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Accuracy of Automated Analysis of Language Samples from Persons with Deafness or Hearing Impairment

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ACCURACY OF AUTOMATED GRAMMATICAL ANALYSIS OF LANGUAGE SAMPLES FROM PERSONS WITH DEAFNESS OR HEARING IMPAIRMENT

by

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ABSTRACT

ACCURACY OF AUTOMATED GRAMMATICAL ANALYSIS OF LANGUAGE SAMPLES FROM PERSONS WITH DEAFNESS OR HEARING IMPAIRMENT

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Developmental Sentence Scoring (DSS) and the Language Assessment, Remediation, and Screening Procedure (LARSP) are among the more common analyses for syntax and morphology, and automated versions of these analyses have been shown to be effective. This study measured the accuracy of automated DSS and LARSP on the written English output of six prelingually deaf young adults, ranging in age from 18 to 32 years. The samples were analyzed using the DSS and LARSP programs on Computerized Profiling; manual analysis was then performed on the samples. Point-by-point accuracy for DSS and for each level of LARSP was reported. Characteristics of the participants' language at the clause, phrase, and word levels were described and discussed, including the implications for clinicians working with this population.

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Ideally, clinicians aiming to enhance the grammatical abilities of persons with deafness or hearing impairment would make a thorough study of each client's abilities, both to set goals for treatment and to measure progress associated with treatment. Though some commonalities of language impairment exist within this population, an individualized assessment is required, given the great amount of variability and diversity that also exist. Of course, the making of such an assessment assumes that clinicians can invest the time and expertise to do so, which may not always be the case (Long, 1996; Long, 2001; Muma, 1998).

Recently, software for the automated grammatical analysis of language samples has been developed and found to offer fairly good accuracy and time efficiency (Long, 2001). Long and Channell (2001) examined automated calculations of mean length of utterance (MLU; Brown, 1973), Developmental Sentence Scoring (DSS; Lee, 1974), Index of Productive Syntax (IPSyn; Scarborough, 1990), and the Language Assessment, Remediation, and Screening Procedure (LARSP; Crystal, Garman, & Fletcher, 1989). After calculating reliability of the automated analyses, the researchers found that reliability was comparable to interrater reliability for these measures (Long & Channell, 2001). Channell (2003) found that automated DSS on samples from children with language impairment was slightly less accurate than automated DSS on samples from typically developing children. Automated DSS, LARSP, MLU, and IPSyn may be carried out by the Computerized Profiling software (CP; Long, Fey, & Channell, 2006). The latest version of this software is available on-line for clinician use.

However, the accuracy of such software on samples from persons with deafness or hearing impairment has yet to be examined. Some characteristics of this language which might offer challenges to automated grammatical analysis would include reduced use of auxiliaries and verb tense markers; deviant word order or clause order for relative clauses; word omissions, additions, and substitutions; reduced syntactic variety; and constructions whose role in a sentence is difficult to ascertain (de Villiers, de Villiers, & Hoban, 1994; Yoshinaga-Itano, 1996).

The analysis made by the software is based on probabilities extracted from samples of typically hearing children. Channell & Johnson (1999) explain that the software determines grammatical category of a word by examining the possible grammatical categories of preceding words, and the possible options for tagging that word. Thus grammatical variations in the language sample to be analyzed might render the probability data stored in the program as less relevant, leading to lower accuracy and validity.

Thus the purpose of the present project is to examine the accuracy of software for automated grammatical analysis with language samples from persons with deafness or hearing impairment.

Review of Literature

Grammar of Persons with Deafness or Hearing Impairment

The terms *deaf*, *hard of hearing*, and *hearing impaired* have various and overlapping meanings, depending on the source. For the purposes of this study, *deaf* refers to a person with a pure tone average (PTA) of 90 dB HL or greater in the better ear. To avoid confusion, the PTA(s) of the study participants will be specified when the term *hearing impaired* is used. Many people have strong feelings about which term to use when discussing this population. Thus, the review of literature will use the same terminology of the article being discussed, in order to remain as neutral as possible.

Early studies of the grammar of deaf children reported that deaf children produced sentences that were markedly shorter in length than those of hearing children, and that the deaf children did not attain sentence lengths comparable to hearing 8-year-olds until age 17 years. But the grammar of deaf children does not simply develop at a slower rate than that of hearing children; it is qualitative different. Deaf children have been found to use a greater proportion of determiners, nouns, and verbs than hearing children, and a lesser proportion of adverbs, auxiliaries, and conjunctions (Quigley & Paul, 1984).

More specific information about the grammar skills of deaf children were reported by Geers, Moog, & Schick (1984). These researchers selected 327 deaf hearing aid users ages 5;0 to 8;11 years and evaluated them using the Grammatical Analysis of Elicited Language—Simple Sentence Level (GAEL-S; Moog & Geers, 1979), an assessment developed to evaluate the English grammar skills of deaf children. Although the purpose of this study was to compare the English syntax abilities of children in oral/aural and total communication programs, it plainly illustrates that both groups of

deaf children lagged woefully behind their normally hearing peers in syntactic development. The GAEL involves a number of games and activities, which are intended to evoke certain grammatical structures; it was used successfully to elicit each target structure in 90% of 4-year-olds in a pilot study. In this study, both oral/aural and total communication children struggled with most of the grammatical structures evaluated. The categories, with mean performance (percent correct) of both groups, were: verb inflection (18%), copula inflection (34%), demonstrative (35%), article (41%), copula (41%), preposition (40%), pronoun (45%), conjunction (45%), quantifier (47%), negative (51%), adjective (56%), possessive (61%), wh-questions (61%), verb (71%), object noun (74%), and subject noun (83%). It is important to note that the deaf children's performance in each of these categories was poorer than the performance of the typically developing 4-year-olds in the pilot study.

An Italian study (Taeschner, Devescovi, & Volterra, 1988) looked specifically at whether the language development of deaf children is merely delayed of qualitatively different. The written language of 25 deaf children, ages 11-15 years, was compared with that of 125 hearing children, ages 6-16 years. These researchers found that there was no significant difference between the performance of the deaf and hearing children in the task of pluralization of both real and invented nouns. On a task involving use of definite articles, the deaf children performed well below the hearing children their age and younger; the 11-15-year-old deaf children performed similarly to hearing first graders in terms of number of errors. However, the types of errors in the deaf children's writing were somewhat different than those of the hearing first graders, indicating that deaf children may have different rather than simply delayed development in terms of syntax. It

is important to note that use of articles is more complex in Italian than in English, as Italian articles require gender and number distinctions. The final syntactic structure assessed in this study was the use of the clitic pronoun in sentences with infinitive clauses. This structure does not have a direct English equivalent. On this task, the deaf adolescents' performance was most similar to the third and first grade groups, and it seemed to show delayed development rather than qualitatively different.

In a study of syntax of the spoken and written productions of 20 hearing-impaired college students who were known to have poorer writing skills than their peers, error patterns characteristic of this population were described (McAfee, Kelly, & Samar, 1990). The participants in this study had a mean pure tone average of 88.4 dB[1], with a range of 60 to 105 dB; all were able to understand some speech in sentence contexts, although the researchers did not specify whether this was auditory only and if hearing aids were used. All participants had intelligible speech. The procedure for collecting language samples for this study was simple: Participants were shown a short cartoon which they described, first verbally and later in writing, to a person who was not present while the participant viewed the film. The first eight utterances of each sample were scored using a procedure described by Crandall (1980), who had found six sentences to be a reliable sample for his procedure. Errors were classified into three categories: function, content, and structure. Function errors involved bound inflectional morphemes, bound derivational morphemes, determiners, prepositions, auxiliary verbs, and connectors. Content errors consisted of contentive stem substitutions and additions; structure errors were described as omissions of major constituents. Examples from the

[1] The article did not specify reference level for dB.

article are included in Table 1 (McAfee et al., 1990). Most of the errors found in the students' written and spoken productions fell under the category of function errors, although the subcategory containing the most errors was not specified in the study.

The notion that deaf children's grammatical systems develop differently than hearing children's, not merely in a delayed manner, is supported by de Villiers et al. (1994), who commented on several aspects of the grammar of deaf children. First, auxiliary verb use develops early for hearing children, typically in Brown's Stage III, which corresponds with an MLU of 2.5-3.0. Deaf children struggle with auxiliaries long after their MLU exceeds 3.0; many deaf children do not have adequate receptive knowledge of auxiliaries even at age 10 years. Unpublished research (Williamson, 1985) cited in the de Villiers et al. (1994) text indicates that 65% of wh-questions produced by oral deaf subjects 6 to 15 years of age did not contain an auxiliary verb. By contrast, hearing preschoolers (ages 3-5 years) produced correct auxiliary verbs in questions approximately 90% of the time. Verb tenses are another syntactic construction on which hearing and deaf children differ in development. In Baumberger's 1986 unpublished work, cited in de Villiers et al. (1994), profoundly deaf children ages 6;4 to 13;4 years (n = 21) were compared to normally hearing children ages 4;0 to 5;6 years (n = 19). The results are summarized in Table 2.

This study clearly demonstrates the differences in the groups' syntactic development. The deaf children struggled to produce regular past tense verbs accurately, while the normally hearing children, who were much younger, had 90% accuracy with regular past tense. Both groups performed poorly in production of irregular past tense verbs; however, the error types demonstrated by the two groups were quite different.

Table 1

Categories Used to Assess the Syntactic Acceptability of Transcribed Speech and Writing Samples

Category	Description	Example
Function	Bound inflectional morpheme	He *try* to shoot but *miss*.
	Bound derivational morpheme	The man is very *depressive.*
	Determiner	He had to write ___ note.
	Preposition	He jumped *out* of the bridge.
	Auxiliary verb	The man ___ not feel good.
	Connector	The devil told Mr. Koumal *that* try to kill himself.
Content	Contentive stem substitutions and additions	Next he tried a *hang-neck.*
Structure	Omission of major constituent	I don't know what ___ wrong with him.

Note. Table adapted from McAfee et al. (1990).

Table 2

Comparison of Deaf and Hearing Children's Past Tense Productions: Percentages of Usage

	Hearing (4;0-5;6 yrs)	Deaf (6;4-13;4 yrs)
Correct Usage		
Irregular Past	45	38
Regular Past	90	34
Errors on Irregulars		
Unmarking	10	75
Present Progressive	14	8
Overgeneralized –ed	56	8

Note. Table adapted from de Villiers et al. (1994).

