

Running head: Communication Disorders in Signed Language

Do Developmental Communication Disorders Exist in the Signed Modality?
Reporting on the Experiences of Language Professionals and Educators
from Schools for the Deaf

David Quinto-Pozos
University of Texas at Austin

Anjali J. Forber-Pratt and Jenny L. Singleton
University of Illinois at Urbana-Champaign

To appear in *Language, Speech, and Hearing Services in Schools*.

Purpose:

This investigation focuses on whether developmental communication disorders exist in American Sign Language (ASL) including how they might be characterized. ASL studies is an emerging field; educators and clinicians have minimal access to descriptions of communication disorders of the signed modality. Additionally, there are limited resources for assessing ASL acquisition. This report is designed to raise awareness about developmental communication disorders in ASL and categorize types of atypicality that have been witnessed.

Method:

We conducted four focus groups and a one-on-one interview with a total of 22 adults (7 Deaf, 15 hearing) who work at bilingual-bicultural (ASL-English) schools for the Deaf. Experiences of these educators and language professionals were analyzed qualitatively using a combination of grounded theory (Charmaz, 2001; Strauss & Corbin, 1998) and a modified van Kaam approach (Moustakas, 1994).

Results:

Participants confirmed observations of children with suspected communication disorders and considered the prevalence, possible etiologies, and psychosocial aspects of such disorders. They reported frustration at the lack of diagnostic tools for reliable identification and intervention strategies to be used in educational settings.

Conclusions:

This work provides us with practitioner accounts that such disorders do exist. Future reports will describe primary data from signers with atypical language attributes.

Word count: 200 (not including headings)

Have you ever observed a deaf or hard-of-hearing school-aged client or student struggling with the acquisition of aspects of their signed—not spoken—language?¹ Have you ever struggled to find assessment instruments that would help you gauge whether or not these individuals are progressing normally with all the complexities of signed language development? Are you curious whether communication disorders of signed language could manifest in a percentage of deaf and hard-of-hearing children just like disorders of spoken language appear in segments of the hearing population? And, if communication disorders in signed language(s) were found to exist in the population of some signing children, have you wondered if there could be similarities between disorders of speech and spoken language and so-called signed language communication disorders? If you have considered any of these questions, you are not alone.

Within this work, we describe what various language professionals (e.g., speech language pathologists, teachers, American Sign Language [ASL] specialists) and general educators (other support staff) have to say about this topic based on their experiences interacting with deaf and hard-of-hearing children. We held interviews with professional staff at two state schools for the deaf to obtain their insights. All interviewees were in regular contact with children who are deaf and who use ASL. We frame the reported experiences of these professionals within a larger discussion of what the theoretical and practical implications may be for service provision for this population.

Many questions surface as this topic is carefully considered. Communication disorders exhibited by hearing children are commonly categorized as articulation or phonological disorders, language disorders (receptive or expressive) or fluency disorders. However, the literature does not provide us with an explanation of whether such communication disorders are evident in the signed language of children who are deaf who may otherwise be developing normally (e.g., cognitively, emotionally, socially).

One challenge of finding answers to the questions presented above lies in the unique make-up of the deaf population; more than 90% of deaf and hard-of-hearing children are born to hearing parents (Mitchell & Karchmer, 2004). The majority of these

¹ Following Wilcox & Wilcox (1997), we use the term “sign language” when referring to a single language (e.g. American Sign Language or British Sign Language) and “signed language” to refer, in a more general sense, to language from the visual-gestural modality.

children are not exposed to signed language as infants; as such, this early delay or deprivation of input could have a measurable negative effect on their signed language development (e.g., Mayberry, 1993; Newport 1990). There is no reason to believe that these children would be immune from exhibiting so-called communication disorders in signed language, but the task of distinguishing between a communication disorder in signed language and the effects of delayed exposure to signed language is quite a challenge. For this reason, our immediate focus is placed on deaf children who have been exposed to signed language from birth, a group that in fact represents a small minority of the deaf and hard-of-hearing children within our schools. We argue that this small percentage of children can provide the testing ground for examining whether communication disorders in signed language exist. That is, atypical signing among children who are deaf with early and rich exposure to ASL would be compelling evidence for “communication disorders in signed language.” Moreover, we suggest that this information could also prove to be insightful for our continued study of spoken language and fluency disorders—including methods that we use for intervention.

Many clinicians in our schools (residential, self-contained, and mainstreamed programs) work with students who are deaf or hard of hearing and are developing skills in both spoken English and ASL (or other manual codes). Because research on signed language is still an emerging field, professionals are often left without diagnostic tools to assess typical, much less atypical, signed language development. This report is part of a larger project that is designed to examine atypical developmental patterns in signed language acquisition. The interviews that we reference in this article provided us with an entry-point into the study of this topic. While this report focuses on the professionals who have engaged children who are deaf whose signed language development (production and/or comprehension) appears atypical, we are currently working with specific children who have been identified as exhibiting some type of linguistic atypicality, and we shall report on those case studies in the near future.

Typical Language Development

Most children acquire language according to predictable patterns and they reach various milestones at approximately similar stages of development. In the interest of focusing on signed language development, we point the reader to Bowen (1998) and

McLeod & Bleile (2003) for reports on milestones in the childhood acquisition of English.

Among the predictable patterns are also errors. There are predictable phonological errors, such as pronunciation of *pig* as *big*, a voicing error, or “*cah*” for “*car*” exhibiting final consonant deletion (Bowen, 1998). And there are predictable language errors as well. For example, a notable percentage of typically developing children engage in pronoun reversals and incorrect production of irregular past tense verb forms (Owens, 2008).

In general, the grammar of English is acquired by age 5 in the case of a child who has received input in that language since birth. Of course, the development and refinement of literacy skills requires time—with changes taking place throughout the school-age years.

Deaf² and hard of hearing children (hereafter, referred to collectively as “children who are deaf”) who are exposed to signed language from birth also tend to follow predictable stages of the production of various articulations, although they are mostly manual rather than vocal. Children who are deaf engage in “manual babbling,” the reduplication of hand or arm movements (Cheek, Cormier, Repp & Meier, 2001, Petitto & Marentette, 1991), which mirrors the stage of vocal babbling for hearing children.³ Furthermore, the manual babbling that children who are deaf engage in seems linked, in particular ways, to the first signs that they produce at a later stage of development.

Children who are deaf commonly produce their first sign by one year of age, or reliably earlier according to some researchers (Bonvillian, Orlansky, & Novack, 1983; Siple & Akamatsu, 1991). Various hypotheses have been posited for this apparent advantage for children acquiring a signed language, although some have maintained there is no true sign advantage in first word production (e.g., Petitto, 1987). Meier and Newport (1990) suggest that there are likely no cognitive differences between being

² Within this article, we follow the convention of using the capitalized “Deaf” when aspects of the cultural and linguistic minority status of individuals is noteworthy. Whereas, we employ the lowercase “deaf” if there is no particular intent to highlight cultural or linguistic status.

³ Hearing children also engage in so-called “manual babbling”, although this is perhaps commonly overlooked because of the focus on the development of their oral skills (Cormier, Mauk, & Repp, 1998).

ready to produce signed versus spoken language. They argue that the early first-sign milestone may be due to articulatory differences; for example, the larger size and ease of manipulation of the manual articulators as compared to vocal articulators. Nevertheless, deaf children's first two-sign sequences appear around the same time as the two-word utterances that are produced by hearing children—generally at about 18 to 24 months of age (Newport & Meier, 1985).

It is notable that children who are deaf also experience typical production errors—just like hearing children acquiring spoken language. Some of the errors involve an incorrect value for one or more of the phonological parameters of manual sign formation (handshape, place of articulation, movement, orientation). For instance, a young child may substitute a relatively easier handshape for one that is more difficult to articulate. Studies have reported that handshape errors are the most common types of errors in the early signed productions of children who are deaf with native exposure to ASL (Cheek et al., 2001), whereas place of articulation is the most robust parameter—containing the fewest errors of production. Some children who are deaf also produce pronoun reversal errors during an early period of development (Pettito, 1987), and some non-manual signals that are part of signed language grammar (e.g., eyebrow raises and furrows, head tilts, and mouth movements) are not comprehended and produced until the semantically relevant lexical signs are mastered (Reilly, McIntire, & Bellugi, 1990).

In addition to typical errors that characterize early development of a signed language (i.e., before age five), there are also a number of linguistic devices that are produced with some errors during the school-age years. Those items are normally mastered during school-age development. Two general examples are fingerspelling and the use of space for a variety of phenomena (e.g., non-present referents, so-called classifiers, role shift, and constructed action). These linguistic and communicative phenomena are of particular interest to this study. They pose the challenge of determining the difference between typical developmental errors or omissions and atypical and persistent struggles with the acquisition of these devices.

Padden (2006) suggests that children who are deaf go through two main stages with respect to the acquisition of fingerspelling: (1) an initial phase in which the child learns the actual skill of fingerspelling, and (2) a later period where the skill of linking

fingerspelling to English words is understood by the child. The first phase involves understanding how fingerspelling is used in ASL in comparison with other signs, recognizing shapes of fingerspelled words and the movements of the hand as it fingerspells, and learning the meanings of commonly fingerspelled words; whereas the acquisition of English literacy is tied to the latter period of acquisition. Various accounts of children fingerspelling as early as age 2 have been reported (Akamatsu, 1985; Kelly, 1995), though it has also been claimed that struggles with the suggested second phase of fingerspelling acquisition can also lead to struggles with English literacy development (Padden 2006; Padden & Ramsey, 1998).

One of the ways that signed languages differ significantly from spoken languages is in the use of the signing space for linguistic purposes. Signers can: a) point to locations to establish and refer to pronouns throughout a discourse, b) move some verbs to certain locations and in certain ways to indicate the subject and object of some sentences with information about plurality and person (e.g., first person, second person, third person), c) use certain handshapes and movements to represent classes of nouns (commonly referred to as classifiers), and d) position and move their torsos and upper bodies in ways to represent characters within a discourse or narrative. In general, some of the ways in which the signers use space may not be mastered until after a child enters the educational system at age 5.

In terms of the use of space, there are a number of linguistic devices that are characterized by developmental changes into the school-aged years for a deaf child acquiring a signed language. For purposes of keeping this summary brief, we focus in two of those devices: so-called classifier constructions and the use of referential shift (listed as [c] and [d] in the previous paragraph).

