers have been found to exploit when producing an iconic sign for an object have been: performing the action associated with the object, tracing the outline of the object's shape, touching the location where the object often is found, and representing or depicting a perceptual feature of the object. These different types or forms of iconicity, moreover, may make the learning of iconic signs more readily accomplished by tying the signs' formations with the learners' past sensory-motor experiences and with the learners' mental representations of the signs' referents.

If the sign languages used by Deaf persons were comprised mostly of highly iconic or pantomimic signs, as many surmised before Stokoe's analysis of ASL, then one would expect that the sign languages used by Deaf people in different countries would be mutually intelligible; however, they are not. Rather, most signs, like words in spoken languages, have a particular meaning because users of the language employ them in a certain way. Or stated another way, signs and words have particular meanings by convention, or tacit agreement, among the users of a language. In fact, in some instances, formationally identical signs have quite different meanings in different sign languages.

In spoken languages, a phenomenon similar to that of iconic signs is evident in a small number of words: onomatopoeia. Onomatopoeic words are words made by imitating the sound associated with the thing designated (e.g., quack, cuckoo). The manual and visual nature of sign languages, however, appears to allow for a higher incidence of sign and concept resemblance than occurs for the majority of spoken words and their underlying concepts (see Fay et al., 2014; Fusellier-Souza, 2006). Thus, although only a minority of signs in a particular sign language are highly iconic or pantomimic, the proportion of such signs appears to be considerably greater than the incidence of onomatopoeic words in spoken languages.

Although this higher incidence of iconic signs in signed languages than of onomatopoeic words in spoken languages was once viewed as a limiting factor of signed languages (because iconic signs were not seen as true symbols), this view has been re-examined and contested in recent years (e.g., Meir, 2010). Rather than a limitation, the perceived resemblance between a manual sign and its referent might instead be viewed as a positive aspect, helping many hearing people learning to sign as a second language more easily learn and remember such signs (Baus, Carreiras, & Emmorey, 2013; Lieberth & Gamble, 1991). The relative absence of resemblance between spoken words and their referents might then be viewed as an impoverishing characteristic of spoken languages (Armstrong, 1983, 1988; Hockett, 1978). It also should be noted that the view that the relationship between a spoken word and its referent is in nearly all instances an arbitrary one has changed; there is growing recognition that the particular sounds from which words are composed often are related at least somewhat to the words'

meanings (Taub, 2001; Ortega, 2017; Perlman et al., 2018; Perniss & Vigliocco, 2014). This view that the sounds of words often give clues to these words' meanings is known as sound symbolism. Spoken language researchers consider verbal iconicity or sound symbolism to exist on a continuum across many different linguistic forms in many different languages of the world (Akita, 2009, 2013; Assaneo, Nichols, & Trevisan, 2011; Dingemanse, 2012; Dingemanse et al., 2015; Perniss, Thompson, & Vigliocco, 2010), much like the views of sign language researchers on visual iconicity. Children, moreover, typically become more sensitive to sound symbolism with increasing age, and this ability may facilitate their learning of word-referent mappings (Tzeng, Nygaard, & Namy, 2017). Various scholars also have advanced the view that iconicity plays an important role in grammatical and syntactical forms in spoken languages as well (Haiman, 1980, 1985).

Finally, users of all natural languages appear to make abundant use of manual gestures to help them convey meanings effectively (Goldin-Meadow & Brentari, 2017; Kendon, 2014; McNeill, 1992; McNeill & Duncan, 2005); many of these accompanying manual gestures are iconic or pantomimic. The extensive use of gestures together with speech in most persons' utterances has led some scholars to view language as a multimodal communication system (Kendon, 2011, 2014; Vigliocco, Perniss, & Vinson, 2014). Whereas spoken language users often rely on producing image-evoking iconic gestures to help them convey the meaning of their utterances (McNeill, 1992), signed languages incorporate gestures (Goldin-Meadow & Brentari, 2017) and real-world visual and spatial information into signed utterances (Brennan, 2005). This incorporation of visual and spatial aspects of the world in signed utterances makes many such signed utterances relatively iconic or representative. Thus, an iconic or pantomimic component appears to be present to some extent across a wide range of human communication regardless of whether the principal language modality is speech or sign.

