

Volume 1: Principles,
Background, and Application

Simplified Signs

A Manual Sign-Communication
System for Special Populations



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1. Introduction

Language and communication abilities are vital to human development. With them, one can interact effectively with others, obtain valuable information, and strive to accomplish important goals. Without them, one may struggle to form social bonds, acquire knowledge, and survive within a community. Simply stated, the development of useful language and communication skills is essential for many critically important aspects of human life. Unfortunately, large numbers of persons either fail to acquire adequate language and communication skills or lose their once existing abilities.

Most people become competent in using one or more of the world's thousands of spoken languages (see Eberhard, Simons, & Fennig, 2020 for listings). These languages rely on a person's ability to hear speech sounds and to produce them. In addition to this auditory-vocal channel of communication, spoken languages can be perceived through their printed or written forms. Systems of communication based on spoken languages, however, are not the only ways in which people can effectively communicate their thoughts or feelings.

People who grow up deaf typically communicate with other deaf persons through a sign language such as American Sign Language (ASL), the principal language of members of the Deaf¹ community in the United States. Deaf persons in most countries have their own sign languages, which have their own distinct sign vocabularies and grammars. In contrast to the auditory-vocal transmission of spoken language, signs in sign languages are produced manually by the hands

1 The spelling of *Deaf* with a capital *D* has emerged as a convention for indicating those deaf persons who communicate primarily through a sign language and who interact frequently with other signers. Such persons often self-identify with Deaf culture. The spelling of *deaf* with a lowercase *d* is used to refer to any person with a substantial hearing loss. It is also used to indicate the medical condition of deafness or when focusing on the physical aspects of hearing loss (Woodward, 1975, 1982).

and arms and perceived visually through the eyes. In some cases, such as with persons who are deaf and blind, signs are perceived through touch (Deuce & Rose, 2019; Mesch, 2013). This reliance on vision, movement, and touch to convey information is a testament to the human brain's remarkable ability to generate and process language regardless of the modality of production and transmission.

Both spoken languages and signed languages² are highly effective means of communication for their users. Nevertheless, many persons throughout the world have difficulty communicating proficiently with others either in a spoken language or in a full and genuine sign language such as ASL. Among these individuals are some persons with an intellectual disability,³ cerebral palsy, or autism spectrum disorder (ASD), and persons who have suffered strokes or head injuries that have left them with a moderate to severe loss of language (aphasia).⁴ Difficulties in communication often cause these individuals major problems in their education, social interaction, and general well-being. Other individuals who may experience difficulties in communication through spoken language are those persons who travel extensively in foreign lands and those who have relocated to another country. Although these individuals typically do not have cognitive or sensory impairments that limit their language learning or processing, they often face the arduous task of acquiring proficiency in another tongue.

Over the last twenty years, we, the authors, have developed a manual sign-communication system designed to address the communication needs of many of these individuals with complex communication needs. That system, known as the Simplified Sign System, consists of manual signs that are relatively easy to learn, remember, and form. It is important to note that the Simplified Sign System is not a full sign language and is not intended to replace one. Instead, it is a system of visual-motor communication that may or may not be used in conjunction with a spoken language. Although this system was originally developed

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- 2 In this text, the terms *sign languages* and *signed languages* are used interchangeably to refer to the visual-motor (or visual-gestural) languages used as the principal means of communication among persons who have grown up Deaf. Hearing persons may also acquire fluency in signed languages.
 - 3 On the term *intellectual disability*, see Chapter 4, Footnote 1.
 - 4 Those individuals who are unable to effectively communicate their daily needs through spoken, written, or sign language, especially those individuals with multiple disabilities, are often described as having *complex communication needs*.

primarily to meet the communication needs of persons with disabilities, we hope that many other individuals may find the system worthwhile as well.⁵ Among those who might benefit from this sign system are parents adopting internationally, infants and young children who are not yet fluent in a spoken language, healthcare professionals, immigrants, tourists abroad, military personnel and aid workers overseas, and persons of all ages who are learning a new spoken language.

The principal goal of these two initial volumes is to make available a collection of manual signs, the Simplified Sign System, together with information on how to form and use these signs. Most of the signs in the Simplified Sign vocabulary or lexicon were selected from existing sign languages or sign systems used by Deaf persons from around the world. Some of these signs were subsequently modified to make them easier to produce.⁶ Other signs in the lexicon were developed solely for the Simplified Sign System; this typically occurred when we were unable to locate signs that were relatively easy to learn and remember in existing sign languages for concepts that we felt were needed. We believe that the resulting sign system has the potential to help many persons to communicate more effectively.

The primary goal of Volume 1 is to examine the research literature on the acquisition of sign-communication skills in various groups whose members have limited spoken language proficiency. From this examination, it should be evident that sign-communication training and teaching programs have significantly enhanced the communication skills and lives of numerous hearing children and adults who have difficulties using spoken language or need to improve their spoken language skills. This review should also make it clear that there are often

5 The fact that the principles of development for the Simplified Sign System not only meet the needs of a range of persons with disabilities but also serve to benefit many other people is consistent with the ethos of universal design. Universal design is defined as the “design and composition of an environment [or product or service] so that it can be accessed, understood, and used to the greatest extent possible by all people regardless of their age, size, ability, or disability” (Centre for Excellence in Universal Design, 2020).

6 The notion that one might modify how signs are formed to make them easier to produce is not a new one. Concerned about the difficulties that many persons with disabilities encountered when they tried to form ASL signs, Bornstein and Jordan (1984) made a number of observations about how the handshape, movement, and location parameters of signs might be changed while still being understandable by other sign users.

wide individual differences in the outcomes of these signing programs. While some individuals acquire a large vocabulary of signs and learn to combine signs into relatively complex sign utterances, others make only very limited progress (Grove, 2019a). Although much of this variability in program outcomes may depend on the characteristics of the learners, some of the variability in outcomes may be attributable to the nature of the signs themselves. That is, some signs in existing sign languages are more difficult to remember and produce than others. In general, the manual signs that resemble what they stand for and that are composed of more basic hand configurations and movements are more readily learned by hearing persons. Thus, if signs that have more transparent meanings and that are relatively easier to form were used instead of signs that are more difficult to understand and form, then the outcomes of sign-communication training and teaching programs likely would be more consistently positive for the participants.

The current chapter provides an introduction to sign communication in general and the Simplified Sign System in particular. First, however, we address common concerns and misconceptions about sign language training and teaching programs and provide some observations about those individuals most likely to benefit from such programs.

