

THE LANGUAGE SKILLS OF SINGAPOREAN DEAF CHILDREN USING
TOTAL COMMUNICATION

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NATIONAL UNIVERSITY OF SINGAPORE

2003

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A THESIS SUBMITTED
FOR THE DEGREE OF MASTER OF SOCIAL SCIENCE (PSYCHOLOGY)
DEPARTMENT OF SOCIAL WORK AND PSYCHOLOGY
NATIONAL UNIVERSITY OF SINGAPORE

2003

Acknowledgements

I would like to express my gratitude to:

- ❖ A/P Susan Rickard Liow, Department of Social Work and Psychology, National University of Singapore, for your advice and patient guidance.
- ❖ The Principal, Mrs Ang-Chang Kah Chai, staff and students of the Singapore School for the Deaf for participating in this study and for teaching me much about the Deaf community.
- ❖ A/P Low Wong Kein, Head, Department of Otolaryngology, Singapore General Hospital, and colleagues in the Listen and Talk Programme for always being quick to provide instrumental aid.
- ❖ Ms Wendy Tham and Mr Tracey Evans Chan for your helpful suggestions and comments on the thesis.

Table of Contents

Acknowledgements	i
Table of Contents	ii
List of Tables	vi
List of Figures	vii
Summary	viii
Chapter 1 Introduction	1
1.1. Deaf Education Worldwide	1
1.1.1. Definitions and Terminology	1
1.1.2. Language and Literacy	2
1.1.3. Approaches to Deaf Education and Programmes	3
1.1.3.1. Auditory-Verbal Approach	4
1.1.3.2. Bilingual-Bicultural Approach	4
1.1.3.3. Cued Speech	5
1.1.3.4. Oral Approach	5
1.1.3.5. Total Communication	5
1.2. Deaf Population in Singapore	6
1.2.1. Introduction to Deaf Population	6
1.2.2. Deaf Education in Singapore	7
1.2.3. History of Sign Language in Singapore	7
1.2.4. Current Approaches to Deaf Education and Programmes	10
1.2.4.1. Oral Approaches in Singapore	10
1.2.4.2. Total Communication in Singapore	11
1.2.5. Observation of Sign Language Use	11

1.2.5.1.	Signing Exact English 2 and Sign Language	11
1.2.5.2.	SEE 2 in Singapore Education	12
1.2.6.	Trends in Deaf Students' Enrolment in Educational Institutions	13
Chapter 2	Literature Review	15
2.1.	Language Development	15
2.1.1.	Language Development of Hearing Children	15
2.1.2.	Language Development of Deaf Children	16
2.2.	Literacy	18
2.2.1.	Literacy Issues of Deaf Children in the World	18
2.2.1.1.	Standard of Literacy	18
2.2.1.2.	Reading and Writing	19
2.2.1.3.	Bilingual Education	21
2.2.2.	Literacy Issues of Local Deaf Children	25
2.2.2.1.	Academic Profile of Deaf Children in Singapore	25
2.2.2.2.	Reading and Writing	27
2.2.2.3.	Language of Instruction	28
2.3.	Signed vs. Written Language	30
2.3.1.	Research on Deaf Children's Signed and Written Language	30
2.3.2.	Local Observations	32
2.4.	Assessing Deaf Children's Language	33
2.4.1.	Assessment Trends	33
2.4.2.	Use of Action Picture Test	33
2.5.	Implications for Observations of Language Errors	35

2.5.1.	Differences in Signed and Written Modes	35
2.5.2.	Language Errors	36
2.6.	Research Questions	37
Chapter 3	Method	39
3.1.	Participants	39
3.2.	Materials	39
3.3.	Design	40
3.4.	Procedure	40
3.4.1.	Administering the APT	40
3.4.2.	Order of Questions and Instructions	42
3.4.3.	Transcription	42
Chapter 4	Results and Discussion	44
4.1.	Transcriptions	44
4.2.	Scoring System	45
4.3.	Hypothesis 1: Information vs. Grammar	46
4.3.1.	Information Scores vs. Grammar Scores	47
4.3.2.	Language Development of SSD Children	48
4.3.2.1.	Information: SSD vs. Norms	48
4.3.2.2.	Grammar: SSD vs. Norms	49
4.4.	Hypothesis 2.: Signed vs. Written Information	50
4.5.	Hypothesis 3: Signed vs. Written Grammar	53
4.5.1.	Written Grammatical Categories Used More Frequently	53
4.5.2.	Signed Grammatical Errors vs. Written Grammatical Errors	57
4.5.3.	Verbs/Tense Markings	62
4.6.	Hypothesis 4: Grammatical Categories	64