The hearing children often used an overgeneralized –ed for the irregular verbs (e.g. *falled, comed*), whereas the deaf children's most common error type was a lack of tense marking on the verb altogether.

The de Villiers et al. (1994) text also delineates errors made by deaf adolescents (ages 11 to 18 years) on a relative clause elicitation task. Some clauses were produced correctly, but others were produced in ways that were characterized by the authors as *stylistically different* or *deviant*. Examples from the authors of stylistically different relative clause productions included (a) topicalization to the front (e.g. *The girl that petted the dog, her father is feeding the dog the food*.), (b) topicalization to the end (e.g. *The nurse was calling the telephone, the nurse that was feeding him*.), and (c) extraposition (e.g. *The boy empty pail who was washing the car*.). Deviant productions were described as (a) redundancy in pronouns (e.g. *That the girl pet the dog that the man gave him food*.), (b) mistakes in the relative pronoun (e.g. *The mother hold the clothes what the fan blow the air*.), (c) relativizing a character that did not need to be specified for the listener (e.g. *The girl that holds the baby, kiss the rabbit*.), and (d) thematic structure mistakes (e.g. *A baker itches his nose, the car that hit him*.). Stylistically different productions comprised approximately 18% (*SD* = 23%) of the deaf children's attempts at relative clauses; deviant productions made up more than 25% (*SD* = 26%) of attempts. It is important to note the relatively high standard deviations, which underscore the great variability in the grammar of this population.

Geers and Moog (1994) compared the syntactic abilities of several groups of deaf children: 13 using cochlear implants, 13 using tactile aids, and 13 with hearing aids and pure tone averages of 100 dB HL or greater in the better ear. The participants ranged in

age from 2-12 years, with mean ages between 5;5 and 5;10 for each group at the commencement of this 3-year study. Language samples were elicited using pictures and a game; the samples were transcribed and the first 50 utterances were analyzed using Linguistic Structure Score (Ling, 1976) and DSS. While DSS is most appropriate for normally-hearing children ages 2-6 years, it has been used in the analysis of language samples from deaf children up to 15 years of age (Geers & Moog, 1978). When the Geers and Moog (1994) study began, the average Linguistic Structure Score was between 2 and 3, indicating that the children were using 2-word combinations, often noun-verb. Three years later, at the end of the study, the average score for the hearing aid group was slightly below 4 and the scores for the cochlear implant and tactile aid groups were close to 4.5. A score of 4 indicates kernel sentences, with 5 for compound sentences, so the groups, on average, were not producing compound sentences consistently despite an average age of close to nine years. The DSS scores were below 2.5 for all groups at the beginning of the study and ranged from 3 (for the hearing aid group) to 4.5 (for the cochlear implant group) at the end of the study. These results show expressive language skills well below those of normally hearing children in terms of sentence complexity.

Yoshinaga-Itano (1996) compared the written language skills of deaf or hard-of-hearing children ages 10-14 years with those of normally hearing children matched for age, residence type, gender, and Weschler Intelligence Scale for Children-Revised (WISC-R) score. She reported that the deaf and hard-of-hearing children relied heavily on predicates rather than the variety of constructions used by the normally hearing children. The deaf and hard-of-hearing group had fewer words per main clause and subordinate clause; they also used fewer prepositional phrases, adverbs of time, gerunds,

participles, and absolute phrases than the typical group. The groups produced similar amounts of modals, possessive nouns and pronouns, and be/have auxiliaries, but the deaf and hard-of-hearing children used these forms in a more stereotypical fashion, with less variety than the normally hearing children employed. Nearly all the deaf and hard-of-hearing children's modals consisted of the future tense *will*. Yoshinaga-Itano found that these children overused pronouns and prepositions, probably to compensate for the limited use or absence of other grammatical structures. Errors using demonstratives and pronouns were noted in the writing of the deaf and hard-of-hearing subjects. The researcher concluded that the deaf and hard-of-hearing children in the study had severely delayed syntactic development, compared with their normally hearing peers.

A study of 29 hearing aid users with a mean pure tone average of 110 dB HL bilaterally and 29 cochlear implant users (Tomblin, Spencer, Flock, Tyler, & Gantz, 1999) sought to understand more about the language benefits of cochlear implantation. The hearing aid group had a mean age of 9;0 years (*SD* = 3.65); the cochlear implant group had a mean age of 10;0 years (*SD* = 2.9). It is important to note that the hearing aid group was comprised of children who were cochlear implant candidates, which means that they did not benefit from hearing aid use; the fit or daily use of hearing aids by this group was not assessed by the researchers, who were interested in comparing cochlear implant users with potential cochlear implant users. Language samples were elicited from the children using a story retell procedure with six short stories; both Signed English and spoken English were accepted in the narratives. The samples were transcribed and analyzed using the IPSyn system (Scarborough, 1990). The mean IPSyn total score for the hearing aid group was 40.69 (*SD* = 17.41); the mean IPSyn total score for the

cochlear implant group was 60.34 (*SD* = 15.19), which was significantly different than the mean score for the hearing aid group. Nevertheless, both group displayed syntactic usage significantly behind and more widely varying than that of normally hearing children. Kemper, Rice, and Chen (1995) reported an average IPSyn score of 76.7 (*SD* = 4.5) in the narratives of 6-year-old normally hearing children.

Nicholas (2000) also found a gap between the syntactic skills of deaf and hearing children. Her study included 43 children with severe-profound hearing loss ages 12 to 54 months and 96 normally hearing children of the same ages. Each child's productive language was analyzed once, using a variety of measures, including MLU. The normally hearing children had consistently higher MLU scores than those with hearing loss. At age 12 months the scores were reasonably similar, with both groups below 1.0, but by age 18 months a considerable gap appeared between the two groups' scores; the gap increased over time. At age 54 months, the normally hearing group had a mean number of words per utterance above 3.0, whereas the deaf group had a mean score slightly above 1.0. Between 18 and 36 months, the deaf group's mean MLU increased by 1.3 words; during this same time period, the control group's mean MLU increased by 2.1 words. These data provide further support for the notion that deaf children's spoken language improves at a slower rate than that of normally hearing children; however, MLU does not have the specificity of analysis necessary to distinguish between delayed and different development.

The spontaneous language production of five young deaf children with cochlear implants was analyzed using MLU (Ouellet, Le Normand, & Cohen, 2001). Samples of the children's language were taken every six months, with a total of three data collections

for each child. This study reported that the children's progress in morphosyntax varies, with two of the children evidencing no improvement in MLU and the other three children showed an increase in MLU with each sample. However, all of the participants were well below the first standard deviation below the mean for normal hearing children, and most of them were below the second standard deviation. The highest MLU reported in the study was below 3.0 at age 78 months, whereas the normally hearing controls reached an MLU close to 9.0 by age 60 months. This indicates that although deaf children may improve their expressive language over time, they are likely to remain significantly behind their hearing peers.

A group of researchers in Italy analyzed certain morphosyntactic constructions used in the writing of profoundly deaf children by reviewing several studies from their country (Volterra, Capirci, & Caselli, 2001). Errors were noted in use of articles, prepositions, and verb conjugation. The errors were characterized by omissions, additions, and substitutions in the children's writing samples. However, the authors noted that the children had age-appropriate pluralization of nouns, which was evaluated using both real and nonsense words. This indicates that not all aspects of deaf children's grammar are equally delayed.

Geers, Spehar, and Sedey (2002) analyzed the spontaneous expressive language of 27 eight- and nine-year-old children using cochlear implants, all of whom were in total communication educational settings for at least three years following implantation. Total communication refers to the use of both speech and signing, usually simultaneously. The participants were from 17 states and 1 Canadian province, and none of the children shared an educational placement. The authors recorded 20-minute samples of spoken

language from each child, which were transcribed and analyzed using the CLAN programs (MacWhinney, 1995) and the Index of Productive Syntax (Scarborough, 1990); the children's utterances were also described by the number of words per utterance and bound morphemes per utterance. The mean IPSyn score was 68.0 (*SD* = 18.06, range 18-93), the mean words per utterance was 5.3 (*SD* = 1.95), and the mean bound morphemes per utterance was 0.37 (*SD* = 0.32). Again, these scores are delayed and vary widely compared with the scores of normally hearing children (Kemper et al., 1995).

Clinical Methods of Grammatical Analysis

There are three general methods of quantitative grammatical analysis for language samples, which are count-based measures, quantified complexity indices, and qualitative/quantitative analyses. Grammatical analysis is further discussed in the Method section.

Count-based measures. Count-based measures involve a broad count of syntactic and morphological elements in a sample. Types of morphemes are not specified, so the result is a gross measure of morphosyntactic ability. An example is MLU, a commonly used calculation for measuring syntactic complexity in a general way. To figure MLU, the sample must be transcribed and segmented into utterances. Certain utterances are excluded from the analysis, including stuttering, false starts, fillers, words repeated for emphasis, and repetitions of the conversation partner's utterance. Having excluded these ineligible utterances, the remaining sample is analyzed. One point is counted for each bound and free morpheme. The following are also given one point each: compound words, proper names, reduplications, irregular past-tense forms, words with diminutive endings, the catenatives *gonna*, *wanna*, and *hafta*, and the words *can't* and *don't*. The

total number of points is then tallied and divided by the total number of utterances; the product is the MLU (Brown, 1973). A higher MLU indicates use of a greater number of morphemes per utterance, although it does not differentiate between type or complexity of morphemes.

Quantified complexity indices. Quantified complexity indices differential values to specific elements of syntax and morphology. An example is DSS, which assigns points to items in several grammatical categories. Developed to quantify Standard English grammar production in young children, DSS has been used by clinicians and researchers for more than 30 years (Channell, 2003; Hughes, Fey, & Long, 1992; Lee, 1974; Lively, 1984). Although the normative data for DSS were collected from typically developing children ages 2;0-6;11, the procedure has been used to evaluate the grammar of populations that vary greatly with respect to age, disability, and linguistic background (Fields & Ashmore, 1980; Geers & Moog, 1978; Lee, 1974; Linares-Orama & Sanders, 1977; Moeller & Luetke-Stahlman, 1990; Politzer, 1974; Wiegel-Crump, 1981). DSS is performed by assigning points to various grammatical constructions present in a language sample; those constructions are grouped into eight categories, which are (a) indefinite pronouns or noun modifiers, (b) personal pronouns, (c) main verbs, (d) secondary verbs, (e) negatives, (f) conjunctions, (g) interrogative reversals, and (h) wh-questions (Lee, 1974). The total points for the sample are divided by the number of utterances evaluated, which results in the DSS score. Because more complex morphosyntactic elements are weighted more heavily than simpler items, the higher DSS score can generally be taken to indicate more complex language form. The DSS procedure can also be used to produce

qualitative data in the form of areas of weakness across the categories, as well as unsuccessful attempts at producing the elements assessed.