Classifier constructions serve to describe the location, motion, and visual-geometric properties of objects and how they interact (Schembri, 2003). Aspects of certain classifier constructions are not mastered until the age of 8 or 9 (Kantor, 1980; Schick, 1990), though parts of the signs may be correct. In some cases, children tend to omit a *ground* classifier, or location anchor within the signing space, when more than one object is being talked about. There is a certain degree of optionality for some forms, but in adult uses of ASL ground classifiers appear frequently—especially within narratives or

the descriptions of scenes. Additionally, ground classifiers are sometimes produced with incorrect handshapes, even for older children who produce *figure* classifiers, or those that represent an object that moves with respect to another object, correctly (Schick, 1990). In short, the production of classifiers with both hands (possibly a distinct classifier on each hand) is somewhat challenging for younger school-aged children. However, it has been reported that such children obtain a mastery of such forms before they reach the age of 10 (Kantor, 1980; Schick, 1990).

Referential shift is used often in ASL and other signed languages to depict a character's point of view, to mark a direct quotation in signed language, and/or to demonstrate the actions of a character through *constructed action* (the reporting of a character's actions with the signer's body parts; see Liddell & Metzger, 1998). Referential shift, like classifier constructions, is used extensively in adult narratives, but it also appears in daily use of ASL when reporting the words or actions of someone other than the signer (unless it is the signer reporting his own words/actions from another time). Referential shift also interacts with the use of serial verb constructions (i.e., multiple verbs that show different aspects of action of a character). Studies have shown that aspects of referential shift are mastered by approximately age 7 (e.g., for demonstrating a direct quotation or words of a character; see Emmorey & Reilly, 1998), but other functions of this device (e.g., for demonstrating constructed action) require more time for development. If we consider serial verb constructions, referential shift is not mastered along with those forms until approximately age 9 or 10 (van Hoek, O'Grady, & Bellugi, 1987; van-Hoek, O'Grady-Batch, Norman, & Bellugi, 1989).

As can be noted, there are various aspects of signed language that are indeed acquired before a child enters the educational system (e.g., Kindergarten or Grade 1), but some aspects of signed language communication require several more years for development. Determining the difference between typical examples of acquisition (including the production of typical errors) is one of the challenges of considering so-called communication disorders in signed language.

Atypical Signed Language Development

To our knowledge, there are no formal studies of atypical signed language development or "disorders" in American Sign Language. However, several recent works

from the United Kingdom (Mason et al., 2010; Morgan, 2005; Morgan, Herman, and Woll, 2007; Marshall, Denmark, and Morgan, 2006) have considered whether Specific Language Impairment (SLI) can be found in the signed language development of children who are deaf. SLI has been identified in approximately 7% of the hearing child population of English speakers (Leonard, 1998), although whether or not SLI exists at the same rate in children who are deaf who are acquiring a spoken language is unknown. It has most often been the case that children who are deaf with signed language difficulties are not eligible to be considered as exhibiting SLI because one of the criteria for diagnosis is normal hearing. Yet, SLI might exist in a similar percentage of the deaf signing population. Or, as Morgan (2005) and Marshall et al., (2006) suggest, the incidence may even be higher than in the general hearing population because some factors that cause deafness (e.g., prematurity, perinatal complications, etc.) may also predispose for SLI.

Morgan and colleagues (Morgan, 2005; Morgan, et al., 2007) collected case study data from a deaf child who may exhibit characteristics of SLI in his development of a signed language, in this case British Sign Language (BSL). The researchers briefly describe characteristics of Paul's language, a child who is deaf (age 5;2) and who acquired BSL in the home from his signing parents; he is enrolled in a bilingual (BSL-English) school for children who are deaf in the UK. Paul is reported to exhibit typical cognitive, social, and neurological development. However, through formal BSL assessments and video footage of Paul interacting in BSL with various people (his parents, teachers, and speech-language pathologists), it was determined that he demonstrated a significant delay in both comprehension and production of certain BSL grammatical constructions, but his phonological development and receptive vocabulary seemed to be normal. Grammatical problems were found in the following areas: encoding negation, distinguishing between noun-verb pairs, and the use of spatial verbs and so-called classifier constructions. However, there were areas in which Paul performed very well, such as in the marking of plurality. The authors also reported that Paul compensated for poor linguistic performance by using gestures and facial expressions for communication and he generally produced one or two-sign sentences (utterances) with very limited grammar.

In more recent work the UK team of researchers (Mason et al., 2010) present an analysis of 13 signing deaf children aged 5-14 who appear to possess signed language deficits they classified as SLI.⁴ This article confirms that earlier descriptions of a child referred to as “Paul” (Morgan, 2005; Morgan, et al., 2007) do not constitute a unique and rare case. Rather, there appear to be other deaf children with signed language impairments. The children referred to by Mason and colleagues perform within normal ranges on various tests of non-verbal intelligence and motor dexterity⁵, yet they fared poorly on one or more linguistic tests that target BSL competencies (the BSL receptive skills test [Herman et al., 1999], the BSL production test [Herman et al., 2004], and the nonsense sign repetition test [Mann et al., 2010]). The researchers note that performance on the linguistic assessments shows “...clear impairments in narrative skills and knowledge and use of BSL grammar within the group as a whole.” (Mason et al., 2010, p. 44)

These findings have encouraged the BSL researchers cited here to question well-known hypotheses about developmental language disorders concerning children’s ability to successfully process auditory signals. As an example, The Auditory Processing Deficit (APD) Hypothesis suggests that children with SLI have difficulties processing the rapid temporal changes that characterize speech (Tallal, 2003; Tallal & Piercy, 1973). All the recent writings from the UK (Mason et al., 2010; Morgan, 2005; Morgan, Herman & Woll, 2007; Marshall, Denmark, and Morgan, 2006) suggest that evidence of signed language impairments in children who are deaf who are otherwise developing in a normal fashion cognitively provide evidence that SLI is not dependent solely on auditory processing but could also be linked to the management of linguistic structures—perhaps beyond the phonological and lexical levels of structure (Morgan, et al., 2007). To the extent that auditory processing difficulties are the primary cause of SLI, the BSL researchers propose that SLI should be infrequent or absent in signing children. In short,

⁴ Most of the children in the Mason et al., (2010) study are not native signers of BSL. However, these deaf children were initially identified by teachers of the deaf and speech language pathologists, which is notable for the readership of this journal.

⁵ All but one of the children scored within the normal range for typically developing deaf and hearing children on the test of motor dexterity.

these data from children who are deaf and acquiring a sign language might allow us to investigate theories of SLI from a different perspective.

With regard to American Sign Language, various authors have suggested that stuttering does occur within the language production⁶ of individuals who are deaf. Snyder (2006) refers to a study dating back to 1937 by Voelker & Voelker, in which “stuttering” and “secondary characteristics” are noted in the language of a congenitally deaf child. It is not clear if that study referred only to spoken language. Backus (1938) claimed that children who are deaf do stutter, presumably in their speech⁷, and that proposal was echoed by Harms & Malone (1939) who also suggested that stuttering (or “stammering”, in their terminology), is related to hearing ability. In regards to stuttering in signed language, Silverman & Silverman (1971) reported that stutter-like behavior (e.g., hesitations, insertions of extra movements, and the repetition of initial letters in fingerspelling and repetition of signs) had been observed in signed language. Montgomery & Fitch (1988), a more recent work also focused on stuttering, considered both the oral and manual modalities. Based on survey data representing 9,930 students who were deaf or hard-of-hearing, the authors’ findings support earlier work that suggest that stuttering in speech is more prevalent (up to eight times as frequent) in the hearing population than among deaf and hard-of-hearing children. An important finding taken from this study is the observation of persons who stutter (n=9) in sign. Furthermore, six of these individuals stuttered only in sign and not in speech, and three stuttered in both modalities. A more recent presentation of the topic of signed stuttering is contained in Whitebread (2004), although this work provides no actual behavioral data. Through the use of interviews with Deaf individuals, the author suggests that sign stuttering may be characterized by the following: inconsistent interruptions in sign and fingerspelling,

⁶ It should be noted that while we refer to stuttering in the population of individuals who are deaf, it is recognized that stuttering in hearing populations is a speech disorder. In the case of Deaf individuals who use American Sign Language as their primary mode of communication, using the term speech disorder in this context would be misleading. The intent of this manuscript is to refer to stuttering as a communication disorder associated with signed language; thus, we will refer to it as a *signed language* disorder.

⁷ Results from this study identified 55 students out of 13,691 (0.4%) who were deaf with a documented condition of stuttering (Backus, 1938). However, it is not clear from the publication whether these students stuttered in sign as well as speech.

hesitation of sign movement, repetition of sign movement while maintaining the initial handshape, exaggerated or “prolonged” signs, unusual body movements unrelated to linguistic communication, poor fluidity of the sign, and inappropriate muscular tension (in the arms and hands) associated with signing.

The few published works on developmental communication disorders in signed language with respect to BSL and the writings on the topic of stuttering within the population of children who are deaf raise many questions that remain unanswered. Little is known about the different types of atypical language and communication that some native signing children who are deaf exhibit. For that reason, we began our investigation of this topic by querying the professionals who work with such children on a daily basis. We feel that the accounts of language professionals and educators at schools for the deaf can provide researchers and practitioners alike with important information that can serve as a starting point for the investigation of developmental communication disorders in signed language within the childhood population of ASL signers.

Method

In order to gain an understanding of communication disorders as exhibited by children from signing environments, a phenomenon not previously studied in the United States, we wanted to capture field-based accounts and observations, rich in detail and embedded within the educational context; therefore, qualitative research methods were used. The following general research questions guided the study (see the appendix for a list of specific questions that were asked during the interviews):

- (1) Have language professionals and educators at schools for the deaf considered the existence of communication disorders in signed language?
- (2) Have language professionals and educators at schools for the deaf interacted with deaf children who come from signing households and who exhibit atypical patterns of American Sign Language production or comprehension?
- (3) If so, what are some examples of the suggested “atypicality” that have been witnessed?