Addressing Concerns about Sign-Communication Training and Teaching

Concern I: Learning to Sign Will Prevent Spoken Language Development

One reason that sign-communication training and teaching programs have not been more widely established is that many persons who teach or care for non-speaking, hearing individuals express a reluctance to embrace a communication system that relies on manual signs or gestures (Silverman, 1995; Sutherland, Gillon, & Yoder, 2005). This reluctance appears to result primarily from the mistaken belief that using such a system would prevent or hinder non-speaking persons' acquisition of spoken language skills. Concerned caregivers often fear that an individual who learns how to communicate through signs (or other augmentative and alternative communication systems)

will have little or no motivation to learn to speak. This assumption, however, is unfounded; indeed, there is substantial evidence to the contrary (Branson & Demchak, 2009; DeThorne et al., 2009; Pattison & Robertson, 2016; Sheehy & Duffy, 2009; Silverman, 1995; Singh et al., 2017; Vandereet et al., 2011). In a number of instances, gains in signing skills have been accompanied by considerable progress in learning to speak (Grove & Walker, 1990; Launonen & Grove, 2003; Millar, Light, & Schlosser, 2006).

One possible reason why signing may help to promote spoken language development is that using signs may “exercise” areas of the brain critical for language. Brain regions involved in the fine motor control of the hands are closely related to those regions involved in the production of the coordinated movements responsible for speech (that is, the movements of the lips, tongue, larynx, and jaw). Evidently, progress in the acquisition of language skills in one modality often has a positive effect on language skills in another (Fouts, 1997; Millar, 2009). In particular, the combination of manual signs with speech (a process known as simultaneous communication) frequently results in improved spoken language skills.

Signing may also foster spoken language development indirectly by reducing an individual’s need to communicate by speech. That is, if a non-speaking person learns to communicate through manual signs, then this accomplishment may result in a lessening of pressure on that individual to communicate through speech (DeThorne et al., 2009; Sheehy & Duffy, 2009). Because an effective avenue of communication has been established through manual signs, that non-speaking person’s level of anxiety may be reduced and he or she may be more receptive to interventions designed to facilitate spoken language development.

Regardless of the particular reasons advanced to account for the apparently counterintuitive claim that learning to sign often facilitates spoken language development, one thing should be clear: teachers and caregivers should not worry that the acquisition of signs prevents spoken language development. Furthermore, the sooner that a sign-communication program is implemented (preferably with simultaneous spoken language input), the greater the chances of positive results with both signing and speech skills (Creedon, 1973; Goodwyn & Acredolo, 1998; Launonen, 1996, 1998, 2003, 2019a, 2019b; Launonen & Grove, 2003).

Concern 2: Non-Oral Forms of Communication, such as Manual Signs and Gestures, Are Unnatural and Stigmatizing

Those who care for a non-speaking individual may also hesitate to implement a signing program because communication that does not rely on spoken language may seem strange or foreign to them. Yet, even those people with little exposure to sign languages or sign systems typically make extensive use of gestures and other forms of nonverbal communication in their everyday conversations (Remland, 2004). Moreover, children who have been blind from birth use gestures along with their speech (Iverson & Goldin-Meadow, 1997). As we go about our daily lives, we are often unaware of the many ways in which we communicate through gestures or interpret the communicative gestures of others. Recognizing the extent of our own nonverbal or gestural communication may serve to reduce concerns about using a manual sign-based communication system with a non-speaking person.

In fact, for young children, the use of gestures to communicate is not only natural, it is the way that young children typically begin to communicate effectively (Bates et al., 1979; Goldin-Meadow, 1998; Iverson, Capirci, & Caselli, 1994; te Kaat-van den Os et al., 2015). Indeed, this strong reliance on gestures to communicate in infancy and early childhood often is a positive indicator of future language ability. That is, early gesture usage in children predicts their subsequent spoken language vocabulary production and comprehension (Goldin-Meadow et al., 2014; Iverson & Goldin-Meadow, 2005; Rowe & Goldin-Meadow, 2009a, 2009b; Rowe, Özçalışkan, & Goldin-Meadow, 2008). One way that this vocabulary learning may have taken place is that parents often responded to their young children's gestures by translating them into spoken words. The children then would often subsequently acquire these words. Moreover, this pattern of facilitated word learning through parental translation of their children's gestures held not only for typically developing children, but also for children with autism or Down syndrome (Dimitrova, Özçalışkan, & Adamson, 2016). The use of gestures in young children should not be viewed as unnatural, but rather, in most instances, as a positive indicator of future successful learning and development.

Concern 3: Learning Sign Language Will Require Too Great an Investment of Time on the Part of the Clinician, Teacher, or Caregiver

Becoming adept at a full, genuine sign language, such as ASL, involves extensive study and practice over a period of years, as well as experience interacting with persons who sign. While learning enough signs from a genuine sign language to interact effectively with a non-speaking person requires less of a time commitment from teachers and caregivers than acquiring sign language fluency, the effort involved is not insignificant. An easier to learn sign-communication system might be more readily embraced by already overburdened teachers and caregivers (Budiyanto et al., 2018; Cornforth, Johnston, & Walker, 1974; Glacken et al., 2019; Mistry & Barnes, 2013). Consideration for the needs of instructors and communication partners, as well as those of the primary learner, has helped guide the development of the Simplified Sign System.

Concern 4: Sign-Communication Programs Seem neither as Common nor as Firmly Established as Many Programs Promoting Spoken Language Development

Initially, the development of effective sign-communication training and teaching programs was slowed because of a relative lack of systematic scientific investigations of sign languages. Not until the 1970s did research into the structure of sign languages and the communicative use of manual signs really begin to flourish. This late emergence of sign language linguistics as a field of inquiry was largely the unfortunate consequence of a long-standing negative attitude toward sign languages and signers by many hearing professionals working with deaf students. Since then, numerous sign languages used by Deaf peoples throughout the world have been at least minimally studied and documented. The growing acceptance of sign languages and sign systems as worthwhile areas of scientific inquiry has helped spur investigations into how manual signs might be used to help persons with severe language impairments acquire better communication skills. In turn, these investigations provided the empirical foundations for successful sign-communication training and teaching programs. While not yet as common as certain

forms of speech or spoken language therapy, this is probably attributable to the relatively recent introduction of sign-communication intervention approaches and not to their lack of efficacy. Indeed, as we shall see in the following section, there are a number of groups likely to benefit from a therapeutic approach that includes signing.

Special Populations

Some persons with an intellectual disability, cerebral palsy, autism, or aphasia experience considerable difficulty communicating effectively. Over the years, speech-language pathologists, researchers, and teachers who work with such persons have employed various approaches or strategies to enhance these individuals' communication abilities. Foremost among these approaches has been speech therapy or intervention. This therapy or training approach has resulted in many persons with severe spoken language impairments making great strides in their communication abilities, although gains in speech intelligibility often have varied widely.

One form of spoken language intervention or training — behavior modification speech training — often is quite successful with those individuals with autism who already have some useful spoken language or the ability to imitate speech (Lovaas, 1977). For those children with autism who are non-speaking or have very limited spoken language skills, however, a singular focus on speech training or therapy may not be the most effective approach to establishing effective communication skills. The same may be true for members of other groups of non-speaking persons.