Qualitative/quantitative analyses. This type of analysis yields both quantitative and qualitative data about the linguistic elements present in a sample. An example is LARSP, which examines syntax and morphology at the clause, subordinate clause, phrase, and word levels. The clinician tallies the types of structure present in the sample, such as Subject-Verb-Object clause structure or plural –s words, on a summary sheet. When the analysis is completed, the types of grammatical constructs present in the sample will be outlined on a single page. The clinician can see which constructs the participant is able to produce. Because the summary sheet is arranged in a developmental sequence, the clinician can also see which constructs a participant should be producing and is not. LARSP was developed as a tool for describing the syntactic abilities of adults and children with language disorders of various etiologies; it has also been adapted for use with language other than English (Crystal et al., 1989).

Studies of the Accuracy of Automated Grammatical Analysis

Channell and Johnson (1999) examined automated grammatical tagging by the program GramCats, which is currently integrated into the Computerized Profiling software (Long et al., 2006). Language samples from 30 typically developing children were used for the analysis; accuracy was obtained by performing a point-by-point agreement analysis on 20% of each sample. Point-by-point accuracy ranged from 92.9% to 97.4%, with a mean of 95.1%.

Long and Channell (2001) compared automated and manual calculations of MLU, DSS, and IPSyn. The corpora of samples for this study included typically developing

children, children with fluency disorders, children with specific language impairment, and children with specific expressive language impairment. Considering the summary score comparison data from across the four groups, the researchers reported MLU had excellent accuracy (99.4%), as did IPSyn (95.8%). DSS had good accuracy (89.8%). Accuracy of LARSP was also examined in this study, although a different method was used due to the nature of LARSP output, which does not produce a summary score. For this measure, point-by-point accuracy was reported. The results were 85% accuracy overall, with accuracy ranging from 84%-92.9% for the clause, phrase, and word levels; however, it is important to note that the subordinate clause level had only 15% accuracy.

Channell (2003) looked at the point-by-point agreement of automated and manual DSS on samples from 48 school-aged children, 28 with language impairment. Accuracy ranged from 0%-98% for the 38 cells in the DSS scoring chart, and the overall accuracy for group scores ranged from 75.2% to 80.1% (M = 78.2). Automated DSS analysis of the language impaired children's samples was less accurate than automated DSS analysis of the typical children's samples, with approximately 2% lower agreement. It may be inferred from this that other non-typical populations might pose challenges for automated analysis; thus, the research questions for this study are as follows.

1. How accurate are automated DSS and LARSP on language samples from persons with deafness or hearing impairment?
2. What characteristics of the grammar of this population are problematic for these automated analyses?

Method

Participant Characteristics

This study included six prelingually deaf participants, two women and four men ages 18-32 years at the time of data collection. Their participation was obtained through announcements in college classes, as well as by friend referrals. The participants were self-selected, with the main requirements being severe to profound hearing loss and the absence of other disabilities.

Participant 1 was a 19-year-old male whose hearing loss was discovered at 10-11 months of age. He is the only deaf person in his extended family. He was aided at age 5 and continued to use bilateral hearing aids, although the left aid was broken at the time of data collection. His unaided 3-frequency pure tone averages were 77 dB HL for the left ear and 83 dB HL for the right ear. He received speech services throughout his schooling, until he graduated from high school. In the home environment, this participant was expected to use speech and lipreading/audition; his family does not sign. Participant 1 was mainstreamed with hearing children, in an oral environment (i.e. no sign language exposure) until fifth grade, when he transferred to a school for the deaf. At the school for the deaf, Participant 1 began learning sign language, and he characterized this as Pidgeon Signed English (PSE). For his last year of high school, he transferred to a mainstream environment and utilized the services of an interpreter. He received a high school diploma and was in college at the time of data collection. His current preferred method of communication is speech or PSE.

Participant 2 was a 19-year-old female whose hearing loss was discovered at birth. She has deaf parents and a deaf sibling; several members of her extended family are

also deaf. Participant 2 was aided bilaterally from infancy until high school and is currently aided unilaterally, although she uses her hearing aid infrequently. Her unaided 3-frequency pure tone averages were 108 dB HL for the left ear and no response at the limits of the audiometer for the right ear. She has never participated in speech therapy. Participant 2 was exposed to American Sign Language (ASL) as an infant and has used ASL to communicate in the home and with others who sign. She uses written communication or gestures with those who do not sign, or she teaches them some signs. Participant 2 was mainstreamed throughout her schooling, with interpreters. She received a high school diploma and was in college at the time of data collection. Her current preferred method of communication is ASL.

Participant 3 was a 32-year-old female whose hearing loss was discovered at 8-10 months of age. She is the only deaf person in her extended family. Participant 3 was aided bilaterally from age 1 until junior high school, and she has been aided unilaterally from that time until the present. Her unaided 3-frequency pure tone averages were 107 dB HL for the left ear and 115 dB HL for the right ear. She had speech therapy from age 18 months to 15 years, as well as 9 months of therapy at age 31. Her method of communication as a child was total communication, which she described as Signing Exact English (SEE) and speech simultaneously. Participant 3 attended a deaf class with partial mainstreaming from kindergarten until eighth grade; this class used SEE and required speech/vocalizations with each sign. When she was mainstreamed in some classes, she had an aide interpreting the classes into SEE for her. At age 14 years, Participant 3 transferred to a school for the deaf, at which time she was exposed to ASL. Since that time, she has used ASL and has used speech only occasionally, with close

family. Her mother and siblings used SEE to communicate with her as a child; later they learned ASL. She uses speech, writing, or gestures to communicate with her father, or another family member interprets. Participant 3 received a high school diploma and a bachelor's degree, and she was applying to a master's program at the time of data collection. Her current preferred method of communication is ASL.

Participant 4 was a 19-year-old male whose hearing loss was discovered at 6 months of age. He is the only deaf person in his extended family. Participant 4 was aided bilaterally from infancy until seventh grade, when he chose to stop using his hearing aids. His unaided 3-frequency pure tone averages were 103 dB HL for both the left and right ears. He participated in speech treatment from preschool until third grade. Participant 4 was mainstreamed through elementary school with interpreters, using SEE and some PSE. During this time, he used mostly speech and SEE in the home. In seventh grade, participant 4 transferred to a state school for deaf children, where he learned ASL. His family also learned ASL at this time, and he stopped using speech to communicate. He received a high school diploma and was in college at the time of data collection. His current preferred method of communication is ASL or PSE.

Participant 5 was a 26-year-old male whose hearing loss was discovered at birth. He is the only deaf person in his extended family. Participant 5 was aided unilaterally from birth until the present time. His unaided 3-frequency pure tone averages were 87 dB HL for both the left and right ears. He participated in speech treatment from kindergarten until tenth grade, although he only received services twice monthly. Participant 5 was expected to use speech only at home; his family does not sign. He learned SEE in elementary school and ASL at age 19. Participant 5 was mainstreamed throughout his

schooling, alternately in a class for deaf children and a full mainstream environment. He used SEE while in the deaf classroom and was expected to lipread and listen while in mainstream classes. He received a high school diploma and was in college at the time of data collection. His current preferred method of communication is speech or ASL.

Participant 6 was an 18-year-old male whose hearing loss was discovered a few months after birth. His parents are deaf, although he has hearing siblings, and his extended family is hearing. Participant 6 was aided bilaterally from infancy until approximately age 10-12 years. His unaided 3-frequency pure tone averages were 108 dB HL for the left ear and 100 dB HL for the right ear. Participant 6 had speech therapy until fifth grade. He used ASL at home and ASL accompanied by speech, which he termed total communication, in school. He was placed in a class for deaf children within a mainstream school from kindergarten until sixth grade. This class communicated using ASL. From sixth grade until the end of high school, he was fully mainstreamed, with interpreters. He received a high school diploma and was in college at the time of data collection. His current preferred method of communication is ASL.

The participant characteristics are summarized in Table 3.

Sample Elicitation

The participants were asked to produce written English samples at least 50 utterances in length. The sample produced by Participant 1 was called Sample1, Sample 2 was produced by Participant 2, and so forth. Participants had the option of writing by hand or typing their samples using a computer program without spelling or grammar assistance functions. All participants chose to type their samples. In order to encourage the participants to produce samples of the greatest length possible, the topics of school

Table 3

Participant Characteristics

Participant	1	2	3	4	5	6
Age at data collection (yrs;mos)	19;1	19;2	32;1	19;7	26;6	18;10
Parents' hearing status	Hearing	Deaf	Hearing	Hearing	Hearing	Deaf
Age hearing loss identified	11 mos	birth	10 mos	6 mos	birth	3 mos
Age first aided	5 yrs	3 mos	1 yr	6 mos	birth	3 mos
3-Freqency PTA in dB HL (L/R)	77/83	108/NR	107/115	103/103	87/87	108/100
Home communication during elementary school	Speech	ASL	SEE/speech	SEE/speech	Speech	ASL
Speech treatment received	Yes	No	Yes	Yes	Yes	Yes
Highest education level	Some college	Some college	BA	Some college	Some college	Some college

Note. PTA = pure tone average; dB HL = decibels hearing level; L = left; R = right; NR = no response; ASL = American Sign Language; SEE = Signing Exact English; BA = bachelor's degree.

experiences, friends, family, and work were suggested. Additionally, participants had access to a book of writing prompts, *Guided Writing* (Howard, 2002). Examples of prompts from this book include, *Have you ever felt like laughing and crying at the same time?* and *Where do you think dust comes from?* Participants were free to look through the book and respond to any prompt they chose. Some participants used this book extensively; others did not even open it. The written samples were completely independent with regards to the actual written production. Participants received no help from the researchers with grammar, spelling, word choice, and topic development. Participants were given a $20 honorarium for their participation.

Summary of Data Generated and Presented

The samples were formatted for CP by segmenting the sentences into communication units. Two versions were generated for each sample: an uncorrected version and a spelling-corrected version. The LARSP and DSS programs from CP were then used to analyze the samples. The output from CP was compared to manually calculated versions of LARSP and DSS. Percent accuracy for automated LARSP was calculated by tallying the number of LARSP elements correct in the automated output and dividing this number by the total LARSP elements. Separate calculation were performed for the clause, subordinate clause, phrase, and word levels of LARSP. Any patterns of weakness in the various automated analyses were noted and will be discussed, along with the possible impact on language sample analysis in this population. DSS was calculated in a similar manner: correct DSS coding decisions in the automated analysis were summed, and this figure was divided by the total number of DSS elements.