This qualitative study utilized a phenomenological interpretive approach with the goal of understanding aspects of communication disorders in populations who natively use signed language. We focused our inquiries on these populations of children in order to

rule out reports of language delay possibly caused by late exposure to signed language. The vast majority of deaf children are raised in non-signing households, and delayed exposure to a natural sign language may also result in atypical patterns of comprehension and/or production of signed language. Our method of implementation involved conducting interviews with language professionals and educators at state schools for the deaf. The professionals discussed key experiences with native-signing children who they described as exhibiting various types of atypical development. Emergent themes were identified within our analysis and are summarized here.

Participants & Sample Selection

We conducted four focus groups and a one-on-one interview with a total of 22 adults (7 deaf, and 15 hearing) who work at schools for the deaf. These data were collected between 2006 and 2010. See Table 1 for more details about the years of experience working with Deaf children of the participants.

The focus groups included participants we refer to collectively as language professionals (speech-language pathologists, teachers, school psychologists, and ASL specialists) and general educators (support staff such as counselors and librarians). Three focus groups were conducted in American Sign Language, and one was conducted in English; the one-on-one interview took place in ASL. One researcher self-identified as a hearing child-of-deaf-adults (CODA) with native proficiency in American Sign Language; the other is a hearing nationally certified ASL-English interpreter and has been engaged in linguistic research for approximately 15 years. Based on the researchers' longstanding personal and professional ties to the Deaf community, over 35 years of research experience collectively, purposive sampling was used to identify schools for the deaf to participate in the study. The other researcher, a hearing graduate student, learned ASL as an adolescent and has worked with the other researchers for 7 years. The two schools selected were bilingual-bicultural schools and were selected based on logistical convenience. An administrator from each of these schools helped with the recruitment of participants. While an open invitation was extended to all educators, speech-language pathologists, psychologists, and support staff at both schools to participate, a larger percentage of speech language pathologists were represented in this purposive sample given the nature of the research questions.

Settings

Two state residential schools for the deaf were used as the settings for this study. The schools were selected based on the researchers' past experience working closely with these schools on other research projects. When conducting research with a minority population, it is imperative to be conscious of the needs of that community and to have a strong rapport. In particular, when conducting research with Deaf populations, it is important, and ethically responsible, to be cognizant of the norms and values of Deaf culture and comfortable with the use of signed language (Singleton, Jones, & Hanumantha, 2010). Failure to do so leads to a high risk of the intentions of the researchers being misconstrued as taking control over the minority population, or not listening to their views. Therefore, extreme care was taken to ensure that the schools were comfortable with the entire team of researchers and the nature of the study. This included series of meetings with school stakeholders and clear communication about confidentiality of the focus group process and resulting data. School communities, and the broader Deaf community, are small and close-knit; therefore, prior acquaintances between researchers, participants, and community members must be acknowledged, but confidentiality vigorously protected.

Both schools were founded in the 1800s and implement the bilingual/bicultural approach to Deaf education. This approach means that deaf and hard-of-hearing children are encouraged to use both American Sign Language and English, in whichever form is most accessible. The classroom is a bilingual environment where ASL is used as one medium to promote the learning of English. Deaf culture is embraced and shared by the students and faculty/staff members at the schools. Deaf culture also is discussed for children to learn more about themselves and other people who are deaf within the school environment.

Procedures

In almost all cases, we provided a list of sample questions to the interviewees ahead of time. We wanted to provide them with the advance opportunity to think about the phenomenon of communication disorders in signed languages so that their descriptions would be rich. A university Institutional Review Board approved the research protocol, and the approved consent forms were made available to all participants

in English. In addition, content of the consent forms was explained in American Sign Language.

To protect student confidentiality, we instructed participants to not use specific names of children during the interviews. All participants were fluent signers, and ASL was used for the interviews if there were any deaf professionals involved in order to encourage accessibility for all participants. The focus group interviews and one-on-one interview lasted between 45 and 60 minutes, and they were all video recorded.

Research design and analysis

This study used a survey interview design, but results were analyzed qualitatively using a combination of grounded theory (Charmaz, 2001; Strauss & Corbin, 1998) and modified van Kaam approaches (Moustakas, 1994). Because of the novelty of the topic, the interview protocol used with focus group members served merely as a guide for their discussion. This approach allowed for key experiences to be discussed freely but allowed for the researchers and interviewees to have flexibility and leeway to explore uncharted territory on this topic. The risk of having a structured interview protocol for such a novel topic was that critical experiences and descriptions of atypicality could have been missed. Our less-structured approach offered an entry point to this new topic, and enabled us to identify key issues related to atypicality among signers.

The following qualitative research techniques were used for data collection and analysis: focus groups, field notes, and triangulation across researchers. Once the focus group interviews were conducted, reliability checks were performed on all transcripts of interviews conducted in ASL to ensure accuracy of the translation (from ASL to English). The reliability checks were performed by a team of four experienced signers—three of whom are native users of ASL.

Using Moustakas' (1994) modified van Kaam approach, the researchers analyzed data by grouping, reducing, clustering and identifying themes, creation of textural-structural description for each participant. A synthesis was created from the meanings and essences of the experiences with atypical signed language development that represent the group as a whole. This interpretive analysis was an iterative and inductive process of decontextualization and recontextualization (Starks & Trinidad, 2007). The process of

decontextualization involved coding specific statements from the transcripts and grouping them by theme to recontextualize them through this new lens.

The first step involved initial or open coding, where the team of researchers independently reviewed all transcripts and identified key themes and subthemes across the five transcripts. In this stage, the researchers made analytic decisions about the data and coding the data accordingly. Each author took all transcripts and generated initial codes that reflected themes emanating from the original transcripts.

In conjunction with the initial coding, each researcher wrote memos, or notes, that allowed for elaboration on the processes defined in the initial coding stage. The process of memo writing helped the researchers clarify their emergent categories, elaborate their conditions and consequences and situate them within broader historical or social contexts.

Then, as a team, the three authors reviewed all transcripts, initial codes, and memos that had been generated for the five transcripts (four focus groups, 1 one-on-one interview). They then generated the core categories (or what Charmaz, 2001, called focused codes) that had emerged from this discussion. Once core categories were established, the team went back to the data to review initial codes and memos to ensure that they had adequately captured all relevant concepts, and to potentially collapse or redefine categories.

In the next section, we present our results as key themes identified from the interviews, and we include various direct quotations from participants. The results are organized as follows: atypical signing patterns, prevalence estimations, possible etiologies, psychosocial aspects of atypicality, and diagnosis and intervention.

Results

Atypicality in Signed Language Acquisition of Native Signers

Most participants claimed that they had, within the span of their professional careers, witnessed children who were deaf, native signers exhibiting atypical or unexpected characteristics of language development⁸. Among the common discussion points through multiple interviews were: so-called “signed stuttering”, exhibiting little to

⁸ Characteristics of language development in this context refers to the production and/or comprehension of signs and/or the use of facial expressions in ASL.

no affect on the face (either emotional or for grammatical purposes), a protracted response time to questions directed at certain children, issues with the switching of hand dominance, problems with the appropriate use of signing space for classifiers and so-called role shift, and some occasional errors that involve particular phonological parameters (e.g., movement, hand orientation). Each of these types of errors is discussed below and specific examples that were provided by participants are included.

“Signed stuttering.” Multiple participants in the interviews referred to what they called “signed stuttering.” In one example, a Deaf ASL specialist with over 15 years of experience working with children who are deaf, described an interaction with a particular child who would repeatedly start to sign, but then stop before he was able to produce a comprehensible utterance. Another example, shown in (1), came from a Deaf educator who described his younger brother who used to, according to him, stutter in sign and speech simultaneously.

(1) Deaf School Counselor, Translated from ASL to English:

He would tend to spell out my name and then say *que que que que que*⁹ while signing WHY WHY WHY WHY WHY¹⁰ [note: signer articulated one final and emphatic sign and loudly voiced the word *que*]

Or, he would sign HEY! FOR FOR FOR FOR (mouthing *p-p-p-p-porque*), [the signer shows a building up to the final articulation with a continued stutter]

It is unclear how these first two examples parallel examples of stuttering in the speech of hearing individuals. From what was said by each interviewee, the signing of the atypical child was not fluid, but rather dysfluent and repetitious. Yet, another example of the discussion of so-called “signed stuttering” came from an interview with a trained and experienced speech-language pathologist and a school psychologist. In that

⁹ This educator reported that Spanish, ASL, and English were used within his household, which was comprised of hard of hearing and deaf family members. The Spanish word *porque* translates to ‘why’ in English, and in the first example above *porque* seems to have been reduced to *que*.

¹⁰ We adopt the common strategy of reporting ASL signs with English semantic equivalents in capital letters. Fingerspelled words are represented with capital letters separated by dashes. Other salient information or verbatim strings of ASL signs can be found within brackets.

interview, the speech-language pathologist noted that she saw “signed stuttering” accompany stuttering in speech (for those children who are deaf who also use speech), but she also remembered a child who was deaf who would stutter in English but not in ASL. She suggested that the child used ASL as a compensatory strategy to communicate when he encountered a point of disfluency in English.

One other descriptive example in (2) of “signed stuttering” came from an ASL specialist at a school for the deaf.

(2) ASL Specialist and Teacher, Translated from ASL to English:

I know one Deaf kid from a long time ago who had Deaf parents and he would start a conversation or get someone’s attention with a little hand wave that you normally do when you get someone’s attention. And then he would start his discourse by signing “BUT BUT BUT BUT” and he would sign that over and over. You know, that sign BUT BUT BUT, and he just kept signing BUT BUT BUT and I would look at him and wait for him to get over his signing of BUT multiple times. Then, finally, he would start talking about whatever he was going to talk about. Or the other variant that I have seen is that they do the little hand wave to get someone’s attention and then they sign AND. So they sign AND AND AND AND, and then they start talking.

These reported data made by the professionals seem to corroborate the suggestions made by the few existing research studies (Backus, 1938; Harms & Malone, 1939; Montgomery & Fitch, 1988; Silverman & Silverman, 1971; Snyder, 2006; Voelker & Voelker, 1937; Whitebread, 2004) that claim that stuttering does exist in the signed language production of some children who are deaf. However, little is known about the causes of such dysfluencies and what can be done about them.

Lack of information from facial cues (including comprehension & production). In addition to providing linguistic information on the hands, signed languages utilize non-manual means for modifying manual signs, displaying emotional affect, and, in some cases, producing mouth articulations that are part of the grammar of the language. Various participants in the interviews noted that they had witnessed children who were deaf native signers who used little to no facial cues to express important information in

ASL. For some of the professionals, the lack of facial cues was akin to a blank stare—a “stone-faced” look on the child’s face. This is particularly odd for a deaf signer of ASL—even for those who may not regularly sign with much emotional affect.

