Signing Exact English: A Simultaneously Spoken and Signed Communication Option in Deaf Education

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Abstract: Current reviews of the literature continue to demonstrate that even with modern assistive listening technology, many children who are deaf or hard-of-hearing (DHH) have English language and literacy gaps compared to hearing peers (e.g., C. Mayer, 2016; C. Mayer & Trezek, 2018). For example, Geers, Tobey, Moog, and Brenner (2008) reported that "early cochlear implantation had a long-term positive impact on auditory and verbal development, but did not result in age-appropriate reading levels in high school for the majority of students" (p. S21).

Given the continually-reported variability of results about language and reading outcomes for children with cochlear implants (e.g., Harris, 2016; C. Mayer & Trezek, 2018), alternative approaches for promoting better language and reading outcomes should be considered. Signing Exact English (S.E.E.), a system designed and demonstrated to encode grammatically-accurate English, is an option to support the development of speech, listening, English language, and literacy. In this article, S.E.E. as it is used in the United States, is contrasted with the many terms that have been used to describe the practice of simultaneously speaking and signing (e.g., total communication, simultaneous communication, sign supported speech, etc.). Research-based responses to common concerns about S.E.E. are provided.

Acronyms: ASL = American Sign Language; CALP = cognitive-academic language proficiency; CASE = Conceptually Accurate Signed English; CI = cochlear implant; CS = cued speech; DHH = deaf or hard of hearing; DLC = Developmental Language Curriculum; IEP = individualized education program; LSL = Listening and Spoken Language; MCE = Manually-Coded English; MSS = Morphemic Sign System; PSE = Pidgin Signed English; NWSDHH = Northwest School for Deaf and Hard-of-Hearing Children; SC = simultaneous communication; S.E.E. 1 = Seeing Essential English; S.E.E. 2 = Signing Exact English; SE = Signed English; SSE = Sign Supported English; SSS = Sign Supported Speech; TC = total communication; TOD = teacher of the deaf

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A Brief History of Total or Simultaneous Communication

Marschark, Schick, & Spencer (2006, p. 9) noted there is still a "continuing concern about low levels of literacy and other academic skills attained by most deaf students" as well as "an attempt to teach deaf children the language [English] that would be used in schools." When David Denton became superintendent of Maryland School for the Deaf in the late 1960s, he promoted sign language and fingerspelling only after instruction in speech and speechreading was tried. He encouraged "speech then sign" as an alternative to an "oral only" instructional method for students who were deaf or hard-of-hearing (DHH). Around this same time, the philosophy of simultaneous use of speech and sign was introduced by Roy Holcomb, a deaf man with two deaf sons and a supervisor of a program for deaf students in California. Labeled as Total Communication (TC), it involved a multi-sensory approach that included speech, speechreading, signs, fingerspelling, gesture, and pantomime—all of which could be used by adults and students in educational settings (Beck, 2005). Today, most people do not distinguish between TC as a philosophy or TC as a method of communication. In practice, there is no empirical basis to suggest that TC differs from Simultaneous Communication (SC; SimCom). Both SC and TC are umbrella terms used to generally describe speaking and signing simultaneously.

Cued Speech (CS) was proposed in 1966 by Dr. R. Orin Cornett at Gallaudet College to aid speechreading without

the use of signs. It is defined by the National Cued Speech Association as "a visual mode of communication that uses handshapes and placements in combination with the mouth movements of speech to make the phonemes of a spoken language look different from each other." (http://www.cuedspeech.org/cued-speech-definition). Because CS is based on making phonemes visible and there is little current research on the system available, it is not discussed further in this article. The interested reader is referred to http://www.cuedspeech.org for more information about CS.

Also in the late 1960s, at least three systems of English signing were being developed. These included Seeing Essential English (S.E.E. 1), Signing Exact English (S.E.E. 2), and Signed English (SE). Each of these systems are described below. In all three systems, speech was paired with signs, creating *bimodal input* that transferred English spoken with the mouth to English communicated to some degree by both the mouth and hands. In situations where interpreting is being done, the systems are technically *transliterated*—changing the English language from one form to another and not from one language to another.

Seeing Essential English or S.E.E. 1 was introduced in 1966 by David Anthony (1971), a deaf man who was a teacher of the deaf (TOD). It is referred to today as the Morphemic Sign System (MSS). The system uses separate signs for most syllables of words and is often signed by "root words." For example, gene is the root for *genetic, general*, and *generous* (Gustason, 1997). Today, MSS is used exclusively in Amarillo, Texas, where a dictionary can be found on the school website (http://aisd-web.amaisd.org/sites/mss/). Luetke-Stahlman and Milburn (1996) reported that students in the Amarillo program scored higher than most other students who were DHH in Texas on state reading tests. Signing Exact English (originally referred to as S.E.E. 2, but known today as S.E.E.) was developed in the late 1960s by Gerilee Gustason, a deaf woman, Esther Zawolkow, the daughter of deaf parents, and Donna Pfetzing, the mother of a deaf child. Both MSS and S.E.E. are signed in a grammatically-accurate manner in which users attempt to include every morpheme of what is said (see Figure 1 below).