Why does speech therapy or training sometimes result in only limited gains in communication skills? For some individuals with impaired language and communication skills, speech training may not be successful because of a significant hearing loss that adversely affects spoken language acquisition. A substantial proportion of children with Down syndrome (a frequently occurring form of intellectual disability), for instance, have some degree of hearing loss (Dahle & McCollister, 1986; Roizen, 1997, 2007). This deficit may make phonological processing slower and more difficult, as well as possibly delaying the development of speech skills. Hearing loss may be present in some persons with

cerebral palsy as well (Pellegrino, 2007), with this loss affecting their spoken language acquisition and use.

Other individuals with a communication impairment may derive little benefit from speech training not because of hearing loss, but rather because the presence of neurological deficits may result in atypical processing of sounds. Many persons with aphasia, for example, may be able to *hear* speech sounds, but experience a serious disturbance in their *understanding* of spoken language. For these individuals, speech sounds enter their ears without obstruction, but their brains fail to recognize the sounds and sound patterns, or the sound signals are lost or distorted on the way to or in the areas of the brain responsible for comprehension of spoken language. While many children and adults with aphasia have auditory-processing problems in general (Corriveau, Pasquini, & Goswami, 2007), others may experience particular difficulty processing the rapid sequences of sounds present in speech (Alvarez et al., 2015; Tallal, 2003; Tallal & Stark, 1981). Auditory-processing disturbances also occur frequently in children with autism (Baranek, 2002; Condon, 1975; Greenspan & Weider, 1997). Some such children may have a hearing loss, but many more possess atypical neural circuitry, such that spoken language makes little or no sense to them. Furthermore, for some individuals with autism, certain speech sounds may actually be aversive and painful (Grandin, 1995; see also Grandin & Panek, 2013).

Other obstacles to speech training lie not in an individual's ability to comprehend spoken language, but rather in the ability to produce it. During spoken language production, cognitive and oral-motor processes must be finely coordinated in order to generate a rapid succession of speech sounds that are accurately timed and articulated to be recognizable. If any element of this process — whether planning, sequencing, or control of oral musculature — becomes disrupted, spoken language will be laborious, or may cease altogether. Children with autism, for example, often have problems controlling their oromotor skills, which results in poor coordination of tongue and lip movements (Page & Boucher, 1998). This, in turn, makes it difficult for them to produce clear, well-timed speech. For persons with cerebral palsy, early brain abnormalities may result in impaired voluntary muscular control and coordination, and may substantially affect spoken language production as well. Children with Down syndrome also

frequently have serious articulation disorders. Difficulties with verbal memory and sound sequencing, together with recessed mandibles (lower jaw bones), may make their production of recognizable speech quite effortful (Barnes et al., 2006; Hamilton, 1993; Kumin, 2006). Finally, the spoken language of many individuals with aphasia often is quite slow and labored because the areas of the brain responsible for the production of speech have been damaged (Beukelman & Mirenda, 2013; Davis, 2007; Kertesz, 1979). In light of the substantial difficulties or disturbances in spoken language comprehension and production among members of these different populations, a nonspeech-based communication intervention approach might prove a very worthwhile addition to these individuals' language therapy programs.

Sign-Communication Training and Teaching

Fortunately, over the last few decades, various non-oral means of communication have been added to the array of strategies or approaches used by speech-language pathologists to facilitate their non-speaking clients' acquisition of communication skills. These approaches include employing signs from sign languages; and making use of a variety of other augmentative and alternative communication techniques, such as pictures, writing, physical objects, and speech-generating electronic devices. In many instances, the use of these different approaches with children or adults who are non-speaking or who have great difficulty using spoken language has resulted in noticeable gains in their communication skills (Beukelman & Mirenda, 2013; Ronski et al., 2015; von Tetzchner & Martinsen, 2000).

Marked improvement in social or emotional behavior and well-being often has accompanied individuals' increased ability to communicate through manual signs or other non-oral approaches (Bryen & Joyce, 1985; Carr & Durand, 1985; Cooney & Knox, 1981; Grove & Walker, 1990; Horner & Budd, 1985; Mira Pastor & Grau, 2017; Prizant with Fields-Meyer, 2015; Schwartz et al., 2009; Wacker et al., 1990). Children with autism who have been taught to communicate through signs, for example, typically show a substantial reduction in such undesired behaviors as tantrums and soiling, and a corresponding increase in such desired behaviors as improved attention span and greater social interaction.

Even for an individual who has learned only a small number of signs, the ability to indicate that she or he needs to use the bathroom or desires something to eat can represent a real improvement in that person's daily life. In addition, an enhanced ability to communicate successfully with other individuals may greatly lessen the isolation that often surrounds a non-speaking person. Thus, the use of signs from sign languages or sign systems may serve not only as an effective communicative intervention strategy, but also as a path by which persons with spoken language impairments may attain a higher level of functioning and fulfillment through other aspects of their lives.

Sign-communication training and teaching programs, however, have not proven to be a panacea, as progress in learning to communicate through signs often has been quite uneven among participants. Although some non-speaking persons have shown remarkable improvements in communication skills when taught to sign, in other instances progress in communication skills has been quite limited or virtually non-existent (Bonvillian & Blackburn, 1991; Konstantareas, 1985; Layton, 1987). Some children in sign-communication programs make very limited progress, acquiring only a small sign vocabulary despite years of teaching. Other individuals acquire hundreds of signs, learn to combine signs to form more complex utterances, and make great strides in their communication skills overall.

The finding that some persons with language impairments make only limited progress in learning to sign may rest on underlying disabilities that also have adversely impacted their spoken language development. Many non-speaking individuals who experience difficulty learning to sign have various motor and cognitive impairments that may interfere with their acquisition and use of a full and genuine sign language (Beukelman & Mirenda, 2013; Bonvillian & Nelson, 1978; Kilincaslan & Mukaddes, 2009; Pellegrino, 2007; Seal & Bonvillian, 1997; Slavoff, 1998; Zhang, Oskoui, & Shevell, 2015). ASL and other Deaf sign languages contain many sign handshapes and movements that may be too complex for a person with motor difficulties to produce accurately. Many persons with disabilities also may have problems remembering how to form various signs, in recalling a number of signs, or understanding the grammatical rules of a particular sign language. In other words, the acquisition of a full and genuine sign language may prove inordinately

difficult for some individuals with language, communication, and neuromotor impairments.

The Simplified Sign System

What, then, might one do to help foster communication skills in persons who are unable to fully understand or produce spoken language and who, because of cognitive, memory, or motor disabilities, may be unable to benefit substantially from instruction in a full and genuine sign language? One alternative that may increase the likelihood of such persons' successful communication is to use a system of signs or gestures specifically developed to be relatively easily learned, remembered, and formed. The Simplified Sign System is such a system.