In addition to reporting the accuracy of the computerized measures, this thesis also presents patterns of syntactic and morphological errors made by the participants. This is intended to contribute to the existing knowledge of the English language skills of deaf individuals, thereby assisting clinicians serving this population.

Interrater Reliability

A second clinician independently coded three of the samples (Sample 2, Sample 3, and Sample 4) for the LARSP and DSS analyses. Average point-by-point agreement on these coding decisions for the various levels of LARSP and for DSS was as follows: LARSP clause line, 96%; LARSP subordinate clause lines, 96%; LARSP phrase line, 98%; LARSP word line, 94%; DSS, 91%. Because DSS agreement was lower than expected, the two clinicians independently coded 318 utterances from two typically developing school-age children. DSS agreement for these utterances was 96%. Agreement for the study samples may have been lower due to the difficulty in understanding what the participants were trying to say. The following sentence from Sample 2 illustrates the problem: *It will blows, huffs, swallow, eats, wash, and licks every exist germs.* One clinician coded *swallow* and *wash* as m4 (main verb category, four points), understanding the sentence as *It will blow, huff, swallow, eat, wash, and lick every existing germ.* She did not give DSS credit for the verbs *blows, huffs, eats,* and *licks*. The other clinician coded *blows, huffs, eats,* and *licks* as m2 (main verb category, two points), understanding the sentence as *It blows, huffs, swallows, eats, washes, and licks every existing germ.* He did not give DSS credit for the verbs *swallow* and *wash*. Sentences like this had a negative impact on interrater reliability, particularly for DSS.

Results

Accuracy of the Automated Analyses

The accuracy of automated LARSP was calculated using point-by-point agreement for all sentences in all of the samples. At the clause level, accuracy was 68.7%; accuracy was 67.5% at the subordinate clause level. CP put nearly all subordinate clause elements on the clause line, but elements were counted as correct if they corresponded with the appropriate word in the sentence, regardless of location on the clause or subordinate clause lines. Without this accommodation, subordinate clause accuracy would have been 0%. The phrase level accuracy was 89.1%, and the word level accuracy was 83.7%. Accuracy was calculated a second time after spelling errors in all of the samples were corrected. The percent accuracy changed minimally for each level of LARSP after spelling correction: 68.9% for the clause level, 67.7% for the subordinate clause level, 89.7% for the phrase level, and 83.9% for the word level. Overall accuracy for the four levels of LARSP was 80.5%, or 80.9% with spelling correction.

Point-by-point DSS accuracy was 75.1%; spelling correction brought this figure to 75.3%. The DSS sentence point, which is given to each sentence that is adult like in every aspect. Because the DSS software is unable to judge this and either awards the sentence point to all or none of the sentences in the sample, accuracy of the sentence point was not included in the accuracy calculation. A summary of the LARSP and DSS accuracy by participant, as well as mean accuracy, is found in Table 4.

Table 4

Automated LARSP and DSS Percent Accuracy, with and without Spelling Correction, Mean and by Participant

	LARSP					DSS
	Clause	Subclause	Phrase	Word	Overall	Overall
Participant 1						
Uncorrected	64.6	55.1	85.5	80.0	75.1	69.7
Corrected	65.3	58.3	87.1	78.8	76.5	70.1
Participant 2						
Uncorrected	71.9	68.3	91.8	82.7	82.8	87.0
Corrected	71.9	68.3	92.3	83.3	83.0	87.0
Participant 3						
Uncorrected	66.0	70.3	90.0	91.9	81.1	74.4
Corrected	65.7	71.7	90.4	91.9	81.4	74.4
Participant 4						
Uncorrected	70.5	86.7	89.9	81.6	83.0	64.2
Corrected	71.0	68.7	90.5	81.6	83.5	64.2
Participant 5						
Uncorrected	69.4	69.1	88.5	79.0	80.0	71.0
Corrected	69.8	69.1	89.0	79.8	80.4	71.9
Participant 6						
Uncorrected	69.9	67.5	88.5	84.8	80.8	77.1
Corrected	70.1	67.5	88.6	84.8	80.9	77.1
Mean						
Uncorrected	68.7	67.5	89.1	83.7	80.5	75.1
Corrected	68.9	67.7	89.7	83.9	80.9	75.3

Common Error Patterns

While the samples varied greatly in syntactic complexity, morpheme use, and other aspects of language, certain error patterns were common to all or nearly all of the samples. Several of these patterns are discussed in the following sections.

The use of articles seems to have been a difficult aspect of English for these participants to master. Samples 2 and 6 generally had superior article use compared with the other samples, but they still had a few errors in this area. Errors included omission of an article when one should have been used, use of an article when another determiner should have been used, and insertion of an article when none was necessary. Examples included *I think it so cute like baby,* from Sample 1; *He walked into a town and everyone was shocked to find a king walked without a bubble,* from Sample 2; *They know that they would earn lot of money if they use internet,* from Sample 3; *I have idea try fool to someone,* from Sample 4; *If a person break the law then a person will have bad happen like going to jail and stuff like that,* from Sample 5; and *They both put on the warm clothes and start tiptoe out of the cave,* from Sample 6.

In general, auxiliaries were used poorly in these samples. As with articles, Samples 2 and 6 showed superior mastery of auxiliary use. However, all participants had errors in this area, which included omission of auxiliaries, substituting an incorrect auxiliary, and inserting an auxiliary where none was needed. Examples included *But player are learn lesson and accept,* from Sample 1; *My Lord, I am just want to prove it to you,* from Sample 2; *Without computers, we will need higher education,* from Sample 3; *She, Sandy, and me are chat in about thirty minutes, then Jean join with me,* from Sample

4; *Yes, I had felt laughing and crying at the same time,* from Sample 5; *Without that introduction, my eyes will never been open,* from Sample 6.

All those involved in the study except Participant 5 made errors with infinitives, including omission of *to*, addition of *to* when it was unnecessary, or using an infinitive when a different verb form would have been more correct. The most common error was omission of *to.* Examples included *Some people hate dance because they too shy, can't,* from Sample 1; *I recommend you ~~to~~ get a new glasses,* from Sample 2; *I think I'm having problem to-think of new sentences,* from Sample 3; *And Sandy has get free ice cream,* from Sample 4; and *They both quietly put on the warm clothes and start tiptoe out of the cave,* from Sample 6.

The participants often used the wrong preposition for the intended meaning, left out prepositions, or included extraneous prepositions. Examples included *They good explain and affection teenagers and kids make good and listen music,* from Sample 1; *The smile quickly wiped off as a throne smacked on his cheek,* from Sample 2; *I cannot able to write faster to keep my brain running or hold ideas on my mind,* from Sample 3; *Jean and me are laugh to Sandy,* from Sample 4; *And I thought myself that Idaho school for deaf and blind need to improve,* from Sample 5; and *The point of the story is that the black world is similar to me as I was little boy who never experienced deeply into the deaf culture which is the light side,* from Sample 6.

Often the participants would begin a narrative in one verb tense and change tenses during the course of the narrative, typically shifting to present tense. Such tense shifts often happened in the middle of a single sentence. This inconsistency of verb tenses seldom occurred in Sample 6 and was fairly uncommon in Sample 2. Examples included

My friends thought I am hearing peoples, from Sample 1; *The long brown stick just sits on the floor as Wizard threw the dirty and dry food on the floor,* from Sample 2; *They will get in fight, get angry easy, having problem in school or education, and many more,* from Sample 3; *At midnight Paul, Ron, and Sandy left to their home. My brother and me clean game board and off light,* from Sample 4; *After 2 years and I wanted to go back to Burley High School to graduate that year because if I don't I have to stay one more year because not enough credit so I decide to go back to burley high school and graduate there,* from Sample 5; and *Every time they went, the big brother start to feel less and less desire to go back there again,* from Sample 6.

It was difficult to judge competency with interrogative reversal due to the nature of the task: few questions were included in the samples, because they were monologues rather than conversations. However, four of the participants made errors with interrogative reversal, even with the few questions they produced. Errors included deletion of the verb, deletion of the auxiliary, and insertion of an unnecessary auxiliary. Most errors were deletions. Examples included *What your like drink?* (assuming that *like* means *favorite*) from Sample 1; *How can the computers can destroy us?* from Sample 3; *What number room?* from Sample 4; and *If no clocks or watches in life?* from Sample 5. Participants 2 and 6 used interrogative reversal correctly.

Derivational morphology appeared to be difficult for the participants to master. All of the samples included instances where the incorrect part of speech was used, such as an adjective in place of an adverb, or a noun used for a verb. Examples included *People are fear to death because it sharks easy get bite you,* from Sample 1; *I can promise it works perfect,* from Sample 2; *There are children who play violence games,*

from Sample 3; *We song birthday to her,* from Sample 4; *I'm that the teacher are doing really good job,* from Sample 5; and *I've experienced them with cherish and joy,* from Sample 6. Because there is not a noun form for *cherish*, correction was not attempted for the Sample 6 example.

General Information about the Analyses

In the clause and subordinate clause level analysis, S = subject, V = verb, O = object, C = complement, and A = adverbial. When both indirect and direct objects occur in a sentence, Oi = indirect object, and Od = direct object. *X* and *Y* refer to any clause element, including S, V, O, C, and A. Q refers to a wh-question word. A structure was considered productive if it occurred at least five times in a sample. Structures were counted when they were correct; however, some structures were used productively but also were used incorrectly in some instances in the sample.

Regarding phrase level analysis, when a participant is productive with preposition-determiner-adjective-noun phrases, one assumes that the individual is productive with determiner-adjective-noun and preposition-determiner-noun phrases. Similarly, a person productive with determiner-adjective-noun phrases is considered proficient with determiner-noun and adjective-noun phrases. Therefore, a participant who is productive with preposition-determiner-adjective-noun phrases is considered to have more advanced phrase level syntax than a participant productive only with adjective-noun and preposition-determiner-noun constructions. Similarly, a person productive at SVOA clauses is assumed to be productive at SVO, SVA, and VOA clause structures.