In one instance, the speech-language pathologists and psychologist described, in spoken English, a student who had a “flat affect” across all communication settings with all communication partners. Moreover, they suggested that there was absolutely no indication of eyebrow movement, facial expression or other linguistically important facial cues in ASL.

During one interview, an ASL specialist noted that a lack of facial cues was common for all of the native signing children (n=5) whom he could remember as having some type of language or communication problem in their signed language. In at least some of those cases, a Deaf ASL instructor had worked with the children to help them improve their use of facial expressions. Specifically, the ASL instructor had them practice raising and lowering their eyebrows, which is one of the markers of various types of syntactic constructions in ASL. However, the interviewee also remembered seeing the same individuals later in their life and saw that they had the same expressionless faces that he had noticed before in their childhood.

Similar points about facial expression were echoed during two other interviews at the other school for the deaf. One interviewee stated, “...facial expression, may not be so good sometimes with these kids. That’s what I have noticed.” Another elaborated by providing the comments in (3):

(3) Teacher, Translated from ASL to English:

...like in facial expression, [points at other interviewee] I know what boy you were talking about a little bit ago. I remember him. He had Deaf parents and wow, he was hard to understand because he was just kind of stone-faced. You just didn’t really get much expression out of him. He would sign, but there were things that seemed to be missing from his facial expression. It’s really hard for me to describe it. He would produce language, he would produce sentences, but there wasn’t a whole lot of facial expression when he was doing it.

Based on the comments highlighted here, the lack of facial cues for providing information (presumably grammatical and affective) is a characteristic that has been noted by various professionals with respect to some native signing children who are deaf who seem to be developing atypically.

Use of space. As noted earlier, the use of the signing space for communicating various types of information is perhaps one of the characteristics of signed languages that differentiate them from spoken language linguistic phenomena. Two salient examples of errors noted by the interviewees relate to the use of space for establishing referents in discourse and secondly, using role shift strategies for communicating the thoughts and actions of one of the characters (i.e., direct quotation).

In the first example (4), the educator is recalling a 12-year old child with impaired signing, suggesting that by that age, the child “should be able to do that [setting up characters in space], but they can’t”.

(4) Teacher, Translated from ASL to English:

...Sometimes, you know, they may say there is a child located somewhere in the signing space in front of them. Then they say there is an adult to the right. The signer would normally have to turn their torso and head and look up as if it was the child gazing up towards the adult. But sometimes they don’t do that. And I wonder why they struggle with that sometimes. Is it something sign related, something language related, or is it kind of cognitive?

In example (5), an educator relays a story about a student who neglected to appropriately use space to set up the location of the objects in her story.

(5) Teacher, Translated from ASL to English:

That child tended not to use space; but what I did was to model the correct use of space back to her. Such as “Oh, you mean that there was a car here, and another car here, and they pass each other. [ASL: YOU MEAN CAR Vehicle-Classifier-handshape on right side of signing space, AND OTHER CAR Vehicle-Classifier-handshape on the left side of signing space, classifiers move past each other]”. I tended to model it back because she was not clear. She did not set up objects in

the signing space that way. For example, she would not indicate where a woman and a man would be located on opposite sides of a conversation.

In this example, the atypical child signer was not clear about significant aspects of her story, so she could not connect the details together into a cohesive narrative. Instead of taking steps to clarify the message, this child waited to see the modeled response from the educator and then responded, “YES, THAT!” indicating that the educator’s production was the intended meaning of her story. As we pointed out in the section describing typical development in ASL, aspects of the acquisition of classifiers are often characterized by a protracted developmental pattern. However, the examples provided in (4) and (5) seem to suggest that the children to whom the educators were referring were not performing at age-appropriate levels.

Errors in phonological parameters. Perhaps the first place that someone might look for errors or atypical development with respect to signed language would be with the phonological parameters that are manifestations of sublexical structure in signed languages.

Several professionals in the focus groups claimed they detected phonological errors in the signing of atypical native children who are deaf. For example, one participant suggested that movement and place of articulation of certain signs may be produced incorrectly by children who are struggling with their signed language development. Another professional, in the same interview session, supported the suggestion that errors with movement are common; though she did not feel that place of articulation was as problematic for those children. One of the reported movement errors concerned the sign ENOUGH. A speech-language pathologist described a 5-year-old who was attempting to articulate that sign. The sign is correctly produced by forming the non-dominant hand in a closed fist (i.e., ASL S-handshape, ulnar side of the hand facing downward) and the dominant hand (palm facing downward) sweeps across the top twice in an outward motion in an open-5 handshape. The child, however, had to make purposeful movements in order to position his articulators in the correct manner. Furthermore, when it was time to add the movement to the sign, the child’s dominant hand moved in the opposite direction, towards their body thereby producing instead something closer to the sign FULL (same handshapes and orientations but with different

movement of the dominant hand). This particular child, as described by the clinician, “was groping, like somebody, somebody with oral motor problems.”

One interviewee offered up an example of what he thought was an error in place of articulation of a sign. He reported having interacted with a child who was deaf who would sign PLAY (a two-handed sign) by crossing her hands and arms so that each hand would be located on the contralateral side of the torso (i.e., the side opposite that of each hand) rather than on the ipsilateral side (i.e., the same side of the torso as the hand). This may not be an example of an error in place of articulation since the same places are used in the correct form of the sign—except that the hands were switched in the error. Additional examples of that child’s signing would be needed to determine if other errors in phonological parameters were common.

Regarding palm orientation, one salient example described by a speech-language pathologist was a child who was trying to sign WANT, which is typically signed in ASL with two hands palms oriented upwards in a bent-5 handshape, but the child inverted her palms downward instead. See Figure 1 and Figure 2, respectively, for the correct articulation of WANT and the incorrect version that was reported by the professionals.

As noted in our brief summary of typical developmental trends for native signers, young children commonly go through periods, very early in development, in which errors in phonological parameters are exhibited. Such errors are common in handshape, but less frequent with place of articulation. It may be the case that the errors of these older children do not pattern like the expected errors of development for young children. More work is needed in this area to determine if there are predictable differences between the two.

Failing to establish reference information (e.g., time, place, referents). Another issue that was described with respect to the signed language development of native signing children who are deaf was the lack of establishing reference information when they would begin to tell a story. The excerpt given in (6) exemplifies this problem, with a focus on the classifiers that were used by the child.

(6) School Psychologist, in English:

...and I get kids that come in, I’m testing them and all of a sudden they start telling me this story and I don’t know if it’s on TV, I don’t know if its

something they saw, I don't know if it's a book they read or whatever. They don't give me any time frame, they don't give me any setting, and I'm figuring out what the classifiers are but they didn't set them up. They didn't show me what the classifiers were. And that's a really basic thing. I don't care if a three year old doesn't set up that classifier, but when I've got a third grader or a fourth grader who's not setting up that classifier, I'm concerned.

In addition to children not providing necessary information about classifiers, some interviewees noted, as in (7), that some children who are deaf from signing households fail to inform their interlocutor when and where a reported event occurred.

(7) Teacher, Translated from ASL to English:

Yeah, there was an expression problem. She had problems setting things up. She had problems conveying when things happened in the story. She recently told a story about her weekend. I had to ask, "Did it happen on Friday night or last night? When did it happen? [ASL: HAPPEN FRIDAY NIGHT O-R PAST NIGHT? WHEN HAPPEN?]" She responded, "BEFORE...BEFORE..." She couldn't set up when it happened. She's really weak with time, really weak with time.

Taken together, these examples illustrate how atypical signers can miss critical information with regard to story construction. One can surmise the comprehension difficulties that peers and others would have when interacting with an individual who omits this type of information when telling a story.

Switching hand dominance. Some professionals were concerned about native signing children who are deaf who switch hand dominance regularly within a communicative turn. In such cases, the children may be articulating signs correctly (with their dominant hand serving as the dominant handshape/movement/orientation for the sign), and subsequently switch to sign with the other hand. In theory, this could occur with signs that are both one- or two-handed in nature, however, that information was not provided in the interviews. In some cases, the discussion focused on the production of fingerspelling by the dominant hand and then switching to production by the non-

dominant hand. Whereas this is possible in ASL for stylistic purposes, the professionals seemed to frame this pattern as an atypical articulation.

As can be seen from the examples provided here by the interviewees, speech-language pathologists and educators attested to various types of unexpected linguistic deficits that have appeared in some children who are deaf with whom they have interacted. As we proposed earlier, linguistic deficits could also be characteristic of children who are deaf who are not native signers (i.e., where there is little or no use of a natural signed language in their home), and a few interviewees provided their own accounts of such children. However, the focus of our discussions was on native signing children who are deaf in order to rule out language delay, and all the examples provided in this section are about such children.

Prevalence of Atypicality: Estimates Regarding Incidence and Questions about Adult Awareness

One may wonder about the incidence of such deficits in native signing children. We asked the language professionals and educators about their intuitions, and we received various responses. One interviewee said that she has only seen about five such students within 18 years of working with children who are deaf or hard of hearing. Another professional estimated that he normally sees one new child per academic year, but he also felt that it used to be fewer—about one every three years. In another interview, the professional felt that such deficits were evident in only 1 out of 12 children at that school who were native signers. The focus group comprised mostly of speech-language pathologists suggested that the incidence of such deficits in native signing children is approximately 3-5%, although this was simply an estimate based on their own experiences.

The estimates generated by the participants appear somewhat low if we compare those figures to published prevalence estimates for language and fluency deficits among hearing children who use spoken language (e.g., the suggested 7% prevalence of SLI in English-speaking children; Leonard, 1998).

Another consideration regarding the estimated incidence of such deficits concerns the level of awareness that these language professionals and educators might have about the possibility of signed language impairments. It has generally been assumed that

children who are deaf from signing households are fluent and model signers. Their language input is expected to be sufficient for the development of basic communication skills at home, which allows them to arrive at school prepared to continue their learning of academic discourse (what Cummins [1979] referred to as BICS and CALP, respectively). Yet, some of the language professionals and educators noted that they have realized that their expectations do not always match what they see.