Chapter 5	General Discussion and Conclusions	68
5.1.	Discussion of Results	68
5.2.	Other Implications for SSD	72
5.3.	Directions for Future Research	76
5.4.	Conclusions	78
References		79
Appendices		85
Appendix 1	Local Signs of Deaf Kids	85
Appendix 2	Permission to use the Action Picture Test by Winslow Publishing	86
Appendix 3	SSD children's Biodata and Language Background	87
Appendix 4	Information Scores and Age-Equivalence	89
Appendix 5	Grammar Scores and Age-Equivalence	90
Appendix 6	Mean of Correct Answers	91
Appendix 7	Ethics Committee Approval	94

List of Tables

Table 1.	Agreement in the judges' transcription.	44
Table 2.	How a sentence may be scored.	46
Table 3.	Renfrew's norms and the SSD children's signed and written scores.	47
Table 4.	Stories the SSD children composed.	52
Table 5.	Grammatical categories where there was a significant difference between signed and written responses.	54
Table 6.	Differences in the use of specific grammatical categories between signed and written responses (incorrect answers).	58
Table 7.	Types of verb used as substitutes for past tense verb.	62
Table 8.	Types of verb used as substitutes for future tense verb.	63
Table 9.	Types of verb used as substitutes for present participle verb.	63
Table 10.	Responses elicited by the APT.	65
Table 11.	Highest and lowest scores for content words and function words obtained by native signers, late acquisition and second language signers.	66

List of Figures

Figure 1.	History of language changes in Singapore deaf education.	9
Figure 2.	Graph of Primary School Leaving Examination grades of SSD children from 1990 to 2000.	26
Figure 3.	Graph of Primary School Leaving Examination grades in 2000 at national level.	26
Figure 4.	Four pictures that the SSD children wrote about.	51
Figure 5.	SEE 2 signs for “mice” and “mouse”	54

Summary

To date there has been little research on the development of language skills by Singaporean deaf children although many fail to pass the public examinations at the end of primary school. Education in one of Singapore's schools for the deaf is based on the total communication (TC) approach, and all children enrolled there must learn Signing Exact English 2 (SEE 2) as a first language. In this study, the efficacy of learning English through SEE 2 in this school was investigated by analysing 31 deaf children's signed and written responses to Renfrew's *Action Picture Test*, an assessment tool that separates scores for information and grammar content. The data showed clearly that all children were delayed in language relative to their unilingual hearing peers for information and grammar in both signed and written English. These results are reasonably consistent with previous work on deaf populations elsewhere but a comparison of scores across modalities, and language components, proved instructive: Information content was stronger than grammar content and similar across language modalities, but written grammar scores were significantly better than signed grammar scores. This pattern of performance, together with a detailed investigation of verb usage, suggests SEE 2 is not a strong foundation for written language development, and that the current teaching programme for these children may not be optimal even for signed language development. The theoretical implications and pedagogical applications of the study are discussed with reference to a multilingual setting such as Singapore.

Chapter 1 Introduction

The purpose of this study is to examine the language production of deaf¹ children in Singapore, where English is the medium of instruction in all schools. Research on language comprehension and language acquisition are better established in psycholinguistics, but language production is gaining prominence (Wheeldon, 2000).

As this thesis is the first detailed investigation of local deaf children's language, I will highlight implications for deaf education in Singapore as well.