Sample 1 Analysis

Participant 1 used approximately 60 minutes to produce his sample. This participant found the task of producing 50 sentences to be difficult, and he commented several times that it was too much. After segmenting run-on sentences into communication units, Sample 1 was 75 sentences in length, a total of 528 words. Only three sentences in Sample 1 were free of syntactic errors. Participant 1 chose to use prompts from *Guided Writing* (Howard, 2002), and each prompt elicited a short paragraph. Toward the end of his sample, he invented his own prompts: *What your like food?* and *What your like drink?* His responses to these were simple sentences, such as *I love Subway.* After this, he asked a researcher for topic ideas. Participant 1 made numerous spelling errors, although the meaning was usually apparent from context, e.g. *My dance like hip-hop, coutnry* (country), *happy dance, and etc.*

Clause and subordinate clause level analysis. Participant 1 was productive with SVOA sentence structure, as well as with sentences containing two adverbials (AA*XY*). He had one SVOiOd sentence, which was *He gave me punishment five miles*. He had two SVC sentences, *But my hearing aid is broken,* and *My friend thought I am hearing peoples*. However, he had many SC structures that should have included a verb, indicating that Participant 1 is not proficient at SVC sentence structure. This participant's use of the copula is further discussed in the phrase level analysis section below. Most of the sentences in Sample 1 were relatively short, such as *I love High School Musical Disney*. Comprehensibility was often compromised when more ambitious clause structure was attempted, as in *Because they good explain and affection teenagers and kids make good and listen music.*

Phrase level analysis. Participant 1 was productive at using determiner-noun, adjective-noun, preposition-noun, and intensifier-adjective phrases, as well as personal and other pronouns. The sample contained one verb-verb phrase, one verb particle, two noun-noun phrases, two determiner-adjective-noun phrases, two auxiliary modals, and two other auxiliaries. No phrasal elements from LASRP stage IV were used.

Participant 1 had poor copular use, as in *That so sad*; *I think that all*; *My coach really mad at us*; *My friends thought I am hearing peoples because I too good music*; *Some people hate dance because they too shy, can't*; and *Without I will for sure full deaf*. He used the copula correctly once: *But my hearing aid is broken so I don't know do my hearing aids left. Broken* was considered an adjective in this sentence. This participant also struggled with negation, typically using the word *not* without an obligatory auxiliary. Examples included *The team not sleep enough,* and *I thought I not like Colorado*.

Word level analysis. Participant 1 used plural nouns and past tense verbs productively. He also had three instances of contracted negation, all of which were the word *don't*. Also in the sample were one past participle, *born*; one third person singular verbs, *is*; and two possessives, *friend's* and *shark's*. No present participles, contracted copulas, contracted auxiliaries, superlatives, comparatives, or –ly adverbs were used in Sample 1.

Advanced structures. Participant 1 produced many subordinate adverbial clauses, as well as several subordinate object clauses. Two postmodifying clauses were produced in Sample 1: *I find out the research that sharks are fear of people,* and *I learned from my friend deaf who were lived in Hawaii*. One comparative was used: *But my hear right much better like fifty five percent than left hearing because it too full deaf.* Participant 1

had one complement clause, *My friend thought I am hearing peoples because I too good music what kind music titles of names.* Three complex verb clauses were used in this sample: *But my hearing aid is broken, so I don't know do my hearing aids left; Don't know what kind how I got cause became deaf;* and *Can't even stop.* Participant 1 did not produce any passive constructions.

Sample 1 contained four questions. Two were sentences with a questions mark at the end, and two were wh- questions that did not contain verbs: *What your like food*? and *What your like drink?* Sample 1 contained no commands.

Sample 2 Analysis

Participant 2 used approximately 30 minutes to produce her sample. This participant chose to write a story as her sample, and she had no difficulty producing at least 50 sentences, without prompts or encouragement from the researchers. After run-on sentences were segmented into communication units, Sample 2 was 98 sentences in length, a total of 775 words. More than half of Participant 2's sample, 57 sentences, were free of grammatical errors. Participant 2 made only three spelling errors, two of which were readily apparent from context. The other error was in the sentence *Wizard Broom's eyes crocked and asked, five cents?* The word *crocked* was not decipherable, although it was assumed to be a verb.

Clause and subordinate clause level analysis. Participant 2 was productive with SVOA, SVCA, SVOiOd, and AA*XY* sentence structures. She also had one SVOC sentence: *They named it the king with no bubble*. Although they were often not perfectly formed in every regard, the sentences in Sample 2 had varied and complex syntax. An example was *And since he was a little boy, he was always in the bubble because when he*

learned about germs, he developed a phobia. And everyone was shocked to find a king walked without a bubble was another example.

Phrase level analysis. Participant 2 was productive with postmodifying phrases, including *But for a few seconds you could see green hands stuck out from the bottom of the broom.* Preposition-determiner-adjective-noun phrases were also used productively, as in *He took the broom out from a long, brown sack.* Participant 2 showed productive use of personal and other pronouns, as well as modal and other auxiliaries. She used negation three times during the sample. One example of both auxiliary use and negation was *I won't give you the broom until you give me my ten cents.*

Word level analysis. This participant showed productive use of plural nouns, past tense verbs, third person singular verbs, and possessive nouns. The sample also had four –ly adverbs, one comparative adjective, two instances of contracted negation, one contracted copula, and two past participles. There were no present participles, contracted auxiliaries, or superlative adjectives in Sample 2.

Advanced structures. Participant 2 was productive with subordinate adverbial, subordinate object, and postmodifying clauses. She also produced two complement clauses: *King Edward was very eager to listen the new tool*, and *He sat down and was very excited to see what happen*. Sample 2 also had two clause sequences introduced by *it*: *It was ridiculous to pay ten cents for a stupid broom*, and *It was rather difficult to move King Edward to new location because of he was in the bubble*; and one clause sequence introduced by *there*: *There was a king named Edward.* Participant 2 used three complex verb phrases, including: *And the king ends up throw up*, and *I will follow behind you so the germs can't catch and kill me.* No passives appeared in Sample 2.

Sample 2 contained several questions: three VS(*X*), one QVS, and two QXY+. Examples included *Why did you make mess?* and *How much do you want?* Sample 2 had several commands, as well, which ranged in complexity from the simple *Show me,* and *Take it or die,* to the more advanced *Seriously, give him your ten cents before I change my mind.*

Sample 3 Analysis

Participant 3 used approximately 45 minutes to produce her sample. She invented rhetorical questions to serve as prompts for her sample; she did not ask for help with topics or use the *Guided Writing* (Howard, 2002) book. Participant 3 talked about computers, her family, and her upcoming transition to graduate school. Sample 3 contained three spelling errors, all of which were comprehensible from context; the length of this sample was 64 sentences, or 664 words. Nineteen sentences in this sample did not contain syntactic errors.

Clause and subordinate clause level analysis. Participant 3 was productive with SVOA, SVCA, and AA*XY* sentence forms. She also had one SVOiOd: *If you replace computer's place, it might give you lot of stress.* Much like Sample 2, Sample 3 had relatively complex and varied clause structures, which often contained phrase level mistakes, including *Also it can be addiction for people who play games on internet or normal games,* and *I think I better shut up or I will not able to stop typing.*

Phrase level analysis. Participant 3 was productive with determiner-adjective-noun, pronoun-determiner-noun, and negated verb phrases. She also used modal and other auxiliaries productively, as well as personal and other pronouns. This sample

showed productive use of the copula. Two postmodifying phrases were present in the sample, including *Computers can be a big problem for the children and adult.*

Word level analysis. Sample 3 showed productive use of the present participle, plural nouns, past tense verbs, contracted auxiliaries, and third person singular verbs. This sample also contained one past participle, three possessive nouns, one contracted negative, four contracted copulas, one superlative adjective, two comparative adjectives, and one –ly adverb.

Advanced structures. Participant 3 was productive with subordinate adverbial, subordinate object, and postmodifying clauses. She also had three subordinate complement clauses and one subordinate subject clause: *Using the Word program on the computer is not only one reason.* Sample 3 contained one passive, *My two older sisters and I were born in Berlin, Germany.* Four clauses introduced by *it* and two clauses introduced by *there* were also present in the sample, including *It's time for me to go back school for master's*, and *There are children who would play violence games.* Participant 3 was productive with complex verb phrases, for example, *We do rely on computers to run many things,* and *I do not think I want to build more stress on me.*

Sample 3 contained no commands, but it had several questions: one VS(*X*), four Q*XY*+, and two VS(*X*+). One of the VS(*X*+) sentences was *Are we thinking how the computers can be useful to us?*

Sample 4 Analysis

Participant 4 used approximately 20 minutes to produce his sample. He also did not request help with topics or use *Guided Writing* (Howard, 2002). Participant 4 talked about college and experiences with friends, and he commented that it was easy to

produce his 50 sentences. This may have been because the sentences he produced were rather simple. He made 9 spelling errors in his 50-sentence, 340-word sample. Only four of these sentences did not have grammatical errors.

Clause and subordinate clause level analysis. Participant 4 was productive with SVOA and SVC sentence forms, and he had four AA*XY* sentences. Four SVOiOd sentences were also present in the sample, such as *Now we song birthday to her.* Participant 4 used two SVCA sentences, including *I was mood eat Mexico.* Although Participant 4 produced these structures, it is apparent that there is little elaboration of the clausal elements. This will be further discussed in the phrase level analysis section.

Phrase level analysis. Participant 4 was productive with determiner-noun, preposition-noun, and verb-verb phrases, as well as personal pronouns. He had four correct uses of the copula and two determiner-adjective-noun phrases, such as, *My friend is same my three classes*. He attempted three preposition-determiner-noun phrases, but all had semantically incorrect prepositions, such as *She, Sandy, and me are chat in about thirty minutes,* meaning: She, Sandy, and I chatted for about thirty minutes. Sample 4 contained one non-personal pronoun and one negated element. Participant 4 used one auxiliary modal and attempted five other auxiliaries. Only the modal was used correctly, although it did not have a verb: *We will late.* Examples of other auxiliary attempts included (with their intended meanings) *I was enjoy went three classes* (I enjoyed going to my three classes)*; Jean and me are laugh to Sandy* (Jean and I laughed at Sandy); and *We were enjoy eat Mexico restaurant* (We enjoyed eating at the Mexican restaurant). This participant seems to have used modals to indicate past tense, although this was not consistent.

Word level analysis. Participant 4 was productive with past tense verbs, although, as illustrated above, his use of the past tense was more often flawed than correct. He was also productive with third person singular verbs, specifically *is, was,* and *has.* He used four plural nouns and one past participle, *We play game board called Clue.* Sample 4 contained no possessive nouns, present participles, contracted copulas, contracted auxiliaries, contracted negatives, superlative adjectives, comparative adjectives, or –ly adverbs.