Deciding that S.E.E. 1 and S.E.E. 2 were too complicated for young children, Harry Bornstein and a team at Gallaudet University (e.g., Bornstein and Saulnier, 1984; both hearing) developed Signed English (SE) and published *The Comprehensive Signed English Dictionary* that is often referred to as "the blue book," (Bornstein, Saulnier, & Hamilton, 1983). The system included both invented signs and those borrowed from American Sign Language (ASL) as well as 14 affix markers for bound morphemes (e.g., *-ed, -ing, -s*). The authors intended the system to be used with young children and Gallaudet University published at least three series of children's stories and reference materials for this purpose. Within a short time period, whole programs adopted SE. Luetke-Stahlman (1988a) found variable recommendations about

how SE should be signed. In the preschool storybooks some SE was signed conceptually (i.e., signing the concept of the message rather than single words) so that the grammar of English was not always apparent, while other phrases were signed literally (i.e., signing one sign for each English word). Luetke-Stahlman provided examples of morphemic inconsistency illustrated in the *Dictionary*. For example, the sign for *mentally retarded* does not require the affix markers *-ly* or *-ed* but the signs for *emotionally disturbed* do. In language samples filmed by Luetke-Stahlman, users sometimes created plurals by repeating the signs for nouns rather than using the /s/ marker. Although signs are illustrated in the *Dictionary* for verbs such as *know* and *don't know*, there is no explanation available as to how to sign inflections such as *didn't know* or *known*. Because of these factors, SE cannot be signed in a grammatically-accurate manner (see Figure 1 below).

As signing in English became more frequent in school programs for children who were DHH, many terms were used to label it. Among these were Pidgin Signed English (PSE), sometimes referred to as contact signing (Baker-Shenk & Cokely, 1996) and Conceptually Accurate Signed English (CASE; https://www.cdc.gov/ncbddd/hearingloss/parentsguide/building/case.html), described as a naturally-occurring result when people who do not know the complete grammar of the other's language want to communicate with each other. PSE and CASE are synonyms for the same method of signing; both combine parts of two languages, thus they do not completely represent the grammar of either one (see Figure 1 below). In addition to these terms, a number of other labels are used, such as Manually-Coded English (MCE; defined on Wikipedia as "a variety of visual communication methods expressed through the hands which attempt to represent the English language"), Manual English, s/Signed English (the lower-case form signifying a generic term; and the upper-case form signifying the system developed by Bornstein, Saulnier, & Hamilton, 1983). These terms have been used over the last 60 years to label variations of simultaneous speech and sign (Stewart, Bonkowski, & Benet, 1990) that by design do not completely represent the grammar of English (see Figure 1 below).

Sign Supported English (SSE) and Sign Supported Speech (SSS) are terms used more recently, borrowed from British authors. These methods are defined as the use of British Sign Language vocabulary using English sentence structure and grammar (Sutton-Spence & Woll, 2004; Nielsen, Luetke, & Stryker, 2011). Signed Speech (Johnson & Durieux-Smith (n.d.) is another term used in Great Britain to mean SC.

Current data could not be located as to the popularity of any of the above-mentioned forms of simultaneously speaking and signing, but survey data from the Gallaudet Research Institute (2013) indicated that approximately 13% of children who were DHH in the United States received instruction in some type of simultaneous

speech and sign. Specifics as to which sign methods were included in the percentage were not mentioned and because the survey data has been discontinued, more recent data are not available. Given the confusion in sign system labels described by Dan Diffee (personal communication, May 16, 2018), below, it is also unlikely that the percentage is accurate. Still, it is included here to indicate that there are a significant number of families, professionals, researchers, and children who use a communication method that is not Listening and Spoken Language (LSL) or ASL.
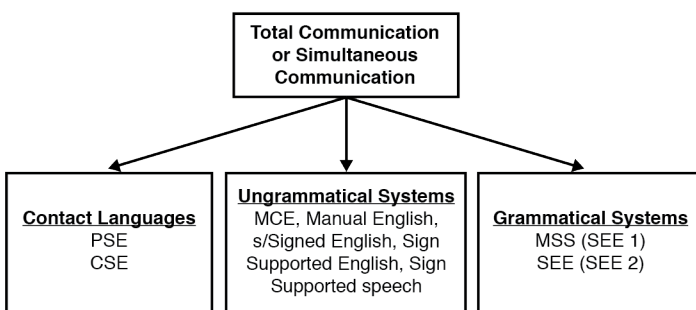

Figure 1. **Types of simultaneous communication. PSE = Pidgin Signed English; CASE = Conceptually Accurate Signed English; MCE = Manually-Coded English; MSS (SEE 1) = Morphemic Sign System; SEE (SEE 2) = Signing Exact English.**

What is Signing Exact English (S.E.E.)?

Signing Exact English was developed in the late 1960s by Gerilee Gustason, a deaf woman and teacher of the deaf; Esther Zawolkow, the daughter of deaf parents and an educational interpreter; and Donna Pfetzing, an educational interpreter and the mother of a deaf child. By the early 1970s, the three colleagues started their own company and published "the yellow book," the *S.E.E. Dictionary* (Gustason, Pfetzing, & Zawolkow, 1973). Signing Exact English was initially referred to as S.E.E. 2 or (S.E.E. II) because MSS was originally referred to as S.E.E. 1 (or S.E.E. I), but today it is simply referred to as S.E.E.

Gustason (1990) explained that the authors of S.E.E. were motivated to invent the system for use by both parents and professionals for the following reasons:

1. Increased knowledge about how hearing children develop English language;
2. A desire to have children who were DHH use English as it was used by hearing teachers in school programs;
3. Dissatisfaction with the educational achievement of children who were DHH (e.g., compared to their hearing peers, children who were DHH typically lagged significantly behind their hearing peers in reading and writing skills; had smaller English vocabularies;

used simpler and more rule-bound clauses; had a weaker grasp of the morphological and syntactical rules of English; used fewer adverbs, auxiliaries, conjunctions, and figurative words and phrases; and made many errors of omission of necessary words); and
4. Research had shown that access to the morphology of spoken English was impossible via speechreading alone. As noted by Gustason (1990, p. 109), "Research on speechreading indicated that 40 to 60% of the sounds of English looked like other sounds on the lips (e.g., interest, interesting, interests, and interested are nearly impossible to distinguish) and the best speechreaders used their knowledge of English to fill in the gaps... otherwise bright and capable deaf children caught only 5% of what was said though speechreading."