In some cases, however, the deaf parents of such children are also aware of their child's deficit. One professional advanced this point in (8).

(8) Teacher, Translated from ASL to English:

I had one set of parents who realized that something was going on with this child because they had other, older deaf children. They could not say what it was exactly. Both parents were educated. In fact, the parents of each one of the five students I have discussed today are educated. The parents of this particular child knew something was going on but did not know exactly what it was.

However, it may also be true that parents are aware of their child's deficit but find themselves unwilling to openly accept that it is truly occurring. This was exemplified in (9).

(9) Speech-Language Pathologist, Translated from ASL to English:

Yes, and that's my concern because some of these parents don't want to accept that their child has a problem.

In summary, the speech-language pathologists and educators that we interviewed believed that there were cases of native signing deaf children who exhibited various types of language and communication deficits. Unfortunately, lack of awareness of this possibility among educators and parents may lead to under-identification of such deficits in these children.

Considering possible etiologies

The widespread belief that atypical signing is rare among native signing children who are deaf may be fueling the following responses to our question about what may be causing the deficits. Some professionals suggested that there may be something atypical in these children's input that is causing them to experience such language difficulties.

Other types of suggested causes were: the level of residual hearing of the children, concomitant cognitive deficits that are influencing language development, and the role of personality in language development. These points are discussed within this section.

The Role of Input. Various participants suggested that parental language may be a primary factor influencing linguistic deficits that a child may possess. For instance, with respect to a particular child who exhibits challenges with responding to questions at times, an educator noted that the child's parents are quiet like the child, suggesting that there is a personality similarity that may be influencing the child's development of signed language. This account was also forwarded by another participant at a separate interview session (and a different school). Parents who seem to be reserved and not very animated in their signed language production were also cited as possibly affecting the language development of their children who are deaf.

Earlier, we discussed the switching of hand-dominance as one of the characteristics that some of the professionals had noted in the native signing deaf children who appear to be developing atypically. In one case, a deaf child was described as having one deaf parent who switches dominance regularly—apparently with the signs that are produced, and not solely fingerspelling. The professionals in that interview engaged in extended discussion about the role of linguistic input and wondered whether that child's switching of dominance was simply a reflection of the idiosyncratic linguistic behavior of their deaf parent.

Factors Other than Input. Various professionals expressed their uncertainty in knowing whether a language deficit is being caused by a non-linguistic cognitive deficit rather than something that is primarily linguistic in nature. For example, various interviewees noted that some of the deaf children they had in mind exhibited characteristics of Autism Spectrum Disorder, whereas others may have a learning disability.

Children with attention deficits are certainly found among the student populations at schools for the deaf. During one interview, several speech-language pathologists and a school psychologist wondered whether such students may be particularly vulnerable to deficits in signed language because the visual linguistic medium requires that the language learner attend to the input in order to receive it. In other words, there is no

“overhearing” in ASL—such as in hearing people’s communication when one is attending entirely (at least visually) to one object or location while listening to speech that is being produced within earshot. When a person who is deaf perceives language, they must be attending to the signer by keeping their eye gaze fixed on the signer’s face and, peripherally, hands. The professionals hypothesized that this requirement could be problematic for deaf children with an attention deficit disorder.

Several professionals also wondered whether an atypical signer is signing differently due to his/her personality type rather than because of a language or communication deficit. In short, the common question of language difference versus language disorder was recurrent in these focus group discussions. This is reflected in the quote in (10).

(10) Deaf educator, Translated from ASL to English:

It has to do with personality, I guess. Some of these children have a kind of sweet nature and it’s reflected in how they sign as well. And some of them are a lot more intense and you can kind of see it in their signing. And for those who are intense, sometimes I don’t understand what they are trying to say because of how they say it. Sometimes there are very subtle signing differences, you know, that reflect people’s personalities, like facial expression, or other things. You know, I realize that sometimes handshape is not articulated very well, not particularly clear. Some of them are what I call “soft signers” and that’s reflected in their personality and reflected in their signing. I don’t see it as being kind of lazy.... but it’s certainly not crisp, I can tell you that.

Another comment made by a professional that merits mention because of its possible implications concerns the level of residual hearing that a child may possess. According that professional, the amount of residual hearing could potentially influence the signed language development of that child with hearing loss. This professional wondered whether a student who is hard of hearing, one with sufficient hearing with or without the use of amplification devices, might be at a disadvantage for acquiring signed language in a robust way because of the potential for interference from the auditory signals that he/she is simultaneously receiving.

Psychosocial Aspects to Consider

Another common theme from the interviews focused on the effects of such language challenges on the children's social and emotional development and, in some cases, on the attitudes and beliefs of their parents. Social and/or emotional problems were noted for some of the children—presumably tied to their language deficits. It was claimed that the children become frustrated at times, and the parents also react in particular ways. Additional insight by several people suggested that the children's linguistic behavior and performance may be different at home than at school.

Some of the professionals mentioned that emotional and/or social problems are evident in some of the children with language and communication deficits. In some cases, the problems lead to isolation at school. Two of the professionals were discussing a child with communication issues who does not spend time with other children at school. The child was reported as not having many friends. Other interviewees also commented on the fact that such children may get ostracized by their peers—presumably due, in part, to their lack of fluent signed language and communication skills.

The child's awareness of their language deficit was a related theme brought up by one of the interviewees. One might see an emotional toll when a child becomes aware that he/she is not communicating at the same level of some of his/her peers. The interviewees reported that in such cases the children usually became very frustrated and they may even deny or downplay their communication challenges.

The example in (11) is an account of a frustrated native signing deaf child presumably because of her language deficit. This quote refers to the establishment of reference information, which was a topic discussed earlier.

(11) Teachers, Translated from ASL to English:

Teacher 1: She always signs BEFORE BEFORE BEFORE. But, what does that mean?

Teacher 2: So what you are seeing is not a long description of events, but more of a short description and that's all.

Teacher 1: Yes, just short descriptions of events. If you try to pull information out of her, you can see she starts to get really flustered. You

see that she's frustrated because she knows that she has to say something, but she can't. She's frustrated.

Interviewees also suggested that language and communication deficits could affect whether and to what degree a child socializes with peers and other signers. In some cases, a child with communication problems might not be invited to participate in extracurricular events in the community, and that child realizes that the lack of invitations may be related to their communication challenges. However, several speech-language pathologists conjectured that a child with a deficit may also search out other children who are suitable communication partners—even if such children are younger than him/her. This strategy maintains a network of better-matched communication partners for a child exhibiting signed language deficits (and, with so many late learners of ASL in the signing community, their struggles may not be as noticeable to the broader population of signers).

One other topic of discussion that we have included within the theme of social and psychological effects is that of differences in signed language use between the home and the school. In some cases, as illustrated in (12), the claim is that the children do sign well at home, but that fluency is not reflected in their signed language use at school. That topic is covered in the discussions presented below.

(12) Educator & ASL Specialist, Translated from ASL to English:

Educator: I agree with you. Some students, at home, they can sign really well. But then they get to school, and then at school they feel kind of stressed or something I don't know what it is and they sign kind of different, almost very linear. It's not ASL at all. It seems influenced by English.

ASL Specialist: It was the same as when I was a kid. I used ASL, you know, when I was an infant. I had Deaf parents. And when I came to school, I felt very scared or in some ways almost oppressed by some of the teachers. I definitely acted differently here than I did at home in my natural environment. What you are saying [points to colleague], when you talk about some kids at home, they sign very well and they come here and they change their signing.

One professional, an ASL specialist, expressed concern about what he viewed as differences in home signing versus school signing. In particular, he was wondering why they use initialized signs (signs that are formed with the handshape that corresponds with

the fingerspelled letter of the alphabet; these are often considered as displaying influence from English) instead of fingerspelling the words if no specific ASL sign were to exist. He gave the example of the English words “truck” and “bus”, and he noted that children often use an ASL classifier-like construction, that would normally mark the general shape of the object, and modify the expected classifier handshape by using a manual alphabet T-handshape for “truck” or a B-handshape for the word “bus”. His argument was that those concepts are usually fingerspelled at home with families who are deaf, but they are produced with initialized signs at school. This type of variation is likely common in ASL signing among children who are deaf of school age (and beyond, in some cases), and it must be considered when addressing potential deficits in signed language production. This likely reflects language difference (i.e., variation) and sociolinguistic pressures of certain contexts; rather than a language deficit or communication disorder.

Diagnosing Communication Disorders in Signed Language and Providing Intervention

The final major theme that we present is one of particular importance for clinicians who work regularly with children who are deaf and hard of hearing, and it has to do with the general lack of assessment instruments—including diagnostic tools—and accepted intervention strategies within the field. Currently, there are few tools that can be used to assess a deaf child’s signed language production, and the ones that do exist mostly target global measures of a child’s abilities (see Singleton & Supalla, in press, for a review of such tools). Additionally, no diagnostic instruments exist for particular deficits of a child’s signed language (if particular deficits exist, as in spoken language development), and documentation of normal errors and examples of stylistic variation are not readily accessible to speech-language pathologists working with children who are deaf or hard of hearing throughout the country. The vast majority of the existing measures of ASL proficiency were developed by researchers for specific purposes and most have not undergone comprehensive investigations to determine each instrument’s psychometric properties, including the establishment of norms that could be used by professionals assessing children with suspected delays or deficits. These points were echoed by a majority of the professionals in this study.

“Lazy” or “Sloppy” Signing. As with disorders of spoken language, an initial task with signing children who are deaf is to determine whether an unexpected or atypical

production is the result of natural variation (e.g., regional variation, personality differences, sociolinguistic context) or some type of language or communication deficit. This point was raised in discussions of so-called “sloppy signing” that a few native signing children who are deaf are purported to exhibit. Professionals from this study report that it is not usually a problem to comprehend the signing of these children, but their style is certainly noted because it deviates from clear signing and it is a style not generally expected from native signing children. Several speech-language pathologists and educators in one interview referred to the signing as “droopy”, with “...their hands not as upright as they should be.” In (13), one professional describes the phenomenon in the following way:

(13) Teacher & Student Teacher, Translated from ASL to English:

Student Teacher: Well often I see some kids, I don't know if their parents are hearing or deaf, I'm not paying much attention, but some kids sign in a sort of sloppy way. They sign, I don't know if that's their problem, or their personality, or style. They are just kind of lousy signers. It's hard to say what that is really.