Advanced structures. Participant 4 showed productive use of subordinate adverbial clauses. He also had four subordinate object clauses, including *Because I miss eat Mexico.* Three postmodifying clauses were used in Sample 4, one of which was *I take three classes are writing, grammar, and reading.* Participant 4 did not use complex verb phrases or passives.

Sample 4 had two questions: one Q*X*, *What number room?* and one Q*XY+*, *Why not we kidding to Sandy about birthday and get free ice cream?* The verbs are notably problematic or missing here. No commands were used in this sample.

Sample 5 Analysis

Participant 5 used approximately one hour and 40 minutes to produce his sample, with many prompts from the researcher to continue to 50 sentences. He began with a narrative about his educational background, but when he had only 12 sentences after an hour, he began using the *Guided Writing* (Howard, 2002) book. The remainder of his sample consisted of single-sentence answers to the writing prompts in *Guided Writing* (Howard, 2002). All of the sentences in his first paragraph were run-ons, and when they were segmented into communication units, his entire sample was 62 sentences in length.

Sample 5 contained 11 spelling errors and 653 words. Thirteen of Participant 5's sentence were free of grammatical errors.

Clause and subordinate clause level analysis. Participant 5 was productive with SVOA, SVCA, and AA*XY* sentence structures, and he had one SVOiOd sentence. He began his sample with complex, though flawed, sentences such as *And about eleventh grade, the boss who is charge of the school for the deaf and blind asked me if I wanted to move other school, because there a better education for me for the deaf group in class.* As he continued, it was difficult for him to maintain this level of complexity, and he produced sentences like *People wear jewelry because of the looks.*

Phrase level analysis. Participant 5 showed productive use of determiner-adjective-noun and preposition-determiner noun phrases. He also used personal and other pronouns productively, as well as the copula and non-modal auxiliaries. Sample 5 contained four auxiliary modals, such as *If without bones, then body won't work well or might not move.* This sentence is also a good example of negation, which was used three times in Sample 5. Two postmodifying noun phrases appeared in this sample: *Anyway, the teacher that hired was not well sign and no experience with deaf people from first grade to about seventh grade,* and *Laws means to follow the rules from the governments.* Participant 5 used three preposition-determiner-adjective-noun phrases, including *There a better education for me for the deaf group in class.* Two auxiliaries were not used with a single verb in any sentence in Sample 5.

Word level analysis. Sample 5 showed productive use of present participles, plural nouns, past tense verbs, past participles, and third person singular verbs. Two comparative adjectives, two contracted negatives, two contracted copulas, and one

contracted auxiliary were used in Sample 5. This sample did not have possessive nouns, superlative adjectives, or –ly adverbs.

Advanced structures. Participant 5 was productive with subordinate adverbial and postmodifying clauses. An example of a subordinate adverbial clause from Sample 5 was *I always like played basketball when I was young*. Participant 5 also used three subordinate object clauses and two passives, including *And I got accepted.* This sample contained two complex verb phrases, both in the same sentence: *If without bones, then body won't work well or might not move*. Two clauses introduced by *there* also appeared in Sample 5.

Sample 6 Analysis

Participant 6 used approximately 30 minutes to produce his sample; he did not request help with ideas for topics. He wrote first about himself and his experiences as a deaf individual, and then he related a story. After a few run-on sentences were segmented into communication units, the sample was 77 sentences in length. There were two spelling errors in this 762-word sample. Forty-three sentences in this sample had no syntactic errors.

Clause and subordinate clause level analysis. Participant 6 was productive with SVOA, SVCA, and AA*XY* clause structures. This sample also had four SVOiOd sentences. Participant 6 used complex and varied sentence structures, including *I grew up all my life hearing things that I couldn't achieve like other extraordinary people*, and *The point of the story is that the black world is similar to me, as I was little boy who never experienced deeply into the deaf culture, which is the light side.*

Phrase level analysis. Participant 6 was productive with pronoun-determiner-adjective-noun phrases, as well as postmodifying phrases. Examples of these two structures included *It was a dark place for that little boy*, and *He stayed at the light side for the rest of his life to the end.* Participant 6 was also productive with personal and other pronouns, as well as modal and other auxiliaries. Participant 6 was the only study participant to use two auxiliaries with a single verb: *I've done things that not many could've done.* This sample contained one negated verb, as well.

Word level analysis. Participant 6 was productive with present participles, plural nouns, past tense verbs, past participles, third person singular verbs, contracted copulas, and contracted auxiliaries. He also used one possessive noun, one contracted negative, one comparative adjective, and four –ly adverbs. No superlative adjectives appeared in Sample 6.

Advanced structures. This participant was productive with subordinate adverbial, subordinate object, and postmodifying clauses. He also had four subordinate complement clauses, including *The best part of studying the Deaf Studies, I am one of their own kind.* Passives were used productively in Sample 6, as in *One night, the boys got caught by their parents.* Complex verb phrases were also used productively by this participant.

Three questions appeared in Sample 6, one Q*XY*, one VS(*X*+), and one tag. They were, respectively, *What's out there?*, *Do you ever wonder what's out there?*, and *Outside the cave, you mean?* There were no commands in Sample 6.

Discussion

Accuracy of the Automated Analyses

In this study, written language samples from six deaf young adults, ranging in age from 18 to 32, were analyzed for syntax using automated and manual DSS and LARSP. Automated analyses, using Computerized Profiling software, were compared with the manual analyses, and point-by-point agreement was calculated to judge the accuracy of the automated analyses.

Long and Channell (2001) cited agreement exceeding 85% as acceptable, exceeding 90% as good, and exceeding 95% as excellent. Based on these standards, the automated LARSP clause, subordinate clause, and word level accuracy levels would be considered unacceptable. Automated DSS accuracy would also be considered unacceptable. Automated LARSP phrase level accuracy, however, would be considered acceptable or good. For this population, overall LARSP accuracy, at less than 81%, was too low to be considered acceptable.

Long and Channell (2001) conducted a study that included 69 typically developing children, stutterers, and children with language impairment, all of whom were under the age of eight years. These researchers reported higher accuracy than was found in the present study. After figuring point-by-point agreement for LARSP elements, Long and Channell found 83.7% accuracy at the clause levels, 90.9% at the phrase level, and 94.3% at the word level. Phrase level accuracy was comparable to what was found in the present study, but the clause and word level percentages are considerably lower. The Long and Channell (2001) study assessed the accuracy of automated DSS by reporting the percentage of utterances that were correctly coded by the software, rather than by

calculating the percentage of DSS elements coded correctly by the software. The result was that 73% of the utterances in the samples were coded correctly. Channell (2003) reported point-by-point accuracy for automated DSS to be between 75.2% and 80.1% for typically developing children and children with language impairment ages 5;6 to 11;2. Overall point-by-point accuracy in the Channell (2003) study was 78.2% for automated DSS, which is marginally higher than the results of the present study.

The present study had lower accuracy than the two studies recently discussed. Based on the accuracy found in this study, it would probably not be a worthwhile endeavor to analyze the written language of deaf or hearing-impaired participants using the DSS and LARSP programs on CP. However, this does not mean that it is not worthwhile to obtain language samples from this population and analyze them.

Linguistic Characteristics of the Samples

In addition to reporting accuracy of automated LARSP and DSS, characteristics of each participant's syntax, as well as common errors seen in all of the samples, were described. Syntactic ability varied widely among the participants. Participant 6 had generally superior syntactic skills, with more than half of the sentences in his sample free of errors. With regards to advanced structures, Participants 2, 3, 5, and 6 were far more competent than Participants 1 and 4. The six participants were roughly equal in productivity with clause and subordinate clause level structures. However, phrase and word level errors sometimes made these structures unclear in meaning and awkward in structure.

Great variation was seen in facility with phrase level structures. Participants 6 and 2 had the most highly developed phrase level capability, showing productivity with

postmodifying phrases and preposition-determiner-adjective-noun phrases, as well as good auxiliary, pronoun, and copular use. Participants 3 and 5 were less proficient; however, they had good use of auxiliaries, pronouns, the copula, and three-element phrases, such as determiner-adjective-noun. Participants 1 and 4 had extremely poor phrase level use, combining only two elements with some consistency and showing poor use of auxiliaries, determiners, prepositions, the copula, and negation.

At the word level, Participants 2, 3, 5, and 6 were roughly equal in productivity, although Participants 2 and 6 had more consistent accuracy using these morphemes. Participants 1 and 4 had poor use of the word level morphemes, showing proficiency only with plurals, past tense verbs, and third person singular verbs. However, the past tense and third person singular verbs that were used correctly by these two participants were all irregular verbs, especially *be*, *do*, *have*, and *go*.

Because of the variability in the population, the uneven development across levels of grammar, and the strong possibility of idiosyncratic errors, it would be beneficial for clinicians to obtain a language sample from a deaf client and perform a syntactic analysis. The analysis should focus on phrase level syntax and word level morphology, as these are likely to be areas of vulnerability in this population.

Study Contributions

Numerous studies have shown that deaf or hearing-impaired people have delayed syntactic development (Geers & Moog, 1994; Geers, Moog, & Schick, 1984; Geers, Spehar, & Sedey, 2002; Kemper, Rice, & Chen, 1995; McAfee, Kelly, & Samar, 1990; Nicholas, 2000; Ouellet, Le Normand, & Cohen, 2001; Tomblin, Spencer, Flock, Tyler, & Gantz, 1999). The participants in this study showed not merely delayed but

qualitatively different development of English grammatical structures than is seen in hearing children. Development across the clause, phrase, and word levels of syntax were uneven, with growth at the clause level outpacing phrase and word level growth. Even when clause level structures were quite complex, phrase level elements that develop reasonably early in hearing children, such as determiners and auxiliaries, continued to be in error. The finding of different rather than simply delayed linguistic development is in accordance with the reports of several studies (Quigley & Paul, 1994; Taeschner, Devescovi, & Volterra, 1988; de Villiers et al., 1994; Volterra, Capirci, & Caselli, 2001; Yoshinaga-Itano, 1996).

The participants in this study showed considerable variability with regards to syntactic ability, even with the small number of participants involved. This supports the findings of two studies using toddlers and elementary age children: both studies reported that their participants varied greatly in syntactic ability (Geers, Spehar, & Sedey 2002; Ouellet, Le Normand, & Cohen, 2001). The current study shows that this variability continues into adulthood, further illustrating the diversity of the population.