The Simplified Sign System is more than just a collection of signs and gestures.⁷ The signs that comprise the Simplified Sign System were selected, modified, and/or created according to a number of underlying principles or guidelines with the goal of increasing non-speaking individuals' accessibility to communicative symbols and symbol use through signs. These principles or guidelines include a considerable visual resemblance or connection between the signs and what they stand for; this resemblance should make the signs relatively easy to learn and remember. Because many of the intended users of this system experience some degree of motor disability in addition to cognitive dysfunctions (see Dennis et al., 1982), Simplified Signs also were developed to be easily formed. This was accomplished largely by creating or modifying signs so that they typically were formed with only a single movement and a basic handshape. Basic handshapes, also known as unmarked handshapes, tend to be produced relatively frequently and accurately by persons acquiring a sign language, including individuals with autism (Seal & Bonvillian, 1997), ASL-learning children of Deaf parents

7 The Simplified Signs included in Volume 2 have diverse origins. Most initially came from the sign languages used by Deaf persons in different countries around the world. In many instances, however, these signs needed to be modified to make them easier to form. Other important sign sources were the signs used by various Native American nations and signs used by members of monastic orders who embraced silence in their contemplative lives. All too often, however, we were unable to find existing signs that met both perceived communication needs and our criteria for inclusion. On those occasions, we created new signs (see Chapter 8 for a description of our procedures).

(Bonvillian & Siedlecki, 1996, 1998, 2000; Siedlecki & Bonvillian, 1993, 1997), and undergraduate students who had reported that they were unfamiliar with any sign language (Wright, Bonvillian, & Schulman, in press). These easier to articulate handshapes, including the pointing-hand, the fist, the flat-hand, and the spread- or 5-hand, are typically among the first handshapes that young children produce in many sign languages (Carmo et al., 2013; Clibbens, 1998; Juncos et al., 1997; Morgan, Barrett-Jones, & Stoneham, 2007). Other handshapes, such as the C-hand, the tapered- or O-hand, the L-hand, and the baby O-hand (also known as a pincer grip), also were produced frequently, albeit with higher error rates. When adjusting signs for ease of formation, we often replaced more complicated handshapes with these handshapes.

Another factor that guided our development of Simplified Signs was that many of the signs should represent relatively broad semantic concepts or categories, instead of denoting a one-to-one relationship between one sign and a specific word from the spoken language. This flexibility enables individual signs to represent an idea that may be expressed by different spoken words depending on the context in which they are used. Furthermore, we strove to pick one sign or gesture to represent each concept in the System, even though various acceptable possibilities existed. We standardized the lexicon to limit the confusion that may result from the use of multiple signs or sign variations to represent a single concept. Consistently using one specific sign helps to teach the underlying concept to the non-speaking individual and reinforces the use of that corresponding sign. Finally, the signs are limited to an initial vocabulary of 1000 signs; we have included those signs that the different target populations are likely to need in a wide range of situations.

Pointing, Iconicity, Transparency, and Translucency

One group of readily understood signs or gestures that we have included in the Simplified Sign System consists of signs that directly indicate a part of the body or draw attention to something. This is typically done by pointing with the index finger. These indicating signs are also known as deictic gestures or indexical signs (Cartmill, Beilock, & Goldin-Meadow, 2012). In these signs, the user simply points to (or touches) the

intended location, person, object, or part of the body. Pointing is often a highly successful communication strategy; it is learned early in the development of most children. For most persons learning to sign, these indicating signs can be acquired and employed almost immediately.

Many of the signs we have selected or created for the system visually resemble the objects, actions, or properties they represent (their referents). The extent to which a sign resembles its referent is known as its iconicity. Iconicity may be expressed through a pantomimic expression of an action (e.g., moving one's hand to one's mouth as in EAT) or part of an object (e.g., the steering wheel of a CAR that one wishes to DRIVE); a depiction of an object's shape (e.g., tracing the shape of a TRIANGLE in the air); an evocation of an emotion (e.g., showing that one is ANGRY by shaking one's fist); a display of a prominent characteristic of a referent (e.g., raising one's hand high for TALL); or an indication of the meaning of a property (e.g., waving one's hand back and forth in front of one's face to show that one is HOT) or of an abstract concept (e.g., touching one's temple with one's index finger and then moving the hand away to show the emergence of an IDEA).⁸ Iconic signs typically are easier for children with autism or intellectual disabilities to learn and remember than non-iconic signs (Konstantareas et al., 1978). In addition, many adults can often guess the meanings of highly iconic signs without having had any prior exposure to them. These signs are considered to have transparent meanings (Hoemann, 1975).

Even though many of the Simplified Signs we have selected or developed for our system have readily transparent meanings or are clearly iconic, it is important to understand that the degree of iconicity varies from sign to sign. Actions and objects generally are relatively easy to depict iconically (Cartmill et al., 2012; Fay et al., 2014; Perlman et al., 2018; Perniss et al., 2017) and these signs often have readily transparent meanings. For example, the sign for BALL is made by using one's hands to represent the round shape of a ball. Playing a GUITAR is portrayed by mimicking the strumming of a guitar's strings. In these instances, a prominent feature or characteristic of the concept is represented by the handshape, location, and/or movement of the sign. Signs that portray

8 It should be noted that throughout this volume, translations of signs, or sign glosses, are shown in upper case.

properties, thoughts, and emotions, however, frequently have to rely on a more metaphorical representation. For example, the sign for COLD is made by clenching one's fists in front of the chest as the arms shiver. LOVE is shown by holding someone or something close to the heart. The meanings of some of the signs in the Simplified Sign System, therefore, may not be as readily transparent as certain highly iconic signs or the pointing gestures in the system. Although the degree of resemblance between a sign and its referent may vary, we have tried to maximize each sign's iconicity or transparency.

Unfortunately, we were unable to identify or develop highly iconic signs for a number of the vocabulary items we wished to include in our sign system. Because of this difficulty, we opted to include translucent signs in our system as well. In sign language research, the extent to which the relationship between a sign and its meaning can be discerned after an explanation has been given is called the sign's translucency. Many more people report that they can perceive the relationship between a sign and the concept for which it stands after the sign's meaning has been provided to them (its translucency) than can correctly guess the meaning of an unfamiliar sign (its transparency) (Bellugi & Klima, 1976; Emmorey & Sevcikova Sehyr, 2018). Furthermore, a person's age, linguistic experience, and cultural background may influence his or her perceptions of iconicity (Ortega, 2017), as seen in studies of Italian Sign Language. Hearing non-signers who were Italian outperformed hearing non-signers from other cultures in their ability to correctly guess the meanings of iconic Italian signs (Grosso, 1993; Pizzuto & Volterra, 2000), a finding that reinforces the theory that cultural experience may be required to understand the mappings between a sign's formation and its meaning. It should also be noted that deaf signers consider the signs in their native sign language to be more iconic than signs from unfamiliar sign languages that are presented to them (Occhino et al., 2017). However, once the relationship between a sign and its referent is discerned, many people find it easier to remember that sign. The inclusion of numerous translucent signs in our lexicon is the principal reason why we have provided readers with both a brief sentence or phrase (a memory cue) that concisely ties each Simplified Sign to its referent and a more detailed explanation of the relationship between a sign and its referent (see Chapter 11, Volume 2). These explanations of

the relationship between a sign and its meaning may help some persons better learn and remember that sign.