To address the need to visually represent words and grammar fully and accurately, S.E.E. was designed so that the signs corresponded with the number of morphemes of the English utterance (Gustason et al., 1973; Gustason & Zawolkow, 1993) and represented age-appropriate, complete, grammatically-accurate, proficient, whole English (Luetke-Stahlman, 1993b). Signs in S.E.E are provided for root words and affix markers (e.g., *re-, un-, -ing, -ity, -ness*) including articles, conjunctions, pronouns, and so forth, so that all words and word parts (i.e., bound morphemes) are made visually obvious, resulting in the potential for children to acquire morphemic awareness, which Gustason claimed was necessary to read proficiently. In S.E.E. there are different signs for different words, so that it is possible to sign *electric, electrical, electrician, electricity*, and *non-electrical* all as they are said and written.

S.E.E. uses a *two out of three* rule: If a word is *spelled* with the same letters and sounds the same, it is signed in the same way, even if the *meaning* of the two words are different. Out of respect for some ASL signs, there are exceptions (G. Gustason, personal communication, June 25, 2018). As Schick and Moeller (1992) explained, S.E.E. "attempts to represent English literally, and it purports to follow a strict criterion of one sign for one English free morpheme or 'word'" (1992, pp. 318–319). The researchers also noted that S.E.E. follows English semantics and does not borrow from ASL semantics (i.e., conceptual signs), unlike some other sign modes (i.e., TC, SC, CASE, etc.). Schick and Moeller (1992, p. 319) gave the example in S.E.E. for the word run which "would appear as the same sign in the following phrases even through a different sign for each phrase would be used in ASL: 'a home run'; 'a runny nose'; 'run for office'; and 'a run on the bank.'" S.E.E. includes many ASL signs that have only one English translation and roughly 75% of the signs are common to ASL, S.E.E., and PSE/CASE. To illustrate how S.E.E. signs are initialized, Schwarz,

Guajardo, and Hart (2018) described the S.E.E. sign for the word *ant*, made with an A-hand-shape using the dominant hand on a wiggling base 5-hand (see Figure 2).

Figure 2. **S.E.E. sign for the word "ant."**

When the handshape on the dominant hand is changed (using a B, C, I, P, R, or T), the signs for other words are created (i.e., BEETLE, CRICKET, INSECT, PEST, ROACH, TERMITE; respectively). Groups of signs like these are often referred to as sign families, that assist in the retention of sign formation.

S.E.E. uses the visual features of directionality/movement, change in location based on semantics, facial expression (e.g., questioning, surprise) sign emphasis, body referencing, eye gaze, sign directionality, and use of space as explained by the authors in the first edition of the S.E.E. dictionary (Gustason et al., 1973) and again in Gustason and Zawolkow (1993).

Luetke-Stahlman (1988a, 1988b, 1988c, 1988d) showed how MSS, S.E.E., and Cued Speech use inputs that *completely* encode the morphology and syntax of English as compared to TC, SC, PSE, CASE, and MCE which *incompletely* encode spoken English (see Figure 1). In her research, Luetke-Stahlman (1988a, 1988b, 1988c, 1988d) found that large numbers of students exposed to grammatically-complete English codes (i.e., MSS, S.E.E., and Cued Speech) scored higher on tests of English language and reading achievement than students exposed to systems using grammatically incomplete English codes (i.e., TC, SC, PSE, CASE, and MCE).

Stryker, Nelson, and Luetke (2015) noted that because PSE/CASE and SE lack sufficient affixes to fully represent English morphology *through the air*, PSE/CASE and SE-users "inevitably provide DHH students with ungrammatical English input when morphologically complex words are communicated, such as *unworkable, irreplaceable, and foolishness*" (Schwarz et al., 2018; p. 11). S.E.E. advocates believe that as students are developing their speech and English language skills, it is better to sign each affix in such multi-morphemic words. Once a student pronounces or signs all of the syllables of the word, it is no longer necessary to sign all the affixes (e.g., *characteristically* could be signed as CHARACTER + LY).

Luetke (1988a, 1988c, 1991, 1993a) and Luetke-Stahlman and Tyrrell (1995) completed several studies in which language samples were taken and coded to determine a sign-to-voice ratio following procedures described by Luetke-Stahlman (1982). The results of this work are depicted in Table 1 and explained later in this article.

Table 1
The Degree of English Necessary to Encode the Semantics and Grammar of English in Various Sign Methods

Language Component	Pidgin Signed English (PSE)	Conceptually-Accurate Signed English (CASE)	S/signed English	Manual English	Sign Supported English or Sign Supported Speech, Signed Speech	Morphemic Sign System (MSS)	Signing Exact English (SEE)
Semantics (meaning) encoded	Some	Some	Some	Some	Some	Yes	Yes
English morphology and syntax encoded	Some	Some	Some	Some	Some	Yes	Yes

Note. See Luetke-Stahlman, (1988a, 1988b, 1988c, 1988d, 1990b; and Nielsen, Stryker, Luetke, & McLean, 2016) for more detail and support.