Teacher: Yeah, I have one high school student who is from a Deaf family and when I see that student sign I feel like, wow, that student is really sloppy in their signing and I kind of feel like there are some handshape errors in that child's signing and I want to fix things. I don't know if it's sloppiness or if it's an error. I know that the brother a long time ago was a great ASL signer, very clear. This child struggles a lot. It's interesting that you bring this up. So, it's a possibility.

Interviewer: When you say sloppy are you saying sloppy fingerspelling, or signing, or both?

Teacher: Both.

Student Teacher: yes, both, both. And I also used to tutor before, and I remember some kids being really sloppy. We would read through books and sign in ASL and they would be kind of sloppy, I don't know. It's kind of a habit that's hard to change.

Influence from English. Another linguistic concept to consider within the discussion of signed language deficit (or disorder) concerns language contact phenomena. Various aspects of signed languages demonstrate influence from the spoken and/or

written languages of ambient communities (see Lucas & Valli, 1992; Quinto-Pozos & Adam, to appear). Language contact phenomena are normal and common in bilingual communities, and signed languages contain aspects of contact that have influenced them structurally (e.g., lexicalized fingerspelling and particular sign+fingerspelling compounds [see Padden, 1998]), and aspects that appear mostly in usage phenomena (see Quinto-Pozos & Adam, to appear).

One of the deaf educators noted that some children who are deaf exhibit many characteristics of English structure (e.g., sentence structure) within their ASL. That, she claimed, is not what one would expect from some of these children who are deaf, and she expressed concern about the possible influence of the school environment on the children's development of ASL. In such a case, the challenge lies in determining what types of common contact phenomena appear within the signing of bilinguals (e.g. initialized variants of signs that are not generally initialized, perhaps as a way to communicate the meaning of an English word), and which examples of unexpected signing may be true examples of language deficits or disorders.

Assessment and Intervention. The following comments from the interviewees specifically address points about assessment instruments and questions about intervention strategies. We begin by providing examples of what these language professionals and educators have been doing with respect to these issues.

(14) Speech-Language Pathologists, In English:

SLP 1: Currently, we try to refer to the speech therapy tools, which are not always appropriate. But you know, I'll sit down with my colleague and ask how will we change this. We'll reapply it...

SLP 2: ...But the problem is those tools are designed for English grammar, English vocab, English discourse, and they don't get all the classifiers and all the stuff that we need to assess.

In (15), one of the educators within a focus group noted how she and others at that school have been working on the issue of assessing children's ASL skills. She explains how they have to create their own system to document the various features of ASL, and her comments make it clear that variation among the students is common.

(15) Educator, Translated from ASL to English:

Educator: ...like for instance, we have a checklist [of ASL features]. Just yesterday, [my colleague] and I were looking at these different features. And we were seeing, how you know, some of these kids, have these different features of ASL. They have NMS, nonmanual signals, they have role shifting, they have, you know, just a number of different things. Sometimes, they don't have that. Their facial affect is kind of blank. And so we have to think about if they are getting the right exposure within the family. And we have to think about these kinds of language issues. We have to do some language planning as well. It's our responsibility to help them and help the teachers analyze those students' language so they [presumably, the teachers] can write that on reports and not just make these general statements when it's not true. Because, it could very well not be true. And because, you know, some kids are REALLY good at ASL, and some kids are not. So we have to develop this approach to kind of account for the different features of ASL and document how they're doing on each of those features.

In addition to questions about assessment, the speech-language pathologists and educators provided examples of what they are doing for intervention when they believe a language or communication deficit exists with a particular signing child. In this case, it was not clear in the discussion whether the professionals were referring only to native signing children who are deaf or to any signing deaf child—including those who are not exposed to signed language in the home. We suspect that it is the latter. The first of several examples is found in (16).

(16) School Psychologist, In English:

...And sometimes we use videotape... to show the kids and have them watch another kid's videotape versus their videotape and then practice in front of the mirror or something like that. Try to get the kids to analyze what they're doing. I've seen some children improve with that. I know that we spoke with one young man in terms of the role shifting and he was able to acquire that with some very direct instruction.

The educator in (17) notes how lists of signs are created in order to have inventories of lexical items—presumably that are arranged according to phonological parameters (e.g.,

handshape, place of articulation, movement, etc.)—in order to systematically examine the signing of various children.

(17) Teacher, Translated from ASL to English:

I think it depends on what specific problems there are with different ASL aspects. Suppose it is with production... I have found similar movements...different signs with similar movements and I have documented a list of those. It helps to have a list of these differences. You could do the same thing with making a list of handshapes and a list of movements. Then you could look at signs that have different movements, but the same handshape...

We pool our ideas about a particular student and try to devise a plan. We will implement our ideas during one-hour tutoring sessions.

Additionally, some of the professionals indicated what they have done in order to try and change language behaviors or patterns that they feel do not represent ASL. As one example, a child may articulate a sign incorrectly by making an error in a phonological parameter, such as palm orientation. One speech-language pathologist reported that, in such cases, one way to attempt to correct a sign mispronunciation was to physically turn the child's palms the correct way. This could apply to the error WANT (with palms turned downward rather than upward) that we reported earlier. The ability of another person to manipulate the articulators to make corrections is perhaps unique to the signed modality.

Another example of so-called intervention comes from judgments about what constitutes ASL and what reflects ASL that is influenced by English. The comments provided in (18) speak to language contact phenomena that appear in the ASL of some signers.

(18) Teachers, Translated from ASL to English:

I try to model. For example, some students might sign [the initialized sign] LUNCH (L-handshape located in front of mouth). I will sign "Oh, you mean you're ready for [the ASL compound sign] LUNCH (EAT + NOON) and I will repeat things and model back appropriately. I do spelling tests. The other day one student...[trying to recall the event]...the word was WALKING...no...it was

something that ended in –ING. I signed NOW WALK (to mean walking). I asked, you don't sign WALK + ING do you? He replied, no I don't sign WALK + ING. The one deaf student of a deaf family asked, "What did you mean, didn't you mean WALK + ING?" I was taken aback and said wait a minute. I did not sign WALK + ING to him, I signed NOW WALK. I modeled it. I didn't criticize or try to change what was wrong. I try to model back appropriately and I do that everyday! I guess that is what I mean by "Sign Therapy."

And, (19) refers specifically to devising signed language therapy strategies in order to address what they believe are cases of atypical and incorrect signing.

(19) Speech-Language Pathologist & Educator, Translated from ASL to English:

SLP: Well language therapy, we provide quite a bit of language therapy. We practice "Wh" questions with them; we practice explaining things, well basically explaining and describing things.

Support Services Staff Member: Yeah, you play games with the kids basically trying use the signing space so they can set up things in the signing space.

With these examples of intervention strategies for these children, the speech-language pathologists and educators are clearly trying to improve the situation for these children, in spite of not having normed assessments for diagnosis and tested or accepted methods for intervention. One professional, however, noted an issue with use of the term "signed language therapy". The issue, that interviewee suggested, is that formalizing the interventions they are providing into what might be termed "signed language therapy" suggests that such services may be expected to be a part of a student's legally required services, according to their Individualized Education Plan. Unfortunately, such services may not be recognized within the repertoire of services that can be provided by a school system and its contract staff.

Looking to the Future. We also asked the language professionals and educators what they wish they had in order to work with children who are deaf who appear to be exhibiting some type of language or communication deficit. There was a theme across interviews that clinical tools are needed to be able to better assess the ASL development of these individuals and to provide appropriate interventions. For example, in one interview the speech-language pathologists were discussing the importance of a hybrid

between the skill set of a speech and language therapist and an ASL specialist to address what it is they feel is missing.

(20) Speech and language therapists, In English:

Interviewer: What's your dream world?

SLP 3: We need tools for one thing.

SLP 1: Clinical tools not research tools.

SLP 3: Clinical tools to assess what is the breakdown. And what we need is such a thing as an ASL therapist. And there is no such job.

SLP 2: And you know...

(overlap) SLP 3: Somebody who's gone through the speech therapy part of it but is an ASL person.

The other struggle mentioned by the interviewees was the difficulty professionals have with the actual identification of atypical signed language development. The prevailing mentality is to adopt a wait-and-see approach for these children, because they come from signing homes and therefore it is assumed that their language should be fine. A speech-language pathologist reported that she wished there were standards to use for making comparisons. However, she also noted that it may not even be possible to create those standards because of the variety of confounding variables causing the population to be very heterogeneous. For her, a child who enters a school for the deaf and is immersed in the signed language environment should show signs of typical development after about six months of immersion. If that does not happen, she suggested, then there may be a problem that needs to be addressed. This sentiment was echoed by teachers who explained their opinions in (21).

(21) Teachers, Translated from ASL to English:

Teacher 1: I think we could identify them younger. And that is information for the parents. Many times, myself included, I will see a young child and think, "Oh, well, they are only 6 years old. We can wait until they mature." It's only later do I realize, "Wait, a minute, I should have recognized that problem a long time ago, back in first grade."

Teacher 2: ...armed with whatever analytic tools and treatment we have developed with deaf children of deaf parents, I can at least apply those tools and

approaches with deaf children of hearing parents and begin to rule out other potential confounding variables and then determine if there is a biological basis accounting for the respective problems for the two populations of deaf children. Right now, I cannot definitely say what may be the cause for SLI, thus, this study is very important.

It is clear from these accounts that language professionals and educators have witnessed cases of atypical signed language acquisition, which some of them feel may be examples of communication disorders in signed language. The general level of awareness of such cases is notable in spite of the fact that there are, for the most part, no research and clinical literatures that the professionals can turn to for guidance. However, it is also clear that some of the professionals have taken steps to address the problems—armed with the knowledge and skills that they have gained through their own professions.

Discussion

It has been 50 years since the publication of William Stokoe's (1960) first work on the structure of ASL to be followed by the first linguistic dictionary that highlighted the internal and systematic structure of ASL signs (Stokoe, Casterline, & Croneberg, 1965). Since that time, hundreds of research studies have provided evidence that signed languages are very much like spoken languages in many respects, though it is also the case that differences have been noted (see, for example, Meier, Cormier, & Quinto-Pozos, 2002 for discussions of modality differences that may impact structure). Considering the published reports of signed language structure and childhood acquisition within this modality, we have yet to see purposeful research studies that pose the fundamental question of whether developmental disorders of ASL exist. The present article provides us with practitioner reports that such disorders do exist, but the next step is to focus on gathering primary data from the atypical signers themselves. Case studies of developmental disorders of ASL (Quinto-Pozos & Singleton, 2009, 2010), and other signed languages (Mason et al., 2010; Morgan et al., 2007) will contribute significantly to theoretical discussions regarding the nature and etiology of language and fluency disorders in general.