This strategy of providing information on how the formation of a sign is related to its meaning will probably be extremely helpful to non-speaking persons' teachers, caregivers, and family members because of their ability to understand the explanation of the relationship between a sign and its referent. Students using the signs to help them learn foreign language vocabulary items also will likely benefit from having an explanation provided about how the formation of each sign is related to its meaning. Elderly users with hearing impairments and those persons suffering from aphasia who are still able to read or understand spoken language may benefit from this information as well. It will likely be of less use to very young children or persons with a severe intellectual disability or autism spectrum disorder. Indeed, some users of the system, although they may learn iconic signs more easily than other signs, probably will not consciously understand the connection between an iconic sign and its meaning, even when an explanation is given. Instead, they may learn iconic signs more readily because the movements involved in forming them are familiar actions.

Ease of Production or Formation

Many signs in existing sign languages used by Deaf persons may be too complex formationally for some non-speaking persons to produce accurately. Each sign in a signed language requires that the signer form a particular hand configuration or handshape, make the sign in a certain area or location, and generate one or more movements of the hands and arms. These formational parameters or aspects of signs are referred to as a sign's handshape (HS), location (LOC), and movement (MOV), respectively. Non-speaking individuals often experience difficulty accurately making particular sign handshapes, controlling certain arm and hand movements, or remembering signs with multiple or complex movements. Because many potential users of the Simplified Sign System have motor impairments, the signs in our system have been selected, modified, and/or created with their ease of production in mind. Handshapes that were easier to form often were substituted for handshapes that were more difficult to make. Signs with multiple

movements were simplified to a single movement whenever possible, and movements that were difficult to produce were excluded or changed to movements that were more accurately produced (e.g., contacting action with the body) (see Dennis et al., 1982).

In addition, many signs in the Simplified Sign lexicon can be made with just one arm. If a signer is able to move only one arm, then the signer uses whichever arm is available to perform the main action of the sign. Furthermore, some users of our system may prefer to produce signs that are typically formed with a single hand by moving both of their hands symmetrically; many of the signs in the lexicon can be made in this manner without confusion or a change in meaning. Overall, these various features should make Simplified Signs easier to produce both by individuals with psychomotor disabilities and by typically developing infants and young children.

Concept-Based Signs

Many signs in the Simplified Sign System often refer to relatively broad concepts or categories. In other words, many signs in the system are more flexible in their meanings than the words that we chose to pair them with in our lexicon. It is also important to know that a sign is not a direct translation of any specific word; rather, a sign is a visual representation of a concept — a concept that in turn may be represented by multiple words in a spoken language. For example, the sign CHAIR refers to something that can be used by an individual for sitting: a kitchen chair, a rocking chair, a portable car seat for a baby, or a seat in a vehicle. In the Simplified Sign System lexicon, all of these variations in meaning of the concept CHAIR are represented by one sign.⁹ Although the lexicon (see

9 To be clear, the Simplified Sign lexicon includes signs for other furniture items on which a person may sit, for example, on a SOFA (bench, booth, couch, pew, etc.) or on a STOOL (although this sign is not a part of our initial lexicon). However, just because we have three separate signs for these similar concepts does not mean that every signer will learn or use all three formations. Although some people may benefit from finer conceptual distinctions, other signers may be better served by the broader conceptual category of CHAIR (and thus use that sign to refer to everything on which he or she can sit, including benches, sofas, and stools). An intermediate strategy could also be employed by using two options (e.g., lumping STOOL in with CHAIR but using SOFA for larger furniture pieces). Ultimately, the decision about which sign(s) to employ will rely on environmental context and the particular needs and characteristics of the individual (e.g., age, interests, level of linguistic development).

Chapter 11, Volume 2) lists each sign under the English word that we think most accurately reflects each sign's underlying concept, we also provide many synonyms or words closely related to that concept for ease of reference.¹⁰

As a result of combining the associated meanings of related words into one or two signs, the size and level of complexity of the Simplified Sign lexicon is limited. Much of the initial vocabulary is basic or general in nature, which should make it more mentally accessible to users under various conditions, according to the basic-level advantage phenomena observed in the categorization or retrieval of words or concepts within semantic hierarchies (see Rogers & Patterson, 2007). This approach of not having a sign for virtually every possible word or variation in meaning is one aspect that distinguishes the Simplified Sign System from full languages. We anticipate that this approach will not result in any confusion when the sign is used in a communicative context. Grouping related meanings under a single sign, however, may present challenges to children with autism spectrum disorder. Many of these individuals have difficulty applying one sign to multiple versions of a particular concept. For example, individuals with autism may think that the sign BALL only applies to the red dodge ball they play with; they may not understand that the sign can also apply to a basketball, a tennis ball, a ping-pong ball, or balls of varying sizes and colors that may be present in their environments. Many children with autism spectrum disorder and some persons with a severe or profound intellectual disability must be painstakingly and deliberately taught the skill of generalization. Whereas typically developing children perceive the underlying conceptual basis for BALL (spherical shape), some individuals may need to be taught this through tying each example of a ball to the sign for BALL. This challenge, however, is present when attempting to teach

10 Although both words in spoken languages and signs in sign languages stand for underlying concepts, one should not directly equate individual words with specific signs. As an example, the English word *ground* or *grounding* has a number of meanings, including soil, an object that makes an electrical connection with the earth, a basis for belief or argument, an area of knowledge, and a football offense. The different meanings of this word would require different signs to convey the range of meanings or concepts accurately. In our system, if a listed English word or gloss has two or more divergent meanings, we often provide a parenthetical word or phrase that clarifies which meaning is appropriate for that sign's formation (e.g., RIGHT (CORRECT) and RIGHT (DIRECTION) are two different signs).

any communication skill to children with autism spectrum disorder and to many other individuals with complex communication needs, and is not specific to Simplified Signs.¹¹

Standardization

A number of the signs in the Simplified Sign lexicon may not seem to differ noticeably from gestures that people generate spontaneously. For example, many people tap their head when they need a gesture to indicate *head*. However, there also may be variability across individuals in their gestures: one person may point to the head with an index finger, another may use both hands to tap the head, and a third may make a circular movement around the head. All of these are acceptable and readily understood gestures; a non-speaking individual with severe cognitive and motor disabilities, however, may be confused by this variability. To lower the chance of confusion among communication partners, we have selected one particular gesture or sign for each concept, even though many suitable variations may exist. Moreover, this single, distinct form of a sign should then be used by all people in the signer's environment. This approach of using a single, consistent form for each sign may be especially important in interactions with persons with autism spectrum disorder. Individuals with ASD may experience real difficulty in discerning the underlying structural regularities in input (Hellendoorn, Wijnroks, & Leseman, 2015) if there is wide variability in how signs are formed. This strategy should help reinforce the acquisition of that sign and encourage its use by everyone.