Appelman, Callahan, Mayer, Luetke, and Stryker (2012) demonstrated that when compared to a national sample of post-secondary deaf adults, graduates of a program that used simultaneous speech and S.E.E. had higher graduation rates from high school (100% of S.E.E. graduates compared to 93% nationwide), earned more college degrees (67% of S.E.E. graduates compared to 30% nationwide) and had higher employment rates (85%

compared to 65%). M. Mayer (2013) and Nielsen, Stryker, Luetke, and McLean (2016) empirically demonstrated how S.E.E. can be used to successfully support the development of speech articulation, listening skills, English language development, and literacy abilities in children who are DHH.

Information regarding S.E.E. materials, virtual S.E.E. courses, a S.E.E. smart phone application, and the dates

and locations of S.E.E. Skillshops can be found at the S.E.E. Center (https://seecenter.org/) and Modern Signs Press (http://www.modernsignspress.com). In recent years, S.E.E. research has been conducted by staff at Northwest School for Deaf and Hard-of-Hearing Children (NWSDHH) in the Seattle, Washington area, who have also provided workshops and conference presentations about S.E.E. throughout the country. Regular S.E.E. classes are taught at the school as well as online (see https://www.northwestschool.com/resources/community-resources/). At least two Facebook groups exist: *SEE Users of Texas and Beyond* and *SEE Me Sign*.

A number of school programs that are successfully using S.E.E. exist around the United States. These include NWSDHH, where IEP teams in about 20 school districts have found S.E.E. to be the appropriate method of communication for about 45 children, preschool through 8th grade. S.E.E. is paired with spoken English and all children wear assistive listening devices which are checked daily. In addition, about 17 regional day school programs in Texas (D. Diffee, personal communication, May 16, 2018) use this method. S.E.E. is used with individual students in California, Kansas, Kentucky, Missouri, Nebraska, and Wisconsin. S.E.E. Skillshops are held in many of these states. For more detailed information about ASL and SC (including S.E.E.) see Stewart and Luetke-Stahlman (1998).

Confusion Regarding Sign Systems

Confusion among parents, interpreters, professionals, and researchers concerning the type of signing being used is common. As exemplified in a recent email from a consultant in Texas (D. Diffee, personal communication, May 16, 2018), "many who purport to use Signed English (SE) actually use PSE…Those who use simultaneous communication in Texas, use PSE although they might call it Signed English, Manual English, Manually Coded English, Sign Supported Speech, and so forth. Some report that they try to sign in English word order (i.e., the words are in the correct order in a sentence but not all bound morphemes or function words are signed) and not in grammatically-accurate English (i.e., all morphemes are signed) or ASL during English class, Language Arts, or reading and writing instruction."

D. Diffee (personal communication, May 16, 2018) added that the "state of TX interpreter certification board misunderstands Signed English, which they define as 'the ability to watch and understand information and ideas presented through signs, gestures, classifiers and fingerspelling in an English-like structure and to communicate information and ideas through signs, gestures, classifiers, and fingerspelling in an English-like structure so that others will understand'" (Texas Department of Assistive and Rehabilitative Services, 2012, p. 16). Classifiers, handshapes and/or rule-grounded body pantomime used to represent nouns and verbs for the purpose of providing additional information (e.g., location, kind of action, size, shape, and manner) do not exist in English. It is rare that the authors of published studies involving signing in English by adults and/or children film and analyze the degree to which the morphology and syntax of English is signed so that descriptions are empirically compared one method to another.

Not only is there confusion about the labels and use of simultaneous speech and sign, but standard practice in research studies involving these methods is to collapse both grammatically-complete and grammatically-incomplete methods into one group for analysis (e.g., Geers, 2003; Geers, Brenner, & Tobey, 2011; Geers, Brenner, Nicholas, Tye-Murray, & Tobey, 2003; Knoors & Marschark, 2012; C. Mayer & Akamatsu, 1999; Niparko & Geers, 2004). Giezen, Baker and Escudero (2014, p. 107) noted that "a large number of studies have compared children in Oral Communication (sometimes referred to as LSL) settings, where only spoken language is used, to children in Total Communication (TC) settings, where both spoken language and *some form* of signed communication are used" (italics added). Clarification as to the degree to which the morphology and syntax of English were used by parents and/or teachers are not typically described in the research methodology of these studies (see Schwarz et al., 2018, as an exception). Because of confusions such as those just mentioned, it is important to have definitions and examples whenever simultaneous English signing is discussed.

A Rationale for Providing S.E.E. as an Option in Deaf Education

It is not surprising that when hearing levels are first identified most parents and professionals focus on obtaining assistive listening devices and parent-child communication. The acquisition of age-appropriate English or literacy skills is often not an immediate concern. However, later, if the toddler or preschooler does not begin to use language like his or her hearing peers, concerns may arise. In addition, even if the child uses intelligible speech, Archbold and Mayer (2012, p. 3) cautioned that "excellent levels of speech intelligibility…may mask the young person's language delay or difficulty," especially with regard to cognitive-academic language proficiency (CALP) as it is spoken, read, or written.

A fudge sundae analogy can be used to explain CALP, as well as to discriminate speech from language development. The analogy represents the acquisition of linguistic competence using terms first proposed by Cummins (1980, 1984). In the analogy, a child's speech articulation ability is represented by fudge because most parents and professionals strive for children to achieve their best possible speech intelligibility. Basic interpersonal communication, or the degree of English that is used routinely and includes known vocabulary and simple grammar, is represented by ice cream.