This study illustrated some of the benefits and drawbacks of using written language samples, as opposed to spoken language samples. Using written samples allowed analysis of the language of those who do not have intelligible speech, or whose speech intelligibility limits vocabulary to words that are easier to produce. Using written samples saves the clinician time, as transcription is not necessary, and there is no ambiguity in the samples due to poorly intelligible words. Having participants type their samples rather than write by hand eliminates the possibility of illegible words due to the difficulty of reading handwriting. However, typing does not eliminate the possibility of

spelling errors, which were prevalent in the writing of two of the participants in this study. While it was typically easy to understand what was meant, sometimes spelling errors made it difficult to comprehend a sentence. Typographical errors were seen in all of the samples, as well, which would not be a problem with spoken or handwritten samples. If a clinician were to use automated analysis for this population, it would probably not be worth correcting spelling and typographical errors, because spelling correction made little difference in the accuracy of the analysis. It seems equally unnecessary to correct spelling in samples that are to be manually analyzed.

A major drawback to the use of written samples rather than spoken samples is the actual collection of the sample: It was difficult for some participants in this study to produce the 50 utterances necessary for a representative analysis. While all accomplished the task, for some it required a significant time investment, up to an hour and a half. Four of the participants produced their samples without difficulty, but the other two required encouragement and cajoling throughout the process. They were ready to be finished after 10-15 sentences. These participants may have had an equally difficult time producing spoken samples; it is impossible to know. However, there are ways to facilitate the production of a sample sufficient in length. Encouraging the participants and letting them know in a positive but frank manner that they were not yet finished worked for these participants. The book of writing prompts probably helped more than anything. It may have been difficult for these participants to think of something to say, or perhaps the one-sided nature of the task was off-putting, and answering questions made the task more like an interaction than a monologue. If a client is struggling to produce a sample, clinicians might use writing prompts or even try having a written or typed conversation with the

client. Alternately, the client could produce their sample in two or three sessions, if the clinician's schedule permits. Regardless, it is worth obtaining, or at least attempting to obtain, a language sample from deaf clients. The time saved by not needing to transcribe the samples and the increased legibility of typed rather than handwritten samples make typed samples an advantageous form of language sample for this population.

Conclusions

This study has illustrated that deaf young adults have syntactic development that differs from that of hearing children. The six study participants showed great variability in their syntactic abilities and comfort level with producing written English. In general, clause structures were stronger than phrase and word structures, indicating that clinicians and teachers serving this population may want to focus on improving grammar at the phrase and word levels. Specific weaknesses shown by the study participants included auxiliaries, articles, secondary verbs, derivational morphology, and prepositions. Increasing the length of phrases by combining prepositions, determiners, adjectives, and nouns would also improve the language of the study participants. However, the main area of concern was probably verb conjugation; verb errors, including morphology and auxiliary use, often made it difficult to understand what the participants meant. Clinicians can use this study to familiarize themselves with characteristics commonly seen in the language of deaf or hearing-impaired individuals, and that this will provide a foundation for clinicians approaching linguistic analysis and treatment of this population.

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Appendix A

Consent to Be a Research Participant

Introduction

We would like you to participate in a research study. This study will help us learn more about using computers to analyze deaf people's writing. Participation in this study will increase our understanding of the English grammar of deaf individuals. This study is being conducted by Anne M. Hasting, a graduate student at Brigham Young University (BYU). She is supervised by Dr. Ron W. Channell, an associate professor in the Department of Communication Disorders at BYU. We would like you to participate, because you have been deaf since you were very young.

Procedures

First, we will test your hearing and ask about your background. Next, we will ask you to write about various topics, which might include school, friends, or things you like to do. We will show you pictures and ask you to describe them in writing. We can do this at BYU or at another place that is good for you. You will be able to choose whether you want to write with a pencil and paper, or if you want to type on a computer. If you use a computer, the program will not have spelling or grammar help. It will take about one hour to do the writing.

Risks/Discomforts

We believe there are no risks if you participate in this study. You will be writing or typing for about an hour, which should not hurt you in any way.

Benefits

There are no direct benefits to participants. However, it is hoped that through your participation, people who work with deaf children and adults will learn more about deaf people's grammar skills.

Confidentiality

For this study, there will be no reference to your name or other personal information in paper or computer records. Instead, we will use a number for your writing, to help us organize all the writing we collect. All data will be kept in a locked storage cabinet, and only those are directly involved with the research will have access to them. After completion of the study, the samples will be kept as an archive for possible future research.

Compensation

You will receive $20 when you finish your writing task. This payment will not be pro-rated.

Participation

Participation in this study is your choice. You have the right to withdraw or quit at any time. If you withdraw or quit, it will not affect any services you receive from BYU. It will not hurt your chances of attending BYU now or in the future. If you have questions about the study, you may contact Dr. Ron W. Channell at (801) 422-6457, rwc5@byu.edu.

Questions about your Rights as Research Participants
If you have questions you do not feel comfortable asking the researcher, you may contact Dr. Christopher Dromey, IRB Chair, 133 TLRB, Provo UT 84602, at (801) 422-6461, or at dromey@byu.edu.

Signatures
I have read the above and understand what is involved in participating in this study. I have been offered an ASL translation of this form. My questions have been answered to my satisfaction, and I have been offered a copy of this form for my personal records. I understand that I may withdraw from participation at any time. I agree to participate in this study.

_____ _____
Signature of Participant Date

Appendix B

Uncorrected Samples

Sample 1

People love dance from music, they depend moody love to dance. I love dance diffened kind style my dance like hip hop, coutnry, happy dance, and etc. Some people hate dance because they too shy, can't, most of sit not dance. i like be join hip hop people.

I love music but my hear right much better like 55% than left hearin because it too full deaf but my hearing aid is broken so I don't know do my hearing aids left insteanl use my friend's phones Ipod help me hearings music and dance depend what kind of music. I love hip hop, high school muiscal, and soft music. i born sick cause became deaf don't know what kind how I got cause became deaf. but my hearings aids pretty much help me hears than witout I will for sure full deaf.
my friends thought I am hearing ppls becuz I too good music what knind music titles of names.
I think that all..

I love high school musical disney. because they good explame and affection teenagers and kids make good and listen music.

I love baskteball… I most miss my friends on team baskteball we did almost 2th place but we got 3th place because we not even actives play full. the team not sleep enough beucz too much overnight play like we elementary school something like that. my coach really mad at us. he gave me pushment 5 miles run, push up 100, rope jump 20 min can't even stop if stop will more extra 2 hours. we not want to but player are learn lesson and accpet. not make quit. keep team… I think that all…..

I think it so cute like baby. The people are afraid of spiders because it too small, ugly eyes, scary, and killers people? I guess so.

People are Fear to death becuz it sharks really easy get bite you. Rare if sharks not bite you are lucky seravior and not cut bleed. if bleed out will shark bite you anywhere bite your bodies. that so sad. I very worry my surfboad if I do it but carefully look my bodies before cut blood. I find out the reseach that sharks are frear of people that so weird! I learned from my friend deaf who were lived in Hawaii. He very instested learned new something about the sharks's stuff.

what your like food? I love calforina pizza's kitchen. I love itilay restaurt. I love mexican. l love sandwich. I love subway. I love wendy. I love Japan food. I love country buffet. I love apple. I love grapes. I love bread stick. I love banana.

what your like drink? I love Jucly Jamba. I love pucnh furist. I love root beer. I love anthing drinks but I don't drink beer and alocnh becusae it bad!

my best touch state ever? I love calforina becuz I love surf for 6 yrs lived there. my dad have to moved colorado house and look jobs. I thought I not like colorado but I really first time ever cooper mountain colorado. beucase it so cool and fun camp ever!

Sample 2

There was a king named Edward and since he was a little boy, he was always in the bubble because when he learned about germs, he developed a phobia. It was rather difficult to move King Edward to new location because of he was in the bubble, so they usually have to lift him up otherwise the ball roll down and the king ends up throw up. However, one day, King Edward was forty-one years old during fall time. The "wizard" man claimed he invented germ proof broom. King Edward was eager to listen the new tool, he invited him over to the castle immedality. The wizard showed up in the black tight pants with brown potato bag and juggle hat. The wizard had a long nose with bright blue eyes and a fake smirk on his face, he annouced, "Hello, my name is Wizard of Broom," he took the broom out from a long brown sack, "This is germ-proof broom! I can promrise it works perfect! It will blows, huffs, shallow, eats, wash, and licks every exist germs, I can show you the demo!" The King Edward's eyes got bigger and he cried at Wizard of Broom, "Show me! Show me!" He smacked Wizard of Broom with his throne, the wizard smiled from ear to ear but the smile quickly wiped off as a throne smacked on his cheek. The red showed up in Wizard, he took the broom out and it looked very common broom that you can find in the broom closet. The long brown stick just sits on the floor as Wizard threw the dirty and dry food on the floor. The King was quiet upset with Wizard's mess, he yelled, "I want his head! NOW!" He tried to move but unforutantely, he rolled over everywhere. The guards stood there, giggled at the king. King Edward finally

bumped into a wall, he said, “Oh my merlin, I am so dizzy, someone hands over me a cracker,” he stood up, noticed the wizard was still there and the guards giggled, he laughed. He thought they laughed WITH him instead of AT him. The king’s brown eyes twinkled as he started to crying from laugh too hard, he cleared his throat. King Edward wobbled whole of the way to Wizard and asked, “My Wizard, may I ask why did you make mess?” He pointed to the floor angryily. The Wizard bowed down and said, “My lord, I am just want to prove it to you.” The King’s brown eyes brigther and he grinned, “All right, you have my grant. Continue, Broom!” He turned around and told guard to carry him over to the king throne, he sat down and was very eager to see what happepn. The Wizard swept the flithly on the floor but for few seconds you could see green hands stuck out from the bottom of the broom, Wizard’s eyes crossed but he said, “Do you see? The dirty is gone! It proved the germs are gone!” The king stood up and cried at him, “I want that! How much do you want? 5 cents?” Wizard Broom’s eyes crocked and asked, “Five cents? Are you KIDDING?” The king scowled at him and said, “All right, ten cents! It’s my final offer! Take it or die!” His nose stuck up in the air, the Wizard of Broom sighed, “All right, I accept! I won’t give you the broom until you give me my ten cents,” he folded his arms. The king shrugged, “All right, hey you!” He pointed to a random guard, “Pay him with your own ten cents!” The guard looked around and asked, “Me?” His finger pointed to his chest.