Core Vocabulary

In contrast to the thousands of signs found in the full and genuine sign languages used by Deaf persons, the size of the Simplified Sign System lexicon has been restricted initially to 1000 distinct signs. The smaller size of the lexicon limits the complexity of the system and should make it easier for non-speaking individuals, as well as their teachers and caregivers, to learn. Not everyone will want to or need to learn all of

¹¹ See Chapter 5 for more information on teaching generalization.

the signs in the lexicon, though; some individuals may learn and use only 30 to 50 signs. These numbers are generally comparable to studies of core vocabulary in preschool children, in which as few as 50 words comprised half or more of the total words used by those children (Banajee, Dicarlo, & Stricklin, 2003; Beukelman, Jones, & Rowan, 1989; Burroughs, 1957; Deckers et al., 2017; Fallon, Light, & Paige, 2001; Fried-Oken & More, 1992; Trembath, Balandin, & Togher, 2007). The number of signs a particular user learns to recognize and how many he or she produces will depend in large part on the extent of that person's cognitive and motor abilities, as well as on the dedication and persistence of that person's sign-using caretakers. Those individuals with less severe impairments will be able to learn and use many more signs than those with more profound impairments. The teachers and caregivers of each potential user will need to decide which concepts are the most important and helpful for that individual to learn and then concentrate on teaching the signs for those concepts. The main user's sign vocabulary can then be expanded as his or her communication needs grow (Dark, Brownlie, & Bloomberg, 2019; Grove & Walker, 1990; Walker, Mitha, & Riddington, 2019). Although the present lexicon is restricted in size, we believe that it is sufficiently large to meet many basic needs over a wide range of educational, institutional, and family settings. For those persons who wish to use Simplified Signs as an instructional vehicle to facilitate the acquisition of a substantial foreign language vocabulary, a noticeably larger lexicon of Simplified Signs will probably be needed. As a direct result of this potential use of the system, we tested and added 840 more signs to the lexicon. These additions considerably expand the lexicon's breadth and its resulting ability to address the communication needs of individuals in both general and more specialized settings. In the future, we hope to provide the expanded lexicon to the public and to develop teaching materials and a smartphone app for the lexicon as a whole.

By developing signs that are relatively easy to learn, remember, and form, we hope that we have removed an obstacle to more effective sign communication for many non-speaking individuals. We also hope that the signs that comprise the Simplified Sign System lexicon prove to be quite helpful to those who use them.

Goals, Clarifications, and Recommendations

We mentioned earlier that one of the principal goals that guided our development of the Simplified Sign System was that of increasing non-speaking individuals' accessibility to communicative symbols and symbol use. It would be a mistake, however, to assume that our motivation as authors and investigators was to create a symbol system that would be taught to and used solely by persons with autism spectrum disorder, intellectual disability, cerebral palsy, or aphasia. These individuals often struggle to communicate successfully with other people in their environment. To increase the likelihood of these individuals communicating successfully, other people in their environment also will need to learn and use the Simplified Sign System. The Simplified Sign System is more of a tool for enhancing the ability of its principal users to interact meaningfully with others in their environment. This ability thus serves a social function as well. Ultimately, the Simplified Sign System is an approach to communication by which an individual's quality of life can be comprehensively addressed and improved.

We think that the Simplified Sign System has a distinct advantage over many other augmentative and alternative communication systems (discussed in Chapter 5) because it has substantial potential to be integrated into a more expansive environment. Even though signing is not the norm within hearing and spoken language-based communities, it is becoming increasingly accepted and more prevalent. The Simplified Sign System provides the non-speaking individual an opportunity to engage more successfully with the public and to produce signs that should be recognizable to many people who have never been exposed to them. Our system, then, may help expand non-speaking persons' horizons that in the past may have been limited to their teachers, caregivers, staff members, and other non-speaking individuals involved in an educational or residential program. Therefore, this system may help non-speaking persons be integrated more fully as valuable and contributing members of their own communities and of the larger societies in which they live.

In addition, adoption of the Simplified Sign System is not an admission that one has given up on an individual acquiring speech skills or proficiency in their native sign language, or that the non-speaking

person has no capacity to improve his or her spoken language or native sign language skills. In fact, just the opposite is true. Indeed, the use of Simplified Signs provides a foundation upon which subsequent communication and language development may occur — even the acquisition of useful speech skills. Whereas in the past, a non-speaking individual may have undergone extensive speech therapy with little or no progress, a change of strategy to that of accompanying speech with manual signs may somewhat paradoxically lead to an improvement in speech skills (Creedon, 1973; Fouts, 1997; Millar, 2009; Millar et al., 2006).

Even if spoken language skills fail to emerge with this change in strategy, the non-speaking individual likely will acquire enhanced communication skills through the effective use of signs. The Simplified Sign System has been tailored to the specific needs of various groups of non-speaking persons. However, it is not only for the main users; it is for everyone who encounters and interacts with them. This includes family members, caregivers, friends, teachers, medical and nursing staff, therapists, and the public. This sign system represents a response to the communication difficulties experienced by the *entire community* of people who interact with non-speaking persons. The Simplified Sign System helps to address this communicative need by meeting the vocabulary needs of diverse groups of individuals. The wide range of vocabulary items in the sign system may provide these individuals with their best chance of moving forward. From an initial focus on single vocabulary items, we hope that users of our sign system will progress to signing short sentences or utterances and then longer and more complex utterances — one step at a time, each one building on the steps that came before.