CALP as defined by Archbold and Mayer (2012) is represented by the bowl. CALP is the English language needed in school to understand and express abstract, decontextualized thinking, as well as to comprehend what is read, and to write similar to their hearing peers (Luetke-Stahlman, 1998). Research by Nielsen et al. (2016) demonstrated that in a program where S.E.E. was used to develop English and literacy, most students achieved CALP as measured on standardized tests of English language and reading ability. The study did not include a comparison group of students using a different method of communication.

When children who are DHH are eligible for preschool, choice of communication method and other classroom variables are often discussed. Eisenberg, Shannon, Martinez, Wygonski, and Boothroyd (2000) demonstrated empirically that even with amplification, access to acoustic information (e.g., the teacher's instruction, peers' social language) is degraded for children who are DHH compared with the information acquired by hearing peers, and the vocabulary of most children with hearing loss is compromised. Even for students with mild hearing losses, the result can be underdeveloped communication abilities (Tomblin, Harrison, Ambrose, Walker, Oleson, & Moeller, 2015; Yoshinaga-Itano, Sedey, Wiggin, & Chung, 2017). In research by Mukari, Ling, & Ghani (2007), general classroom teachers using an informal language checklist rated children with cochlear implants (CI) interacting in their mainstreamed classrooms as poor in their LSL communication abilities. Yet, many children who are DHH develop articulate speech and age-appropriate language. Relevant in this article are those who do not. For example, when only CI-using children have been studied, Geers et al. (2008) and Gregory and Hindley (1996), among others, emphasized the need for communication alternatives because some learners continue to lag significantly behind their hearing peers (see also Geers & Hayes, 2011; and C. Mayer & Trezek, 2018; Traxler, 2000). Knoors and Marschark (2014) suggested that CI-using children as a group rarely reach levels of academic achievement comparable to hearing peers regardless of whether children are enrolled in LSL or ASL programming. This is "an outcome that has remained remarkably persistent over time" (C. Mayer & Trezek, 2018, p. 1). Geers, Mitchell, Warener-Czyz, Wang, & Eisenberg, 2017, in a study based on children recruited between 2002 and 2004, "found no advantage to parents' use of sign language (ASL) either before or after CI" (p.1). However, data was collected by parent report "just before surgery and at 12, 24, and 36 months postimplant" (p. 2). Long-term sign use was defined as "positive for sign language use at baseline and/ or 12 months and at 24 and 36 months postimplant (N = 36)" (p. 2). Parents were also asked to estimate how much of the day they used sign language. These responses were divided into two categories for analysis (less than 50% and more than 50% of the day in the home). The authors did not provide a definition for the term "sign language," did not verify the use of parental sign via filming and analysis of voice-to-sign ratio, and did not include

an analysis of children who use sign in their educational program as is discussed in this article.

C. Mayer & Trezek (2018) reviewed 21 studies of primarily school-age students who used CIs and were assessed on standardized measures of reading and writing. The researchers found that most children achieved in the average range, although there was a wide variation in their scores. This finding of variability has been found repeatedly (see also Harris, 2016; Marschark, Sarchet, Rhoten, & Fabich, 2010). In addition, CI users may evidence age-appropriate literacy outcomes in the earlier school years but not maintain them in higher grades (Arfé, Ghiselli, & Montino, 2016; Harris, 2016; C. Mayer & Trezek, 2018). Especially when children who are DHH are young and still acquiring English, they can have difficulty hearing all the parts (morphemes) of English syntax and grammar. Relevant research to this point is provided below:

- Cannon & Kirby (2013) studied 26 children who were DHH, 5–12 years of age, with whom sign was not used and found that the children had difficulty with regular noun singular/plural; accusative first- and second-person singular; noun/verb agreement copular *be*; accusative third-person number/gender; locative pronominal; auxiliary *be*/regular past *–ed*; prenominal determiners plural and inconsistently producing tense markers.
- Spencer, Tye-Murray, and Tomblin (1998) found that 32% of the aural/oral children studied could not produce the third person *s* and 51% did not produce the past tense *ed*. They concluded that the amount of comprehensible input that the children with CIs can perceive influences the acquisition of the inflectional morphology, such as tense markers. As a group, initial speech sound improvement after implantation declined between the fourth and sixth year of CI use.
- Tomblin, Peng, Spencer, and Lu (2008) as well as Ramirez Inscoe and Nikolopoulos (2009) reported similar findings regarding the stabilization and plateauing of speech intelligibility trajectories.
- Koehlinger, Van Horne, and Moeller (2013) described the risk of undeveloped grammatical morphology when children are hard of hearing if input is "inconsistent and distorted" (p. 1702). They found that children who are hard of hearing may have difficulty processing and storing grammatical morphemes that have "low phonetic substance," such as "verb-related morphemes" (e.g., contracted forms of *be*, third-person singular *-s*, and regular past tense *–ed*; p. 1702–1703).

The ability to both perceive and produce all the morphemes (i.e., including bound morphemes) of English is also important for obtaining literacy. As Easterbrooks and Stephenson (2006, p. 390) explained, "word meanings are expanded, modified, and changed routinely by affixing **23**

single and multiple morphemes to the front or end of a root word…If students who are DHH are to read and write well, they must have facility with the morphemic system." For example, the Kindergarten level of *National Geographic Windows On Literacy* (McGough, 2001) contains 11 bound morphemes (i.e., *-ed, -en, -er, -ing, -ist, plural -s, third person -s, the suffix -self,* and *-y*, as well as the *irregular past tense* and the contraction *-'s* (*what's*). One word, *bakery*, contained three morphemes. Luetke (2013) reviewed readers for first graders published by Harcourt and found that to read and comprehend first grade selections a student would need to comprehend and express at least 10 bound morphemes (i.e., *di-s, -ed, -en, -ly, -ful, -ing, plural -s, possessive -s, third person -s, and -y*. These are understood and used by hearing six-year-olds (de Villiers & de Villiers, 1978) who are prepared linguistically to read them. Third grade level selections included words with the bound morphemes: *-able, -an, -ant, -er, -ible, -ic, -ice, -in, -ion, -ious, -its, -ity, -ment, mis-, -or, re-, -sion, -th, -tion,* and *un-* and fifth grade readers were found to include *-age, -al, -ch, -est, -ify, -ish, -ite,* and *-ize* (Luetke, 2013). Many readers who are DHH do not have access to these bound morphemes because they do not use a grammatically accurate sign system, or their assistive listening device does not provide a clear enough signal.