1.1. Deaf Education Worldwide

1.1.1. Definitions and Terminology

Although socio-linguistic characteristics may differ across the various deaf communities, international research on deaf education will be used as a foundation for understanding local issues. I will begin with a review of definitions and terminology.

There are several different terms used for those found with a hearing loss. As hearing loss is often not total, the term "hearing-impaired" is usually preferred to "deaf". Yet, according to Mogford (1988), some people with hearing-impairments tend to reject the negative connotation of the word *deaf* as one that is merely imposed by the hearing community, and prefer this term to *hearing-impaired*. The term "Deaf" is also used to refer to people in the community who are part of the deaf culture. In such a case, the term describes a cultural and linguistic aspect of deafness, rather than the degree of describing hearing impairment. There is often a careful distinction in the

¹ The terms "deaf" and "hearing-impaired" will be used interchangeably to refer to those who have been diagnosed with a hearing loss.

literature on whether the subject of interest is *Deafness* or *deafness*, the former being cultural and the latter being physiological.

In this thesis, I will use the term “deaf” to mean any person with a hearing loss, total or partial, because the terms *deaf* and *hearing-impaired* are used interchangeably in Singapore.

1.1.2. Language and Literacy

The language of instruction in school plays a particularly important role in deaf education and literacy development. Literacy, defined by McAnally, Rose and Quigley (1999) as a person’s ability to read and write in the societal language so as to achieve needs and goals, is of undisputed importance for deaf children as they seek to be independent and contributing members of society. However, many deaf children, including those in America whom Kuntze (1998) observed, start school with relatively little language, and find literacy tasks very difficult. Goldin-Meadow and Mayberry (2001) observed that in America, the reason that these children begin school without much language is because ninety percent of them are born to hearing parents who are unlikely to know sign language. These children of hearing parents may not be exposed to sign language from birth. Consequently, their lack of basic linguistic competence when they start school makes it difficult for them to attain literacy goals.

Efforts at developing literacy among the deaf in many English-speaking societies are consequently hampered by the children’s impoverished grasp of the English language, and American studies often draw attention to the low level of reading achievement (Allen, 1986; Holt, 1993). This particular finding is important for research concerning the academic achievement and linguistic abilities of deaf children in Singapore. Although English is not the first language for most families, it is the language of instruction in Singapore schools, and thus it is possible to draw some

parallel inferences from published work on deaf children in English-speaking countries such as America.

However, many factors remain unique to the local deaf population. The main difference lies in the use of a native sign language by the deaf in America, in addition to manual sign systems. The American Sign Language, the native language of the deaf in America, is widely acknowledged as an established language in its own right, and Gallimore and Woodruff (1996) consider it a distinct language that is completely separate from English. In Singapore, no one has ever identified a language that is native of the deaf population, although the public would say that the deaf use “sign language” to communicate. This “sign language” is actually Signing Exact English 2 (SEE 2), which is not a sign language but a manually coded English sign system.

However, anecdotally, the deaf community does not adhere strictly to the rules of SEE 2. The differences, notably in grammatical structures, will be discussed later in this study.

1.1.3. Approaches to Deaf Education and Programmes

Despite the differences, America provides a good model for Singapore because research on, and implementation of, deaf education policies is more advanced there. According to Schwartz (1996), children who have an educationally significant hearing loss qualify for special education services under federal law (Individuals with Disabilities Education Act) and parents have a choice over the different programmes available. These different programmes include the Auditory-Verbal Approach, the Bilingual-Bicultural Approach, Cued Speech, the Oral Approach, and Total Communication. Several of these programmes are also available to deaf children in Singapore, but in this thesis I will look at the language of children using Total Communication. The reason for choosing this particular approach will be discussed

later. The choice and variety of programme in Singapore will be discussed later. In what follows, I will summarise the different approaches to language learning.

1.1.3.1. Auditory-Verbal Approach

One of the approaches to managing hearing-impairment in America is the Auditory-Verbal Approach, where children utilise their hearing potential by using powerful hearing aids or cochlear implants, to learn to talk through listening.