Sign Language Acquisition

How are sign languages learned? Throughout recorded history, Deaf persons have learned and used sign languages to communicate (Schein & Stewart, 1995). For most persons who are either born deaf or who

lose their hearing in childhood, sign languages constitute their principal means of communication. These individuals often embrace signing and are responsible for the transmission of sign languages from one generation to the next. When Deaf parents have children, these children (whether they are deaf or hearing) typically learn to sign from their parents. These signing parents model the language to their children and engage them in developmentally appropriate conversation. For these children and their Deaf parents, the transmission of a sign language to the next generation is very similar to what occurs when hearing children learn a spoken language from their parents.

When investigators examined how Deaf mothers interacted with their infants, investigators found that the mothers made a number of modifications in their signing in comparison with how they signed to other Deaf adults or older children (Pizer, Meier, & Shaw Points, 2011; Spencer & Harris, 2006). The mothers typically would produce their infant-directed signs more slowly, make them larger, and locate them so that their infants could easily see them (Holzrichter & Meier, 2000). The mothers' infant-directed sign utterances also tended to be relatively short, often only several signs in length. Overall, the Deaf mothers' sign input to their infants appeared to be designed to promote the young children's understanding and to facilitate their language development (Masataka, 2000).

For deaf children as a whole, this pattern of parental transmission of sign language to the next generation has been the exception rather than the rule. This has been the case because the large majority — over 90% — of deaf children are born to hearing parents (Lu, Jones, & Morgan, 2016; Meadow, 1980; Meadow-Orlans, 1990; Schein & Delk, 1974). Indeed, one investigation put the percentage of deaf children born to one or two deaf parents at less than 5%, although it should be acknowledged that precise percentages are difficult to obtain (Mitchell & Karchmer, 2004). Historically, hearing parents often were advised to make every effort to develop their children's speech skills and to refrain from signing with their children. The reasoning behind this advice to not use signs when interacting with their deaf children was that many professionals believed that sign input would adversely affect the children's spoken language development. There was not, however, good evidence to support this recommendation. To the contrary, there

is substantial evidence that early sign input, when used in a program that also includes speech input, does not negatively influence deaf children's oral-language development (Notoya, Suzuki, & Furukawa, 1994; Spencer & Tomblin, 2006). Moreover, there is some evidence that programs that use both manual and oral communication from early in development actually facilitate deaf children's acquisition of spoken language skills (Schlesinger & Meadow, 1972; Yoshinaga-Itano, 2006).

Most hearing parents of deaf children have been unfamiliar with manual sign communication until after their children's deafness was identified (Lu et al., 2016; Marschark, Lang, & Albertini, 2002; Schick, 2003). Not surprisingly, then, the ages at which deaf children of hearing parents have been introduced to sign communication have varied widely across families (Mason et al., 2010; Marshall et al., 2015; Morgan, Herman, & Woll, 2007).²¹ In some instances, hearing parents have made an effort to acquire signing skills and begin signing with their deaf children during their infancy. Other deaf children with hearing parents have commenced their signing when placed in special preschool programs. More often, though, deaf children with hearing parents have learned to sign when attending a school for deaf students. In these schools, incoming students may acquire facility in signing from fellow students and from teachers and staff members who are relatively accomplished signers. Because the ages at which pupils have entered schools for deaf students have varied widely, the ages at which these pupils have been introduced to signing also varied widely. Finally, some deaf children of hearing parents, because they attended either local public schools that did not have a sign program or private schools that had an oral-only (no signing permitted) instructional policy, may not have started acquiring signing skills until adulthood.

The wide range in ages at which deaf children have begun learning to sign has enabled investigators to examine the relationship between age of acquisition and eventual signing proficiency. In general, the younger the individual at the age of sign acquisition, the greater the likelihood that the individual will become a skilled signer (Mayberry, 1994). Those individuals whose exposure to a natural language is either significantly

21 It should be noted that the recent introduction of neonatal screening for hearing loss has meant that many more parents are learning of their children's hearing loss when the children are very young.

delayed or absent may not develop the same language-processing abilities and brain-functioning areas as those youngsters who learn a natural language early in life (Malaia & Wilbur, 2010). Furthermore, the establishment of two-way sign communication between hearing parents and their young deaf children may have important social benefits for the children as well (Magnuson, 2000).