There is possibly a relationship between the finding that most children who are DHH read at the fourth-grade level when they graduate from high school (Traxler, 2000) and the lack of exposure to single morphemic words (e.g., *a, the, to*) and bound morphemes (e.g., *-ible, -ic, -ice*, etc.). Luetke-Stahlman (1988b, 1990b) found that S.E.E.-using children had better English language and reading abilities than children who use PSE. Nielsen et al. (2016) found that most students in a S.E.E. program had intelligible speech articulation, average English language ability, and read at or above grade level.

S.E.E. has proven to be an appropriate option when compared to other methods of simultaneous communication for some children who are DHH when English is the desired language of instruction and social interaction. However, the research on S.E.E. is often ignored and the method is frequently not offered as a communication option for families and professionals. Although more research on S.E.E. is warranted, parents deserve to be given information on all methods of communication that might assist their family.

Responses to Common Concerns About S.E.E.

It is not unusual for current articles written by advocates of LSL or ASL to include concerns about sign systems (Gardiner-Walsh & Lenihan, 2018). Below are some of the most often stated criticisms about S.E.E. with additional information about each one.

Sign Use Hinders Speech Development

As noted by Knoors and Marschark (2012, p. 294), this topic "remains a 'hot button' for many people." However, there is empirical evidence that sign can support both the understanding of speech and speech production itself. Giezen et al. (2014) reviewed the literature related to children who used CIs and were exposed to sign and also conducted experiments of their own. They found that for the children they studied, sign "did not interfere with spoken word processing and may even have provided a benefit when children were trying to perceive perceptually confusable words" (p.118–119).

In contrast, Fink, Wang, Visaya, and the CDaCI Investigative Team (2007), and later Geers, Mitchell, Warner-Czyk, Wang, Eisenberg, and the CDaCI Investigative Team (2017), found that when parents signed to their child during early childhood, the child's use of speech and listening strategies was compromised compared to when parents did not use sign. These researchers (a) defined "sign" to include ASL and "baby sign" as well as other simultaneous communication methods, (b) used parent report to determine whether sign was used, and (c) analyzed ASL and all simultaneous communication methods as one group. They found that children who did not sign had better speech perception and articulation abilities than those children whose parents reported that they used some form of sign communication between 12 and 36 months after implantation. Some parents used sign until their child was 12 months post-implant and others used it for 12, 24, or 36 months post-implant. Sign might have been used for less than half the day or more than half of the day, the two rating choices surveyed. The authors did not verify the use of parental sign via filming and analysis of voice-to-sign ratio and did not include an analysis of children who use sign in their educational program as is discussed in this article.

M. Mayer (2013) noted that children developing English language learn best when difficult productions are taught in small steps, encouraged, and reinforced. As Schick (1997) stated: Children learn what is modeled for them and by the kind of production elicited (and facilitated) from them. To partially illustrate this point, Luetke-Stahlman and Tyrrell (1995) asked adults who purported to use SE or PSE to transcribe the vocabulary and English grammar of sentences that they themselves had signed two years previously (e.g., "*The cars in the lot were lined up in rows; Time is fleeting*;" Luetke-Stahlman, 1993a). Professionals using SE and PSE could not retrieve the semantics and grammar of the original utterances when they attempted to transcribe them. The researchers wondered how educators could expect students, the recipients of their input, to understand their "English" if they themselves couldn't extract English vocabulary and/or grammar from what they had signed.

M. Mayer (2013) demonstrated an outcomes-based approach whereby morphemic aspects of English that a child was not using were facilitated by intentional

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strategies. In doing so, she noted that adults who use Sign Supported Speech typically sign the main words in phrases, ones already being expressed by the child, and not the words or word parts (e.g., bound morphemes) that the child is missing. Speaking of using grammatically-incomplete simultaneous communication methods, Mayer noted that the parts of the English language that are hardest to hear and in the most need of sign support are the ones that adults do not sign. In her work, Mayer provided spontaneous language samples to illustrate the kind of signing in English that is possible when adults are motivated to sign accurate grammar and reinforced for doing so (Nielsen et al, 2016). In the following sample from her study, the TOD simultaneously signed 93% of what she said, omitting words like *oh* and those involved with a listening only condition as she facilitated the listening, speech, and English language development of a Kindergartener (intentional strategies are underlined).