Before this process can occur, however, each non-speaking person's current level or status of communicative abilities should be accurately evaluated and assessed. This evaluation or communication assessment helps the speech-language pathologist or professional caregiver understand the *individual needs* of a target sign user before tailoring a specific plan or strategy to improve his communication skills and track his progress. Unfortunately, we cannot at this time accurately predict either which individuals will benefit most from using the Simplified Sign System, or how much they will benefit. What we do know is that those who try out the system will respond to it based on their individual

abilities, characteristics, circumstances, and goals. These individuals will also be affected by whether or not the other members in their families and communities accept their responsibility to address the shortfall in communication being experienced by all. These family and community members should provide consistent encouragement to the main sign user and become actively involved in his or her life.¹²

Finally, it is important to recognize that the Simplified Sign System is not necessarily exclusive of other communication methods. For some individuals, it may be their sole means of effective communication. For others, it may be their primary means of communication that is then supplemented with other techniques (such as the use of objects, pictures, speech-generating devices, or software applications). For still others, it may be an augmentative communication system that supports another primary technique or approach. The Simplified Sign System is not only flexible in terms of how it is employed, but also in when it is employed. Although it is best (and highly preferable) to implement the system as soon as possible in a child's development or in an adult's rehabilitation, it can still have a positive impact if introduced later. Furthermore, the use of the Simplified Sign System may either grow over time as an individual responds positively to it, or its use may actually diminish as a person's spoken language or native sign language skills improve. This prediction is in line with the results of studies of other sign-communication systems used with persons with intellectual disability, cerebral palsy, autism, or aphasia.

Other Potential Users of the Simplified Sign System

Although the Simplified Sign System was originally developed primarily to facilitate the communication of non-speaking children and adults, other populations or groups of people may find that learning this manual sign system will benefit them as well. Among those who might benefit from learning and using Simplified Signs are persons (both hearing and deaf) who travel to foreign countries or work in the travel industry, parents who adopt children internationally, older persons who have lost their hearing, members of the military or foreign

¹² We provide recommendations for enhancing this sign-learning environment in Chapter 4.

aid organizations, and healthcare professionals. Simplified Signs may also be useful to language instructors as an aid to teaching vocabulary from a person's primary spoken language, to learners of foreign or additional languages, and to children from economically disadvantaged backgrounds. The need to develop highly effective and efficient foreign language instruction materials, moreover, has been underlined by the plight of millions of migrants and refugees who are currently overwhelming existing aid resources.

International travelers frequently encounter situations where their spoken language skills are unable to overcome communication barriers. Although travelers may address this by using the services of an interpreter, finding such an individual might prove difficult, costly, and time-consuming. If time were of the essence, as when one has a plane to catch or requires assistance in an emergency, then the failure to communicate quickly and accurately might have serious negative consequences. In addition, it may be easier for people to learn and use an iconic sign-communication system when traveling within a foreign country for a limited period rather than attempting to learn and use that nation's spoken language(s). If Simplified Signs were acquired by many persons worldwide, especially by travelers who frequently go abroad and those individuals involved in the travel or hospitality industries, then many communication problems might be avoided or minimized.

Those persons who elect to adopt children from countries other than their own constitute another group that might find learning and using a simplified sign-communication system helpful and beneficial. The number of international adoptions increased greatly for several decades (Judge, 1999; Krakow, Tao, & Roberts, 2005; Tan & Yang, 2005; Tessler, Gamache, & Liu, 1999) before slowing in recent years. In the U.S., the decline in adoptions from abroad this past decade has been quite steep partly because of geopolitical reasons, as there apparently is no shortage of parents who wish to adopt (Jordan, 2016). In most instances, the children who have been adopted encounter not only new caregivers and unfamiliar surroundings, but new languages as well. While the parents may find that communicating effectively with their newly adopted children is rather frustrating at first, the children involved may find the change in their language environments truly bewildering. Whereas these children may have successfully understood and produced a

spoken language prior to adoption, their change in circumstances typically places them in situations where their birth language is not spoken and their efforts at speech either poorly understood or not understood at all. Not surprisingly, these children's use of their birth language either declines or is arrested at its level of development at the time of adoption as the children encounter the language of their new environment (Glennen, 2002).

The process in which international adoptees learn the language of their adoptive parents often is referred to as second-first language acquisition. Fortunately, most internationally adopted children develop skills in their new language similar to their non-adopted peers within a few years of adoption (Glennen & Bright, 2005; Glennen & Masters, 2002; Rygvold & Theie, 2016; Scott, Pollock, Roberts, & Krakow, 2013). Although most internationally adopted children eventually perform in the typical range on tests of language abilities, their language skills often lag behind those of children from comparison groups closely matched for age, gender, and family socioeconomic status (Gauthier & Genesee, 2011); additionally, there is often wide variability in language outcomes among adopted children (Scott, Roberts, & Glennen, 2011). Particular attention and intervention services probably should be directed towards those children who were reared in especially impoverished environments prior to their adoption (Hwa-Froelich, 2009). Children between three- and four-years of age at adoption more frequently experience difficulty transitioning to their new language and social environments than children aged two and younger, but often make rapid strides toward attaining language proficiency (Glennen, 2009; see also Tan et al., 2012). For children who may be even older at the time of their adoption, the outcome often is not as positive as it is for infants or younger children (Beverly, McGuinness, & Blanton, 2008). Many of these older children have communication disorders, with their parents frequently reporting that they have language or articulation impairments. Some of these difficulties may be attributable to the children's pre-adoption experiences, often in orphanages, which were not adequately stimulating or supportive.

An approach that would likely facilitate internationally adopted children's transition from their birth language to their new adopted language would be to have the parents use manual signs together with

spoken language when interacting with their children. In particular, if the parents were to use manual signs that had readily transparent meanings together with spoken language, then the meanings of their utterances would likely be much clearer to their children. An increased understanding of their parents' efforts at communicating with them might, in turn, lead the children to pay better attention and to respond appropriately more often. Once the children demonstrated knowledge of their parents' spoken utterances, then the parents would no longer need to pair signs with words. If this approach were to enhance the communication environment for these newly adopted children, then these youngsters' new homes would likely seem less confusing and frightening to them and lead to their better social adjustment.

As more people live longer, the number of persons who become hearing-impaired as part of the aging process is increasing substantially (Chen, 1994; Humes et al., 2012; Strawbridge et al., 2000; Trosman et al., 2012). The numbers involved are not small: in the U.S., 48 million people have hearing loss (Kelley, 2017), with nearly two out of every three persons older than seventy years experiencing a significant loss in hearing (Lin, 2017). For the large majority of these persons, speech will remain their principal form of communication. Although their own spoken language skills may be fully adequate, they may not understand the attempts of others to communicate with them through speech. This situation may be frustrating to all parties involved and socially isolating to those individuals with newly acquired hearing impairments. One way to cope with such a problem would be to request that others write down what they wished to convey. Such an approach, however, might prove cumbersome, time-consuming, and ultimately fatiguing. Although learning a full and genuine sign language certainly is an option, many older individuals and those who interact with them may not want to devote the time and effort needed to become proficient in a full sign language. Rather, a more effective strategy might be for individuals to learn a number of Simplified Signs and combine them with spoken language when communicating with persons who have impaired hearing. In group settings, those individuals who have at least some useful hearing would likely benefit primarily from the spoken words, while those who have become deaf or hard-of-hearing would likely find that the signs help them to understand the communication of others.