Children who acquire a sign language in the first few years of life are considered native users of that sign language, just as children who acquire a spoken language from their parents are native users of that spoken language. It is the acquisition of signing skills in native signers that has been the focus of many studies of sign language development. These very young sign-learning children, deaf or hearing, often have been the offspring of Deaf parents.

Studies of how young children learn the formational parameters of signs (that is, the acquisition of sign language phonemes by young children) typically have relied heavily on Stokoe's model of ASL structure. Of the three formational parameters in Stokoe's model, location is the one most often produced correctly by young children learning sign languages (Cheek et al., 2001; Conlin et al., 2000; Juncos et al., 1997; Karnopp, 2002; Marentette & Mayberry, 2000; Morgan, Barrett-Jones, & Stoneham, 2007; Siedlecki & Bonvillian, 1993). This tendency to accurately produce the location parameter of a sign emerges early in development. In fact, the location parameter usually is correct in the very first signs made by a child. One explanation advanced for this high formational accuracy rests on the observation that location phonemes (the areas on or near the body where signs are made) are often relatively broad categories. To form a sign in the correct location may require that the sign-learning infant make only gross motor movements. An alternative explanation for the high formational accuracy of the location parameter is that parents and investigators may recognize an infant's signs only when they are made in certain locations.

The movement parameter of signs is acquired by young ASL-learning children with intermediate accuracy (Conlin et al., 2000; Marentette & Mayberry, 2000; Siedlecki & Bonvillian, 1993). In general, there is little change in overall production accuracy of the movement parameter of signs during the first two years of life. Although young children show improved formational accuracy of the movement

phonemes that they produced early in their development, these same children also add new movement phonemes to their signing repertoire with increasing age. That is, what changes is that the number of different movement phonemes and the complexity of those sign movements increase with age and vocabulary size. Errors made in the production of these more complex movement phonemes often cancel out the gains in production accuracy of the less complex movement phonemes. Other studies of movement errors in signing children have shown that they frequently repeat movements (Meier et al., 2008; Morgan et al., 2007), mirror movements with the other hand (Cheek et al., 2001; Marentette & Mayberry, 2000; Meier et al., 2008), or change the location of the movement from the correct joint to a joint closer to the body — a proximalization error (Lavoie & Villeneuve, 2000; Meier et al., 2008; Takkinen, 2003).²² Of the different types of sign movements in Stokoe's model of sign formational structure, contacting action is by far the one most often produced by young children. Apparently, having a sign touch or make contact with one's own body is something young children master quite readily.

Of the three formational parameters, handshape initially is produced by young, typically developing children with the lowest accuracy (Cheek et al., 2001; Conlin et al., 2000; Karnopp, 2002; Marentette & Mayberry, 2000; Siedlecki & Bonvillian, 1993; Takkinen, 2003; von Tetzchner, 1984b). Unlike the location and movement parameters of signs, young children show clear improvement in the accuracy of their handshape formation with increasing age. In addition, most young children acquire the different handshapes in a definite sequence (Clibbens & Harris, 1993; Siedlecki & Bonvillian, 1997). For example, children learn to make the spread- or 5-hand (the hand is flat with fingers spread apart and extended) early in their development (Carmo et al., 2013; Juncos et al., 1997; Meier, 2019; Morgan et al., 2007). In contrast, the horns-hand (the little finger and thumb are extended from an otherwise closed hand) typically is acquired much later. Those handshapes that are easier to form or articulate, such as the spread- or 5-hand, often replace those handshapes that are more difficult to form motorically in young children's early sign productions. Both anatomical and physiological

22 It should be noted that adult learners of sign language also display proximalization errors (Mirus, Rathmann, & Meier, 2001).

factors appear to strongly influence children's handshape acquisition order (Boyes Braem, 1973/1990).

Once scholars began accepting Stokoe's position that American Sign Language was a genuine language, they started asking whether the course of language acquisition was the same regardless of language modality. That is, were signed languages and spoken languages acquired at about the same rate and in the same general acquisitional pattern as spoken languages? To answer this question, investigators often have compared the sign language development of children of Deaf parents with the spoken language development of children of hearing parents.