Spontaneous Langage Sample from M. Mayer (2013)

G. is interested in a small plastic toy he thinks represents apples and shows the toy to his TOD. She <u>follows his lead</u> and uses <u>parallel talk</u> to espress what she believes he is trying to communicate to her (Luetke-Stahlman, 1998). The TOD <u>speaks and signs simultaneously in a slow and deliberate manner</u>, using a distinct sign for every morpheme—including an *s* affix marker on the world *apples*. "Oh, you think those are apples?" the TOD asks. She exaggerates the /s/ on the word *apples* in both speech and sign, holding the *-s* handshape for longer than is typical in normal conversation (i.e., <u>both signed and spoken highlighting</u>; Fleming, 1974). She clarifies that they are both looking at little, plastic coconuts (e.g., "Oh, you know what? Those are coconuts.") and then counts the coconuts, <u>repeating and emphasizing</u> the *-s* on the word *coconuts*, and <u>informing</u> G., "with a *-s* on the end." Next the teacher models the target word only: "Coconuts," she says, elongating the *-s* in both speech and S.E.E. This is followed by a <u>direct request for the desired speech sound or morpheme that the child is omitting</u>: "Can you tell me the *-s* on the end of coconuts?" G. does so and his teacher specifically labels his effort in her <u>reinforcement</u>: "Good. Good *-s* sound on the end of coconuts." She continues with the conversation by asking, "You love coconuts?" (again exaggerating the *-s* sound in her speech and sign), but G. has switched topics on her and asks if he can have a toy squirrel that they have played with in the past. The TOD again follows his lead and repeats his request, modeling, "May I *have* the squirrel?" (<u>emphasizing</u> the word "have" that he has omitted in both speech and S.E.E. sign). G. attempts to imitate her model. "Again," she requests (<u>so that correct speech articulation and grammar are habitualized</u>; from Appleman et al., 1980) G. repeats his query but omits the word *the*. "Listen again from the word *the*..." the TOD requests as she picks up a speech hoop. "Listen." Using the hoop to prevent G. from speechreading, she models in speech only, "May I *have* the squirrel." G. attempts to repeat the sentence and his teacher positively reinforces him: "Oh, you are so close!" she <u>encourages</u>. She asks him to "Listen again for 'May I'" and again she uses the speech hoop to encourage G. to listen for the desired morpheme he has omitted. "May I have the squirrel," she models, emphasizing the word *the*. This time G. repeats the request correctly and his teacher reinforces him before explaining that he can have the squirrel after they work on vocabulary. She emphasizes the word *after*. When G. doesn't respond, she <u>models coversational turn taking</u>, saying "Ok...Say, 'ok'" from behind the speech hoop. G. takes his turn in the conversation: "Ok" he says, imitating her prosody.

Signing Exact English is Not a Language

S.E.E. is not a language; it is an invented system that encodes English; however, as Mitchell (1982) stated, "there is no logically implicit reason why contrived systems of communication should be considered less functional than 'natural' languages" (p. 332). There is no evidence that parents are troubled by the fact that S.E.E. is not a language. Parents are more concerned that family members have a way to communicate to their child (Luetke-Stahlman, 1996). Any concept that can be said via LSL or signed via ASL, can be expressed using S.E.E., no matter how abstract or complex. Parents who use S.E.E. want their child to learn proficient English—the door to literacy, high school and college graduation, and employment (Appelman et al., 2012).

S.E.E. Cannot be Signed in a Manner that Represents Grammatically-Accurate English

Some linguists, educators, and parents believe that S.E.E. cannot be signed accurately because of a widely-quoted study by Marmor and Petitto (1979) or because they have seen people sign one of the other sign systems and not proficient S.E.E. However, in the Marmor and Petitto (1979) study, communication samples were analyzed from only two users of PSE who were teachers of the deaf and employed at a residential school. Given these variables, it is not surprising that the finding was that only 10% of the grammar of English was signed because PSE users don't attempt to completely encode the grammar of English. By its very definition, PSE is an unstandardized mixture of English and ASL. Still, the results of the Marmor and Petitto study were widely quoted in the late 80s, at a time when a bilingual approach using ASL was introduced into the educational arena. Today, it is rare that those who have read the available research literature on the topic do not acknowledge that S.E.E. can convey English on the hands. A few of the relevant studies to this point are summarized below:

- Luetke-Stahlman (1988a, 1988c, 1991, 1993a, 1993b) and Luetke-Stahlman and Tyrrell (1995) conducted several studies in which language samples were taken and coded to determine a sign-to-voice ratio following procedures described by Luetke-Stahlman (1982). This calculation shows the degree to which specific vocabulary as well as the morphology and syntax of English are represented simultaneously. The ratio is figured as a percentage of the free and bound English morphemes that are signed compared to those that are spoken. The results showed that S.E.E.-users were able to sign English to a more complete degree than those who used SE and PSE. It was recommended that parents and professionals attempt to sign 100% of what they are saying, which typically results in a high ratio; film themselves; calculate their sign-to-voice ratio; and set goals for improvement.
- As a part of the Nielsen et al. (2016) study, spontaneous language samples of teachers as

they were interacting with children were filmed and analyzed. TODs were unaware that sign-to-voice percentages would be calculated. The average sign-to-voice ratio across TODs was 94.4%, demonstrating that S.E.E., can be signed in a manner that accurately represents the grammar of English.

- • M. Mayer & Lowenbraun (1990) found that people were able to sign grammatically-correct English via S.E.E. if they learned the vocabulary and grammar of the system, were motivated to sign proficiently, and were regularly observed and coached. These results were supported by similar research by Leigh (1995) who studied the Australian English used by TODs in Australia. Like Mayer and Lowenbraun, Leigh advocated that positive steps be taken to ensure consistent and accurate English input via sign, including: (a) adequate training and experience in the use of the system, as exemplified by appropriate assessment; (b) a positive attitude toward the method; (c) accurate knowledge of the encoding principles and specific rules; (d) commitment to use at all times; and (e) monitoring and coaching.