When serving overseas, members of the military and international aid organizations often encounter serious communication problems when they need to interact with the citizens of those countries. If they were to use iconic manual signs and gestures to supplement and clarify their efforts at spoken communication, then many potentially harmful confrontations might be avoided. The use of sign communication might also be of great benefit to the many injured veterans who have returned home over the years, especially those who have suffered brain injuries. These injuries, depending on their severity and the particular areas of the brain affected, may adversely affect or interfere with a veteran's ability to communicate successfully using speech. The addition of a sign-communication system to a veteran's rehabilitation program might help to overcome initial limitations in the use of spoken language.

Furthermore, as societies become more multicultural in nature, healthcare providers increasingly interact with patients (or their family members) who have recently immigrated to the country and who do not yet speak the principal language or languages of that country. In an emergency situation, securing the services of a knowledgeable interpreter might not be a viable or timely option. If emergency personnel were to use easily understood gestures or signs to interact with a severely injured person with limited speech communication skills in the local language, then this approach could truly prove to be a lifesaver.

Manual signs and iconic gestures also have been shown to be a useful aid to teaching English (or other languages) to students, including economically disadvantaged students, as a first or second language (Daniels, 2001; Mancini, 2005; Schunk, 1999). One reason for this success may rest on the finding that input or instruction in more than one modality often improves students' learning on a range of tasks in comparison with instruction in only a single medium (Gellevij et al., 2002; Loncke et al., 2006; Mayer & Sims, 1994). Learning language through more than one sense may result in that language being learned more effectively and remembered for a longer period of time. Because we feel that the topic of using iconic manual signs to facilitate the learning and processing of first and subsequent languages by members of the broader hearing population is of considerable importance, we discuss the literature on this topic in more detail in Chapter 7.

Research has shown that having students enact iconic signs or gestures as they say the to-be-learned words that correspond with these signs is a very powerful way for students to learn these new vocabulary items. We surmise that the production of iconic signs or gestures might enhance learning in a number of other domains as well. That is, if concepts in mathematics, science, and engineering were to be acted out gesturally, then the concepts so embodied might be learned more effectively and robustly (Cook, Yip, & Goldin-Meadow, 2010; Radford, 2009). We say this in part because there appear to be several partially separable human memory codes or representations: word or verbal codes, visual or pictorial codes, and motor or action codes (Cartmill et al., 2012; Engelkamp & Zimmer, 1984). Overall memory performance appears to be especially strong when the different memory codes are involved; people tend to remember those things that they say, see, and do. When describing a concept or an event in a signed language, this action is a form of enactment. It will be of interest to determine if seeing how concepts are described through signs by experienced teachers of deaf students would facilitate the learning of these concepts by hearing students.

From these brief overviews of some of the diverse populations who might benefit from the use of manual signs, it should be clear that the Simplified Sign System has the potential to successfully facilitate communication in a variety of locations and circumstances. To use the Simplified Sign System effectively, however, it will likely be helpful for the reader to examine background information on the nature of sign languages and the characteristics of sign-using populations, as well as learn how the Simplified Sign System was developed. To obtain this information, it is recommended that the reader first understand the structure and contents of these volumes.

Contents and Structure of the Two Volumes

Different people may want to read and use these two volumes in different ways. Individuals knowledgeable about signing with special populations or those who would like to use signs to facilitate foreign language vocabulary acquisition may wish to turn directly to Chapters 10 and 11 (Volume 2) for the listing of Simplified Signs, descriptions of

how the signs are formed, explanations of the relationships between sign formation and sign meaning, and tips on using the lexicon and sign index. Those persons with little or no background in sign languages or teaching sign communication, however, would likely benefit from reading all or some of the chapters in Volume 1 before proceeding to the sign descriptions and drawings contained in Volume 2. For those persons interested in historical perspectives on the use of signs by hearing persons, Chapter 2 provides evidence that manual signs and gestures have long been used to overcome various spoken language barriers. In Chapter 3, the emphasis is on the nature and structure of the sign languages used by Deaf persons (particularly ASL). This background material should prove helpful in understanding the reasoning behind our selection, modification, and creation of signs for the Simplified Sign System.

Persons considering adopting a sign-communication intervention program with children or adults with spoken language difficulties should read the chapters that review the studies of signing with such individuals. We first focus on the sign acquisition of persons with an intellectual disability or with cerebral palsy (Chapter 4). In subsequent chapters, we explore the use of sign communication with individuals with autism spectrum disorder (Chapter 5) and with adults and children with aphasia or a developmental language disorder (DLD) (Chapter 6). In many instances, the participants in these studies had more than one condition or disability that may have adversely affected their use of spoken language, and as a result they had complex communication needs. To some extent, our discussion of the results of certain studies in a particular chapter may appear to be the product of a rather arbitrary placement decision, even though we strove to identify the participants' primary disabling condition.

Chapter 7 concentrates on how learning to sign, and how the use of Simplified Signs, might benefit typically developing children and school-age students. Included in this chapter are reviews of the emerging literature on the use of manual signs to foster vocabulary skills in students learning a foreign language, in children from economically disadvantaged backgrounds acquiring English, and in other groups of hearing individuals with different communication and learning needs. We also include information in this chapter on how learning to sign may enhance a person's cognitive processing, paying special attention

to findings on spatial memory and mental rotation. From reading this chapter, it should be apparent that learning to sign likely has much to offer to a wide range of persons with normal hearing levels.

In Chapter 8, we recount the steps we followed in developing our system, in case others wish to add new signs to the Simplified Sign lexicon. Those individuals electing to initiate a program of sign-communication training and teaching with non-speaking persons are strongly urged to read Chapter 9. Included in this chapter are a number of recommendations about how to make such a program more effective and how to maximize one's chances for successful sign interactions.

We also wish to draw the reader's attention to the presence of various appendices and supporting materials. In Volume 1, a Glossary of terms is included to assist readers by offering definitions or explanations of more technical terms. This glossary may be especially relevant for family members, caregivers, and SLP students who are not already familiar with sign language linguistics, various disabilities or conditions, or research methods and procedures. Appendix A provides a listing of the diverse sign resources we consulted when developing the initial 1000 signs of the lexicon. Appendix B offers a drawing and a short description of each of the handshapes used in the Simplified Sign System. Likewise, Appendix C provides a drawing and an explanation of the formation of each of the palm, finger, and knuckle orientations found in our written descriptions. In Volume 2, there is a sign index with synonyms. The synonyms were provided to assist users of the Simplified Sign System by identifying those words, other than the principal lexicon entries, whose meanings could be conveyed by particular signs. We hope that this inclusion of synonyms in the sign index greatly expands the usefulness of our sign system. Regardless of how these two volumes are read and utilized, we hope that it will enhance the communicative interactions of many different people.