The King said, “Are you blind? I recommend you to get a new glasses. Seriously, give him your ten cents before I change my mind!” The guard hurried run over to Broom, gave his ten cents and thought it was ridiluous to pay ten cents for a stupid broom but yet he said nothing. The king quickly grabbed the broom, climbed out from the bubble. He exclaimed, “It is amazing! I want to try it, come over, guard,” he pointed to the guard that king thought he needed a pair of glasses, “You grab broom and sweep! I will follow behind you so the germs can’t catch and kill me,” he was happy as he walked away behind the ‘blind guard.’ He walked into a town and everyone was shocked to find a king walked without a bubble! They celebrated the day and they named it, “The King With No Bubble!” It happened over 500 years ago.

Sample 3

Do we need computers in our lives? My answer is yes. We do relay on computers to run many things. Without computers, we will need higher education. We probably kill our brain cells while thinking too much. If you replace computer’s place, it might give you lot of stress. I do not think I want to build more stress on me. Are we thinking how the computers can be useful to us?

Computers are useful to some of us. For me, I hate handwriting. When I do handwriting, it always make me to write slower than think! I cannot able to write faster to keep my brain running or hold ideas on my mind. I think mostly is to hold the idea or how to write a sentence. I feel natural when I use computer. I can use word program to type anything I want to. I think I was able to express the words better than handwriting.

Using the word program on the computer is not only one reason. There are so many reasons why the computers are useful. People can create a movie from a computer. Or the computer can run math for clerk. It can use for travel such as airplanes, boats, cars (perhaps GPS), run a business, banks, etc. It can continue forever how people use computers.

It is great to use computers to do for us. But it can be disadvantages for us. Many people are curel and wanted to destroy us through computers. How can the computers can destroy us? We use computer to access the internet, email, and others. People who make porn (or who involved porn business) will try to sell people through computer. They know that they would earn lot of money if they use internet. Or they can put virus to destory the computer on purpose. Also it can be addiction for people who play games on internet or normal games.

There are children who would play violence games, they might not think it will affect them. Actually it did affect them by behavior. They will get in fight, get angry easy, having problem in school or education, and many more. Computers can be a big problem for the children and adult.

We have to use computers wise and not abuse the computers or to us.

I think I’m getting tired of this topic. I’m trying to think the new topic. Gosh, I had to yell “STOP” at Emily because she will not stop picking on her head. Emily is continuing do this. What can I help her to avoid picking her head? She realized that I’m typing about her. She does not want me to discuss about her, so I better stop.

Okay, I think I can talk about my family. I have three sisters and one brother. I’m middle of my siblings. My two old sisters and I were born in Berlin, Germany. My mother grew up in Germany until my

dad married her and moved to USA. I guess California is my second home. I must be so excited because I'm on fifty! Are you satisfy?

Gosh, Emily is not satisfy with number 39, 40, and 41! I guess I better make a few new sentences. I think I'm having problem to think of new sentences. Sighs.

Oh yeah, I'm looking forward to move Florida end of April. More likely I will move first week of May because of Emily and my youngest sister's graduation. Why I want to move Florida? It's time for me to go back school for masters. I'm majoring in Deaf Education. Marisa college do offer wonderful program for Deaf Education. Emily and I went to visit Marisa college last November and I loved it. It was so beautiful and quiet. I think I will enjoy living in Florida. Actually I'm ready for new life and challenge. Now you know my news. Okay, I think I better shut up or I will not able to stop typing!… Bye!

Sample 4

On Monday, January 7, 2008. I went Valley State College. My three classes are frist day. I take three classes are Writing, Grammar and Reading. My friend is same my three classes. My friend name is Sandy. She is cool. I was enjoy went three classes. I think I like class is Grammar. Because Grammar is fun and more work writing and think. After three classes, I meet other friend. She name is Jean. She, Sandy and me are chat in about 30 mins. then Jean join with me went my home in American Fork. We play game baord called "Clue." We have fun play game baord. My brother join play game baord. and my other friend asked me want go dinner meixco resturant. I was mood eat mexico. Because I miss eat mexico. I was always eat mexico in California. Utah is not most eat meixco resturant. Paul, Sandy, Ron, Jean, Shaun, My brother and me went mexico restuarnt. we were enjoy eat mexico resturant. I have idea try fool to someone. I told to Jean why not we kidding to Sandy about brithday and get free ice cream. then I tell to woman servie. she said "ok sure." About 10 mins later She give ice cream to Sandy. She is confuse. Jean and me are laugh to Sandy. Now We song brithday to her. But She is not brithday today. and Sandy has get free ice cream. that funny story. After we ate at mexico resturant. We went my home. We played game board "clue." We played in about 2 hours. I love play game borad "Clue." Beacuse I like mystice and find out who did. We were enjoy and fun play game board. At midnight Paul, Ron, and Sandy left to their home. My brother and me clearn game board and off light. We went to bedroom and change clothes. We went to sleep. We were very tired. I have enjoy that day! ☺

We will late. We found map. And we arrive soon. What number room?

Sample 5

I was born in 7 months in burley about 2 lbs. and a year later my family moved to burley from Dallas, Texas. And now Im going to write about school thing, Idaho school for the deaf and blind hired hearing teacher in burley because there few deaf group in Burley which is really small town. Anyway the teacher that hired is not well sign and no experince deaf people from 1st grade to about 7th grade. And I thought myself that idaho school for the deaf and blind need to improve and better sign teacher for deaf kids. And then about 8th grade in middle school and I go school all by myself until about 11th grade but I have a person who help me at school sometime. And about 11th grade the boss who is charge of the school for the deaf and blind asked me if I wanted to move other school because there a better ed. for me for the deaf group in class so I did move there and live there with foster family. The thing I like about a teacher, I'm impress that the teacher are doing really good job and I love her and I wish I was her teacher in the frist place. After 2 years and I wanted to go back to burley high school to graduate that year because if I don't I have to stay one more year because not enough credit so I decide to go back to burley high school and graduate there. After graduate I filled up a mission papers for the latter day saints for 2 years to serve and I got accpected and about 3 months later I went to mission tranning center in Provo, Utah and stayed for couple months before I fly to orlando, FL. After two years served my mission and I got home and excited to see my familly.

Bones to help support the body. If without bones then body wont work well or might not move. Yes, I had felt laughing and crying at the same time. Funny bone is something you hit and the nerves feels like funny pain. Three things that change my life, one is LDS mission, two is people by good expamle and 3 is barely to deaths. In future my goal is save up money and move to rochester, NY for deaf college. Dust come from dirt who god create. ☺ To get rid of dust by broom and cleaning stuff. If no watches or clocks in life?, I looked the sun and I know the time. Three things I do with my eyes is move, see and blink. Laws means to follow the rules from the goverments. If a person break the law then a person will have bad happen like going to jail and stuff like that. The food I like is mexican. I have job right now is byu

landcaping. I have hobbies is sports, camping and hunthing. I am deaf. Where I think socks missing from dryer dropping somewhere. I was deaf because I was sick from 7 months born. I had been some states is utah, new york, wy., colordao, nevnda, and idaho. Everyday I woke up at 7:30am. to go work. I get done work at 4pm. everyday. I always like played basketball when I was young. I do have dogs and cats. People wear jewelry because of the looks. We have two eyes. Both men and women are different. Im mormon. I have 3 sisters and 2 brothers. I have 2 half brothers. Sometimes I sleep on the floors. Sometimes I took a nap. If the clouds cover and will make rains. I always sleep around midnights. I always had fun with familys. we have a house to keep us warm. I always like to learn new things. I want to be computer network and sign teacher. I love spa.

Sample 6

Howdy, my name is Harry James Potter. I am deaf, but I'm still a human. I am like human babies; I poop, I sleep, I eat, I cry. But most of all, I am independent! I grew up all my life hearing things that I couldn't archieve like other extraordinary people. I've been struggling through my childhood as deaf person but I am still standing. I survived through atomic wedge, name calling, and the toilet twirl. (where you get flushed upside down in the toilet head first) But I am still here, I am still standing. I've done things that not many could've done, I experienced them with cherish and joy. I embraced my life style now after I was introduced through the deaf world from my deaf parents. I owe them a big debt, without that introduction, my eyes will never been open and I will suffer through the world alone with frustration and struggling.

I am now known as my nickname HP. I am famous for gigantic sense of humor and many jokes. I had my shares being involved in deaf activities, even being member of those clubs. I met many international deaf people and their own unique signing language. They inspired me to attend to the college of Valley State College to study partial of Deaf Studies. But the best part of studying the Deaf Studies, I am one of their own kind, I know what it's like. I am even dating a lovely deaf girl which I embrace very much. I made many deaf friends through college and deaf activites. My burden as being deaf make me feel positive instead of having negative energy flowing inside me.

I want to bring up this story that I've heard and loved it. It's about a little boy who had parents and one older brother who lived in a cave. It was a dark place for that little boy, he suffered many things that he never liked. His parents has only one rules they expect the boys to follow.

Never leave this cave, ever. That was their rules as they wrote on the paper. But that never stopped the little boy curiousity of knowing what's out there. One night, when the parents were asleep in their bed, the little boy crawled out of the bed toward his big brother's bed. He woke up his brother and asked him "Do you ever wonder what's out there?"

"Outside the cave you mean?"

"Yeah, outside of the cave, out there, what's out there?"

"Hmm, that's a good question, I never thought about it." The big brother responsed with puzzled looks.

They both quietly put on the warm clothes and start tiptoe out of the cave and suddenly, the bright white light hit the boys eyes as they crawled out of the dark hole. The boys was shocked and their jaws dropped, it was completely white color everywhere and everything. There were people too but the boys did not approach them, instead, they watched and watched.

"I..I…I think we better get back." The big brother spoke with terror in his voice. So they did, they crawled back to their room. The next night, the boys waited for the parents to sleep and did the same thing as they did the night they crawled out. Over and over they did, every time they went, the big brother start to feel less and less desire to go back there again.

One night, the boys got caught by their parents, the father yelled at them for breaking the sacred rule as the mother weeped. They were ordered to go back to their room and do not come out until they were told to. They did went back, but the little boy made a beeline to the drawer and packed his clothes and told his big brother that he's going to the white place again. The brother begged him not to, it took the little boy a while to realize that his brother does not want to go out there.

"Okay, you can stay, but I will miss you very much" The little boy nodded and bid him farewell, walked out and never came back. He stayed at the light side for the rest of his life to the end.

The point of the story is that the black world is similar to me as I was little boy who never experienced deeply into the deaf culture which is the light side. It's where the little boy belong, it's where I belong. I am proud to be deaf.