It is generally the case that children who acquire ASL are also acquiring English (in some form), which means that their language development should be considered within the larger lens of bilingual language acquisition. For some children who are deaf or hard of hearing, reading and writing English is the focus. However, as many speech-language pathologists know, some children also use speech, to varying degrees; these children could be termed bimodal bilinguals (see Plaza-Pust & Morales-López, 2008). In such cases, we may want to ask whether there are connections between developmental language disorders in the auditory-oral and the visual-gestural modalities. In other words, if a bimodal bilingual child exhibits language deficits, might this child exhibit deficits in both modalities? Certainly, we can look to the bilingual development literature to examine questions about the use of two spoken languages and possible effects of deficits in one or the other (see de Houwer, 2009, for various references). However, that literature does not clearly address the use of two modalities for language and communication and the possible links or tensions between those modalities.

We suggest that this qualitative study of atypical ASL development is pertinent to how we consider other non-majority languages to which children are exposed. As with the case of ASL, children acquiring any minority language from natural input in the home could exhibit patterns of atypicality in that language, and the determination of whether a communication order may exist for that home language could, indeed, be challenging. For many languages (e.g., Native American languages of the American Southwest) there are few or no assessment instruments for examining a child's development, similar to the ASL case. And, various factors (e.g., frequency of input, environments in which a language is used, and expectations placed on a child by caregivers) might influence the course of language development in any minority language (de Houwer, 2009; Goldstein, 2004; McCardle & Hoff, 2006). Children who use minority languages in the U.S. are most often exposed to English in preschool or K-12 settings, which means that they are engaged in the acquisition and learning of two (or more) languages. For such cases, some researchers (e.g., Goldstein, 2004) have suggested that the best course of action is to assess, to the extent possible, the children in both languages. For example, tests of lexical knowledge and grammatical ability for each language could provide the speech language pathologist or school psychologist with critical information about whether the

child may exhibit a language delay or a language disorder. In this respect, the case of atypical acquisition of ASL can be compared to atypical acquisition of other minority languages; the challenge in each case is to find reliable means for assessing development and determining if it is typical or atypical.

In the data presentation section, we provided examples of various language professionals and educators who speculated a possible link between quality of signed language input and the language deficits that have been noticed for some native signing children. In particular, they wondered if atypical signers at home or less-than-fluent signers at school or in other settings could have a significant impact on language development for children who are deaf. Other studies of children who are deaf with inconsistent or impoverished ASL input (Goldin-Meadow & Mylander, 1990; Singleton, 1989; Singleton & Newport, 2004;) suggest that children who are deaf with no known learning impairments are extremely resilient language learners and indeed are more likely to “go beyond the input given” than reproduce the inconsistent forms produced by their signing parents. It may be the case that a threshold of consistency must be reached in the language input in order for the typically developing child to perform such a “boost” in grammatical structures. What is not fully understood is how a child who may have an endogenic language learning disorder copes with inconsistent or impoverished input and sociolinguistic variation. In essence, their language-making capacities (i.e., resilience) may be compromised.

As with developmental deficits of language and communication for hearing children, a significant focus will need to be placed on the etiologies of communication disorders in signed language, including so-called fluency disorders in sign. Such inquiry could prove to be quite fruitful since it may provide insight into what types of language and communication problems are due to the modality in which they are communicated (e.g., auditory or visual processing problems, motor control of the hands and arms versus the parts of the oral cavity, etc.) rather than neurological structures and cognitive mechanisms that drive language comprehension and production.

The role of psychosocial factors should also be explored. In some cases, there seem to be social and/or emotional difficulties associated with atypically developing children, presumably tied to their language deficits. The language professionals and

educators that we interviewed reported that the children occasionally become frustrated—presumably as a result of their difficulties with some aspects of language and communication. And, some children’s linguistic and communicative behavior may be different at home than at school—a cause for examining questions about comfort level at both locations. By examining these issues in more detail, the role of emotional and psychosocial factors can be explored with respect to language development for children who are deaf.

In order to understand and address disorders of signed languages, it is imperative that assessment and diagnostic instruments be developed in order to allow for the systematic identification of particular problems. As noted earlier, a limited number of assessment instruments have been marketed for British Sign Language (Herman et al., 1999; Herman et al., 2004), though tests of ASL have mostly been created for research purposes (Singleton & Supalla, in press). One question that should be posed is the following: what types of linguistic structures and patterns of development would be unique to sign and require their own instruments that are created based on common signed language structures and discourse patterns? As reported in the literature review section, signed languages use non-manual means (e.g., head movements, raising/lowing of the eyebrows, and certain mouth movements) to modify manual material. In these cases, development of instruments that allow for the examination of the development of such non-manual modification would be useful. And, the commonality of language contact between ASL and forms of English (spoken & written) need to be considered and teased out from possible cases of language disorder. One possible obstacle to the development and broader dissemination of reliable instruments for the assessment of signed language and communication disorders within educational settings is the low incidence of this population. Test publishing companies may be less willing to invest in field-testing and norming of tools specifically designed for such a small population. This may be why so many of the research tools that have been constructed remain undeveloped for commercial and educational use. Educational institutions are now beginning to develop ASL curriculum standards for early childhood and K-12 settings and thus, there may be progress in the coming years on this issue.

Likewise, this study indicates, there is a need to develop intervention strategies for use with children who exhibit deficits in their signed language development. Various language professionals and educators who were interviewed through this study reported that they had developed their own intervention strategies, such as modeling, correction, self-reflection, that they used with children with signed language difficulties. But some stopped short of calling it “signed language therapy” due to perceived negative repercussions, politically or socially in their school environments. Regardless, the professionals we interviewed knew of no evidence-based established intervention protocols that could guide speech-language pathologists through the provision of such services to children who are deaf with communication disorders in signed language. We suggest that future studies ought to be conducted in this area to address this gap in determining what intervention strategies would work best for this population. This would also provide empirical evidence-based support for some of the strategies currently used by professionals. We do not want to discredit the perhaps successful strategies currently being used and described in this study, rather, we want to expand upon these to design studies that specifically examine the effectiveness of these approaches. This was simply beyond the scope of this initial study presented here.

We suggest that the future of this work will require collaboration between researchers, language and learning specialists, school administrators and parents, in order to create the types of instruments and protocols that are needed to identify, assess, and provide intervention for these children. This is truly a research topic that can allow various professionals to work together in order to create a tight link between research and practice and ensure that the practice informs the research that is conducted.

Acknowledgments

This research was supported by the National Science Foundation Science of Learning Center Program, under cooperative agreement number SBE-0541953, and a Mary Jane Neer Grant from the University of Illinois at Urbana-Champaign to the first author. Any opinions, findings, and conclusions or recommendations expressed are those of the authors and do not necessarily reflect the views of the National Science Foundation. We thank the editors of *LSHSS*, Chloe Marshall, and an anonymous reviewer for their close

reading of this text along with their helpful comments and suggestions. We would also like to thank various students who have participated in the project at various stages. Sarika Mehta assisted with data collection. Several research assistants (Ryan Barrett, Peter Crume, Caroline Hernandez, Rachel Mazique, and Katie Moore) helped to translate the interviews from ASL to English and conduct the reliability screening of the translated versions. And, several volunteers in the Signed Language Lab at the University of Illinois at Urbana-Champaign assisted with various tasks. They were: Jaye Eisenberg, Lisa Shafar, and Katie Walsh.

References

- Akamatsu, C. T. (1985). Fingerspelling formulae: A word is more or less than the sum of its letters. In W. Stokoe & V. Volterra (Eds.), *SLR '83: Sign Language Research*. (pp. 126-132). Silver Spring, MD: Linstok Press.
- Backus, O. (1938). Incidence of stuttering among the deaf. *Annals of Otology, Rhinology and Laryngology*, 47, 632-635.
- Bonvillian, J. D., Orlansky, M. D., & Novack, L. L. (1983). Developmental milestones: Sign language acquisition and motor development. *Child Development*, 54, 1435-1445. doi: 10.2307/1129806
- Bowen, C. (1998). *Developmental phonological disorders. A practical guide for families and teachers*. Melbourne, Australia: ACER Press.
- Charmaz, K. (2001). Qualitative interviewing and grounded theory analysis. In J. F. Gubrium & J.A. Holstein (Eds.) *Handbook of Interview Research: Context & Method*. (pp. 675-694). Thousand Oaks, CA: Sage Publishers.
- Cheek, A., Cormier, K., Repp, A., & Meier, R. P. (2001). Prelinguistic gesture predicts mastery and error production of early signs. *Language*, 77, 292-323. doi: 10.1353/lan.2001.0072
- Cormier, K., Mauk, C., & Repp, A. (1998). Manual babbling in deaf and hearing infants: A longitudinal study. In E. Clark (Ed.), *Proceedings of the Child Language Research Forum*, 29 (pp. 55-61). Stanford, CT: CSLI Publications.
- Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism*, 19, 121-129.
- de Houwer, A. (2009). *Bilingual First Language Acquisition*. Multilingual Matters.
- Emmorey, K., & Reilly, J. (1998). The development of quotation and reported action: Conveying perspective in ASL. In E. Clark (Ed.), *Proceedings of the Twenty-Ninth Annual Stanford Child Language Research Forum* (pp. 81-90). Stanford, CA: CSLI Publications.