Children Who Use S.E.E. will be Unable to Converse with Members of the Deaf Community
Because S.E.E. was invented in the early 1970s and has been in use for almost 50 years, there are hundreds of deaf adults who were raised using S.E.E. and are capable of using it as a part of the array of communication options available to them, including speech only, S.E.E., PSE, and ASL. Children who grew up using S.E.E. often learn to code-switch depending on the person with whom they are conversing. It is inconceivable that the "Deaf Community" is a single entity that converses using one method of communication.

In addition, in the only research article the authors could find on the topic, Luetke-Stahlman (1990a) demonstrated that elementary-aged children of differing communication backgrounds comprehended ASL to the same degree. In that study, 12 deaf children who were enrolled in a public-school program that used S.E.E. and 14 deaf students enrolled in a residential program that used a combination of PSE and ASL watched commercially-available ASL stories and answered comprehension questions about them. There was no difference in the ability of S.E.E. students as compared to residential peers in the number of correct answers they supplied to written comprehension questions.

S.E.E. is Unnecessarily Complex
Contrary to the claims made by Bornstein (1990), S.E.E. is no more complex than the English being used by the person. The authors could find no research support for the notion that it is beneficial to use simplified English with children who are DHH or that S.E.E. is too complex for children to acquire, no matter their age.

Children who are DHH deserve the same level of instructional and social language input as hearing children receive. If adults do not sign grammatically-correct English, children who are DHH do not have access to the vocabulary and grammar that hearing children do. Examples of age-appropriate English can be found in developmental lists of vocabulary and grammar. One such source is the *Developmental Language Curriculum* (DLC; Luetke-Stahlman,1998, reprinted from Cheney, Compton, & Harder, 1988) which lists parts of English such as pronouns, possessives, helping verbs, and bound morphemes that are typically acquired by hearing toddlers and preschoolers (and children up through 8 years of age). According to the DLC, a child who is 24 to 30 months old should use more than a dozen verbs; use the present progressive verb form (-*ing*); name at least one color; use the pronouns *it, this, that*, and *you*, and the preposition *in*; and, have a vocabulary of 300 to 500 words. Before three years of age, the child should use 2- to 3-word combinations; use *what, where*, and *why* in question forms; use two dozen verbs; begin to use regular past tense (-*ed*); use about a dozen adjectives; use at least four pronouns; use contractions for negatives such as *can't* and *don't*; use the prepositions *on, under*, and *off*; use determiners such as *a*, *the, this*, and *that*; use the conjunction and; use the possessive marker -'*s* as well as plural -*s*; and, have a vocabulary of 500 to 700 words. Children who are DHH and are not exposed to these parts of English in an accessible manner, have great difficulty acquiring these parts of English, many of which are difficult to hear (Guo, Spencer, & Tomblin, 2013).

Children Who are DHH Don't Learn Grammatically-Correct English or Literacy Via S.E.E
In the most recent study about this concern, Nielsen et al. (2016) found that most students enrolled in a program that used simultaneous speech and S.E.E. acquired English proficiency and read on grade level. Participants were 17 children who were from English speaking homes, old enough to be tested on the standardized language and reading tools used, had no additional significant disabilities, and were granted permission by their parents to participate. Extensive information about the 17 students' background (i.e., ethnicity, age of identification, age of obtainment of assistive listening equipment, unaided pure tone average, pure tone average while wearing equipment, social economic status, and parent signing ability) was published in McLean, Nielsen, Stryker, and Luetke (2015). All the students wore amplification at home and school; all came from families where English was the language of the home (and no family used another method of simultaneous communication or ASL).

Students were administered both informal and formal (standardized) tests of language and reading annually. The study found a developmental trend (and no plateau) for both English language and reading achievement (i.e., students improved in their abilities each year). Morphological awareness, made possible via S.E.E., was found to be a prerequisite to high language and reading

scores. Nielsen et al. (2011) reviewed the research on reading acquisition, including the importance of morphemic awareness. They showed how the construction of S.E.E. facilitates morphemic awareness. In the Nielsen et al. (2016) study, neither speech ability nor CI use was significantly correlated with English acquisition or reading ability. Instead, English language proficiency predicted reading achievement. That is, the more proficient a student's English, the more age-appropriate their reading ability was.

Schick and Moeller (1992) conducted a series of studies involving children enrolled in a S.E.E. program and Schick (1997) reported that they internalized and produced some of the most complex rules of the syntactic structures in English as measured by embedded clause, conjunctions, and modal. Further, an increase in cognitive complexity resulted in more complex use of English structures but not an increase in errors.

Conclusion

This article has distinguished the invented system of Signing Exact English (S.E.E.) from the commonly-confused array of terms used to describe various ways of speaking and signing at the same time (e.g., total communication, simultaneous communication, PSE, CASE, MCE, S/signed English, Manual English, Sign Supported English or Sign Supported Speech, etc.). These various methods are often discussed without definition and without information as to the extent to which English grammar is accurately signed. There is a lack of research and analysis of these communication methods to clarify whether and if so, how they differ from each other in actual use.

S.E.E. is a viable option to Listening and Spoken Language (LSL) or American Sign Language (ASL). The rationale, examples, and research have been summarized and show that S.E.E. can be an effective primary method of communication for many children who are DHH and their families. The fact that an estimated 13% of children who are DHH use S.E.E. is further evidence that it can be an effective communication method. Research has demonstrated that S.E.E. differs in the accuracy of English grammar conveyed when compared to PSE.

Responses to common concerns about S.E.E. were provided so that this information is available to parents and professionals who are considering communication options for children, discussing equal representation on panels and committees, and crafting public policy. Because S.E.E. is being used successfully by many families across the United States, research on the system as well as other methods of simultaneous communication is warranted.

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