The answer to this question at a general level is that the course or path of language development is quite similar across modalities. Systematic comparisons between the sign-learning children of Deaf parents and their speech-learning counterparts have shown many parallels in language acquisition (Chamberlain, Morford, & Mayberry, 2000; Meier, 1991, 2019; Morgan & Woll, 2002; Newport & Meier, 1985; Schick, 2003; Schick, Marschark, & Spencer, 2005). Most typically developing children, regardless of language mode, first babble (vocally or manually). Manual babbling often is evident in the many sign-like gestures produced by children of deaf parents during the latter half of their first year (Meier & Willerman, 1995; Petitto & Marentette, 1991). In addition, many of the handshapes, hand arrangements, palm orientations, and hand-internal movements (such as the opening and closing of the hand) that occurred in the children's prelinguistic gestures subsequently were present in the same children's early signs (Cheek et al., 2001). Young children then produce their first recognizable words or signs, and soon after begin using these words or signs to name or label things and actions in their environments. Indeed, the content of the vocabularies of young children learning ASL and those learning spoken English is remarkably similar (Anderson, 2006; Anderson & Reilly, 2002; Bonvillian, Orlansky, & Novack, 1983; Folven & Bonvillian, 1991). These early language milestones are typically followed by a rapid growth in vocabulary size, the combination of lexical items, and the formation of short sentences, either signed or spoken (Bonvillian, 1999; Meier, 1991, 2019; Morgan, Barrière, & Woll, 2006; Woolfe et al., 2010).

Additional evidence of similarities in development across language modalities can be seen in studies of how negation is expressed (Anderson

& Reilly, 1997), the acquisition of verb agreement (Meier, 1981, 1987; Morgan et al., 2006; Quadros & Lillo-Martin, 2007), and the emergence of different types of semantic relations or functions (Morgan et al., 2008; Newport & Ashbrook, 1977). In their two-sign combinations, young deaf children typically produce the full range of semantic relations also found in hearing children's two-word spoken utterances [e.g., the genitive or possessive, such as MOTHER PENCIL (i.e., 'that's mom's pencil'), and the locative or the location of an object or action, such as SWEATER CHAIR (i.e., 'the sweater is on the chair')]. Furthermore, when the order of emergence of different types of semantic relations was examined within individual children, it was found that the order was virtually the same regardless of language modality (Newport & Ashbrook, 1977).

It might be anticipated that young children of Deaf parents learning to sign would find signs that are highly iconic or pantomimic much easier to learn than non-iconic signs, and that iconic signs would constitute a large portion of their early vocabularies. Certainly, there is some evidence that the Deaf parents of sign-learning children believe that iconic signs will be easier for their children to learn than non-iconic signs. These parents often commented that they consciously used highly iconic or pantomimic signs more often when they interacted with their young children.

Do the young, typically developing children of Deaf parents acquire iconic signs more easily? Although the evidence on this issue is not clear-cut, it appears to indicate that sign iconicity is not a critically important factor in the sign acquisition of very young children of Deaf parents. In two studies (Folven & Bonvillian, 1991; Orlansky & Bonvillian, 1984) that examined young children's initial ASL lexicons, highly iconic or pantomimic signs accounted for about one-third of the children's vocabularies. Although this proportion is apparently greater than the overall proportion of highly iconic signs in ASL (Boyes Braem, 1986; Lloyd et al., 1985), it shows that the large majority of signs in these very young children's vocabularies were not highly iconic. Furthermore, many of the signs these young children learned showed no discernible resemblance to their referents. In addition, if parents were deliberately exposing their children to a greater proportion of clearly iconic signs, the level of iconic signs in their children's vocabularies may, in part,

simply reflect parental input. And when the sign productions of ASL-learning Deaf infants were examined, there was very little evidence that the infants tended to form signs that were more iconic than the adult model of the sign; in contrast, there were many more instances where the infant-produced sign was judged to be less iconic (Meier et al., 2008). Factors other than iconicity, such as ease of sign formation, phonological similarity to other signs, parental sign input frequency, and objects and activities of interest to the very young children, likely contribute to much of the sign-learning infants' early vocabulary (see Caselli & Pyers, 2017).