- Goldin-Meadow, S., & Mylander, C. (1990). The role of parental input in the development of a morphological system. *Journal of Child Language*, *17*, 527-563. doi:10.1017/S0305000900010874
- Goldstein, B. (2004). *Bilingual language development and disorders in Spanish-English speakers*. Baltimore, MD: Brooks Publishing Co.
- Harms, M.A., & Malone, J.Y. (1939). The relationship of hearing acuity to stammering. *Journal of Speech and Hearing Disorders*, *4*, 363-370.
- Herman, R., Holmes, S., & Woll, B. (1999). *Assessing British Sign Language development: Receptive skills test*. Gloucestershire, England: Forest Bookshop.
- Herman, R., Grove, N., Holmes, S., Morgan, G., Sutherland, H., & Woll, B. (2004). *Assessing BSL development: Production test (narrative skills)*. London, England: City University Publication.
- Kantor, R. (1980). The acquisition of classifiers in American Sign Language. *Sign Language Studies*, *28*, 193-208.
- Kelly, A. (1995). Fingerspelling interaction: A set of deaf parents and their deaf daughter. In Lucas, C. (Ed.), *Sociolinguistics in Deaf Communities*. (pp. 62-73). Washington D.C.: Gallaudet University Press.
- Leonard, L. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.
- Liddell, S., & Metzger, M. (1998). Gesture in sign language discourse. *Journal of Pragmatics*, *30*, 657-697. doi: 10.1016/S0378-2166(98)00061-7
- Mann, W., Marshall, C. R., Mason, K., & Morgan, G. (2010). The acquisition of sign language: The impact of phonetic complexity on phonology. *Language Learning and Development*, *6*, 1–27. doi:10.1080/15475440903245951
- Marshall, C. R., Denmark, T., & Morgan, G. (2006). Investigating the underlying causes of SLI: A non-sign repetition test in British Sign Language. *Advances in Speech-Language Pathology*, *8*(4), 347-355. doi:10.1080/14417040600970630
- Mason, K., Rowley, K., Marshall, C.R., Atkinson, J.R., Herman, R., Woll, B., & Morgan, G. (2010). Identifying specific language impairment in deaf children acquiring

- British Sign Language: implications for theory and practice. *British Journal of Developmental Psychology*, 28(1), 33-49. doi:10.1348/026151009X484190
- Mayberry, R. I. (1993). First-Language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech and Hearing Research*, 36, 1258-1270.
- McCardle, P., & Hoff, E. (2006). *Childhood bilingualism. Research on infancy through school age*. Clevedon, England: Multilingual Matters Ltd.
- McLeod, S., & Bleile, K. (November, 2003). *Neurological and developmental foundations of speech acquisition*. Invited Seminar Presentation, American Speech-Language-Hearing Convention, Chicago, IL.
- Meier, R. P. (2002). Why different, why the same? Explaining effects and non-effects of modality upon linguistic structure in sign and speech. In Meier, R., Cormier, K., and Quinto-Pozos, D., (Eds.), *Modality and structure in signed and spoken languages*. (pp. 1-25). Cambridge, England: Cambridge University Press.
- Meier, R. P., Cormier, K., & Quinto-Pozos, D. (2002). *Modality and structure in signed and spoken languages*. Cambridge, England: Cambridge University Press.
- Meier, R. P., & Newport, E. (1990). Out of the hands of babes: On a possible sign advantage in language acquisition. *Language*, 66, 1-23. doi: 10.2307/415277
- Mitchell, R., & Karchmer, M. (2004). Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies*, 4(2), 138-163. doi: 10.1353/sls.2004.0005
- Montgomery, B.M., & Fitch, J.L. (1988). The prevalence of stuttering in the hearing-impaired school age population. *Journal of Speech and Hearing Disorders*, 53,131-135.
- Morgan, G. (2005). Biology and behavior: Insights from the acquisition of sign language. In A. Cutler (Ed.), *Twenty-first century psycholinguistics: Four cornerstones*. (pp. 191-208). Mahwah, NJ: Lawrence Erlbaum Press.

- Morgan, G., Herman, R., & Woll, B. (2007). Language impairment in sign language: Breakthroughs and puzzles. *International Journal of Communication Disorders*, 35, 95-116. doi: 10.1080/13682820600783178
- Moustakas, C.E. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage Publications.
- Newport, E.L. (1990). Maturational constraints on language learning. *Cognitive Science*, 14, 11-28. doi: 10.1207/s15516709cog1401_2
- Newport, E. L., & Meier, R. P. (1985). The acquisition of American Sign Language. In D. I. Slobin (ed.), *The Crosslinguistic Study of Language Acquisition, Vol.* (pp. 881-938). Mahwah, NJ: Lawrence Erlbaum Associates.
- Owens, R.E. Jr. (2008). *Language Development: An introduction*. Boston, MA: Allyn & Bacon.
- Padden, C. (1998). The ASL lexicon. *Sign Language and Linguistics*, 1, 39–60.
- Padden, C. (2006) Learning fingerspelling twice: Young signing children's acquisition of fingerspelling. In M. Marschark, B. Schick & P. Spencer (Eds.) *Advances in Sign Language Development by Deaf Children*. (pp. 189-201). New York City, NY: Oxford University Press.
- Padden, C., & Ramsey, C. (1998). Reading ability in signing deaf children. *Topics in Language Disorders*, 18(4), 30-46. doi: 10.1097/00011363-199808000-00005
- Petitto, L. A. (1987). On the autonomy of language and gesture: Evidence from the acquisition of personal pronouns in American Sign Language. *Cognition*, 27, 1-52. doi: 10.1016/0010-0277(87)90034-5
- Petitto, L. A., & Marentette, P. (1991). Babbling in the manual mode: Evidence for the ontogeny of language. *Science Reports*, 251, 1491-1496.
- Plaza-Pust, C., & Morales-López, E. (2008). *Sign Bilingualism: Language development, interaction, and maintenance in language contact situations*. Amsterdam/Philadelphia: John Benjamins.

- Quinto-Pozos, D., & Adam, R. (to appear). Signed language contact. In R. Bayley, R. Cameron, & C. Lucas (Eds.) *The Oxford Handbook of Sociolinguistics*. Oxford: Oxford University Press.
- Quinto-Pozos, D., & Singleton, J. (2009, April) Developmental histories and language elicitation as complementary strategies for investigating signed language disorders. Paper presented at the Society for Research in Child Development (SRCD) conference, Denver, CO.
- Quinto-Pozos, D., & Singleton, J. (2010, September) Investigating signed language disorders: Case study methods and results. Paper presented at the Theoretical Issues in Sign Language Research (TISLR) conference, West Lafayette, IN.
- Reilly, J. S., McIntire, M., & Bellugi, U. (1990). The acquisition of conditionals in American Sign Language: Grammaticized facial expressions. *Applied Psycholinguistics*, 11(4), 369-392. doi: 10.1017/S0142716400009632
- Schembri, A. (2003). Rethinking 'Classifiers' in signed languages. In Emmorey, K. (Ed.) *Perspectives on Classifier constructions in sign languages* (pp. 3-34). Mahway, NJ: Lawrence Erlbaum Associates.
- Schick, B. (1990). The effects of morphosyntactic structure on the acquisition of classifier predicates in ASL. In C. Lucas (Ed.), *Sign language research: Theoretical issues* (pp. 358-371). Washington, DC: Gallaudet University Press.
- Silverman, F.H., & Silverman, E.M. (1971). Stutter-like behavior in manual communication of the Deaf. *Perceptual and Motor Skills*, 33, 45-46.
- Singleton, J.L. (1989). Restructuring of language from impoverished input: Evidence for linguistic compensation. Unpublished dissertation, University of Illinois at Urbana-Champaign.
- Singleton, J.L., Jones, G., & Hanumantha, S. (July, 2010). *Deaf-friendly science? Toward ethical practice in research involving Deaf participants*. Paper presented at the International Congress of Education of the Deaf. Vancouver, BC, Canada.
- Singleton, J.L., & Newport, E.L. (2004). When learners surpass their models: the acquisition of American Sign Language from inconsistent input. *Cognitive*

- Psychology*, 49 (4), 370-407. doi: 10.1016/j.cogpsych.2004.05.001
- Singleton, J.L., & Supalla, S. (in press). Assessing Children's Proficiency of Natural Signed Languages. In M. Marschark & P. Spencer (Eds.), *Oxford Handbook of Deaf Studies, Language, and Education* (2nd edition). New York: Oxford University Press.
- Siple, P., & Akamatsu, C. T. (1991). Emergence of American Sign Language in a set of fraternal twins. In P. Siple & S. D. Fischer (Eds.), *Theoretical issues in sign language research* (pp. 25-40). Chicago, IL: University of Chicago Press.
- Snyder, G. (2006). The existence of stuttering in sign language and other forms of expressive communication: sufficient cause for the emergence of a new stuttering paradigm?. Unpublished manuscript, University of Mississippi.
- Starks, H., & Trinidad, S. B. (2007). Choose your method: A comparison of phenomenology, discourse analysis, and grounded theory. *Qualitative Health Research*, 17(10), 1372-1380. doi:10.1177/1049732307307207031
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research* (2nd Ed.). Thousand Oaks, CA: Sage Publishers.
- Stokoe, W.C. (1960). Sign Language Structure: An Outline of the Visual Communication Systems of the American Deaf, *Studies in linguistics: Occasional papers* (No. 8). Buffalo: Dept. of Anthropology and Linguistics, University of Buffalo.
- Stokoe, W.C., Casterline, D.C., & Croneberg, C.G. (1965). *A dictionary of American Sign Language on linguistic principles*. Silver Spring, MD: Linstok Press.
- Tallal, P., & Piercy, M. (1973). Defects of non-verbal auditory perception in children with developmental aphasia. *Nature*, 241, 468-469. doi: 10.1038/241468a
- Tallal, P. (2003). Language learning disabilities: Integrating research approaches. *Current Directions in Psychological Science*, 12, 206-211. doi: 10.1046/j.0963-7214.2003.01263.x

- van Hoek, K., O'Grady, L., & Bellugi, U. (1987). Morphological innovation in the acquisition of American Sign Language. In E. Clark (Ed.), *Papers and reports on child language development*. Stanford, CA: CSLI Publications.
- van-Hoek, K., O'Grady-Batch, L., Norman, F., & Bellugi, U. (1989). *Perspective shift and serial verbs in ASL*. Unpublished manuscript. The Salk Institute.
- Whitebread, G. (2004). Stuck on the tip of my thumb: Stuttering in American Sign Language. Unpublished Senior Honors Thesis. Gallaudet University.
- Wilcox, S., & Wilcox, P. (1997). *Learning to See. Teaching American Sign Language as a Second Language*. Washington D.C.: Gallaudet University Press.
- Voelker, E.S., & Voelker, C.H. (1937). Spasmophemia in dyslalia cophotica. *Annals of Otology, Rhinology and Laryngology*, 46, 740-743.