Although iconicity may play only a small positive role in sign comprehension and production in infancy, its importance in sign learning appears to grow as young children increase in age (Thompson et al., 2012). This claim is based primarily on the study of the acquisition of British Sign Language signs by thirty-one Deaf children ranging in age from eight months to thirty-six months. Iconicity also played a much greater role in hearing four- and five-year-old children's gestural learning than it did for hearing three-year-olds (Magid & Pyers, 2017). Deaf three-year-olds, in contrast, showed a facilitative effect of iconicity in their gestural learning; this latter finding suggests that the ability to access iconicity may depend in part on one's signing experience. There may also be a change in the preferred form of sign iconicity present in individuals' signing with their increasing age. Preschool- and school-aged (under ten years old) children in Turkey produced more iconic signs that incorporated actions associated with the signs' referents than iconic signs that were based on perceptual features of the signs' referents (Ortega, Sümer, & Özyürek, 2017). In contrast, the iconic signs produced by adult users of Turkish Sign Language, who were unrelated to the child participants in the study, showed a clear preference for iconic signs that were based on perceptual features of the referents in their signing. Thus, it appears that the importance of sign iconicity in vocabulary development not only increases with age in sign-learning children, but that these children also show a preference for producing iconic signs where the iconicity is directly related to the actions these children make with these signs' referents.

One of the few areas where there have been reports of differences in acquisition across language modalities is in the rate that initial

vocabulary is acquired. Various investigators (Anderson & Reilly, 2002; Bonvillian et al., 1983; Folven & Bonvillian, 1991; Holmes & Holmes, 1980; McIntire, 1977; Orlansky & Bonvillian, 1988; Prinz & Prinz, 1979) have advanced the view that the young children of Deaf parents initially acquire signs more rapidly than the children of hearing parents acquire spoken words. These claims of accelerated early acquisition of signs, however, have not gone unchallenged (Petitto, 1988; Volterra & Caselli, 1985). The principal criticism is that those investigators who have argued for a “gestural advantage” (or that speech is “disadvantaged”) may have attributed linguistic status to a sign based on its form rather than on how a sign was used. If, the critics argue, the investigators had focused on the context of the children’s early sign use rather than whether recognizable signs were formed, then many early signs would have been seen as imitations of adults’ signs or as part of familiar gestural interactional routines between parents and their children. Regardless of the outcome of this particular debate, the studies of sign language development in children have shown that acquiring facility in a sign language is a complex learning task that unfolds over a period of years in a manner similar to that of spoken language learning.

Overall, the course of sign language acquisition in young children of Deaf parents resembles in many ways that of spoken language development in children of hearing parents (Meier, 2019). There is some evidence, however, that certain early language milestones may be attained at younger ages by children learning to sign than by children learning to speak. The general finding of many parallels in development across language modalities, moreover, suggests that there is a human capacity for language that transcends its modality of expression.

Concluding Remarks

For centuries, very few scholars examined or wrote about the signed languages used by Deaf persons. This situation changed dramatically beginning about fifty years ago, once linguists recognized that signed languages were full and genuine languages worthy of systematic study. Indeed, the study of how sign languages are acquired and processed has emerged as one of the most exciting and vibrant areas of research in all the sciences. Some of this interest may stem from a desire to learn

about and to assist in the education and development of children with deafness. Other scholars may have pursued their studies of signed languages in an effort to facilitate the development of communication skills in various groups of non-speaking, but hearing, individuals, such as children with autism. Still other scholars may have been motivated to learn about signed languages because they saw the study of sign language psycholinguistics as a way to learn about how the human brain functions. Although the particular interests and motivations of those individuals who studied and learned about signed languages may have varied widely, there is no denying that the fields of sign language research, teaching, and learning have witnessed explosive growth in the past several decades.

In addition to their widespread use among members of the Deaf community, sign languages and sign systems have been used to facilitate the communication of hearing individuals who either have failed to learn to speak or have lost such an ability. There were several accounts of the successful use of signs with non-speaking individuals during the nineteenth and first half of the twentieth centuries. Despite reports of their success, such sign intervention programs failed to catch on. The publication of Stokoe's findings (1960; Stokoe et al., 1965) about the linguistic structure of ASL signs, however, led to changes in many scholars' notions about the nature of language. The recognition that the signed languages used by Deaf persons were genuine languages helped many scholars to overcome their long-held view that language consisted of or was always based on speech. At this point, sign languages and systems based on sign languages began to be seen as potentially viable communication alternatives for non-speaking, albeit hearing, persons. Such persons include individuals with an intellectual disability, cerebral palsy, autism spectrum disorder (ASD), or aphasia. The successes and struggles of these people to communicate through spoken language and/or signs are explored next in Chapters 4, 5, and 6, and will shed further light on the choices we made when selecting, modifying, and creating signs for inclusion in the Simplified Sign System.