Estabrooks (1996) sums up the goal of Auditory-Verbal practice for hearing-impaired children as the opportunity to grow up in a regular learning and living environment that allows hearing-impaired children to become independent, participating, and contributing citizens in mainstream society. The Auditory-Verbal therapist and the parent(s) work together to help the child develop auditory, speech, language, cognitive and communication skills, such that the hearing-impaired child will subsequently participate in mainstream society and attend a regular school.

1.1.3.2. Bilingual-Bicultural Approach

The Bilingual-Bicultural Approach incorporates American Sign Language as the language of instruction in school and teaching English as a second language through reading and writing. Deaf culture is also imparted to the hearing-impaired children through instruction in deaf history, contributions, values and customs of the community. In this approach, the deaf child learns language mainly through the visual mode. American Sign Language, which Gallimore and Woodruff (1996) believe is the only complete language that is entirely visible, allows the child access to a complete language. Speeches reading (also known as lip reading) and manually coded English systems do not.

1.1.3.3. Cued Speech

Cued Speech, a method used to supplement speech-reading, uses handshapes that are phonemically based to show the exact pronunciation of words in connected speech. Williams-Scott and Kipila (1996) describe it as a system that allows the child to 'see-hear' every spoken syllable that a hearing person hears very precisely. This system was developed to help make reading lips clearer, as many English words would look alike when spoken.

1.1.3.4. Oral Approach

The Oral Approach is not one single method, but Gatty (1996) refers to it as a group of methods that places an emphasis on the different aspects of the communication process. These methods collectively emphasise that hearing-impaired children should only use spoken language in face-to-face communication. Emphasis is also placed on the child's use of residual hearing, as it is an important factor in how well the child understands and produces spoken language. Audiological management is hence an important consideration in this approach.

1.1.3.5. Total Communication

Total Communication is the approach used by the children who participated in this study. Bodner-Johnson (1996) described it as a communication philosophy where signs, speech, gestures, speech-reading, amplification and/or finger-spelling may be used to provide linguistic input to deaf children. Children taught using this approach are allowed to express themselves in the mode of their choice. The philosophy of Total Communication assumes that different children benefit from using different modalities in various situations. Thus, one description of Total Communication could be the simultaneous use of speech and signs to represent English. In this instance, manual systems used with Total Communication in the past include invented systems

such as Signed English, Signing Exact English, Seeing Essential English and Linguistics of Visual English, amongst others. Another description could be the choice of sign or speech and the use of speech-reading and residual hearing for communication purposes.

Kuntze (1998) now argues that there is an undercurrent of change that is beginning to take shape in deaf education. Research on bilingual education has shifted deaf education towards a combination of American Sign Language and English to help children access the curriculum better. Nover, Christensen and Cheng (1998) noted that in America, many educators of the deaf are turning to American Sign Language for a linguistic foundation that would enhance the learning of English as a second language. The implication of this change needs to be considered in the light of the educational approach for the deaf in Singapore.

1.2. Deaf Population in Singapore

1.2.1. Introduction to Deaf Population

In 2002, the Singapore population in the *Statistics Singapore Newsletter* by Tan (2002) stood at just over four million people. In 2002, there were 5,252 people registered as hearing-impaired with Singapore Association of the Deaf (SADeaf), the representative body for deaf people in Singapore. SADeaf provides for the welfare, social, recreation and educational needs of the hearing-impaired in Singapore and jointly runs the Singapore School for the Deaf (SSD) with the Ministry of Education. Its mission states that it also aims to help parents cope with, and understand, their hearing-impaired children.

SADeaf conducts SEE 2 classes in addition to providing support services, and these classes are popular with members of the public who want to know more about

the signing deaf population in Singapore. In its relatively short history here, SEE 2 has increased the profile of a community that not many people here understand.

1.2.2. Deaf Education in Singapore

There are few written records of the introduction of sign language in Singapore. However, Ewing (1960) gave an account of a report by Lady Templer at the International Congress held at the University of Manchester, from 15-23 July 1958. She was the Founder and Patron of the Federation School for the Deaf in Penang, Malaya, and presented a report on *The Educational Treatment of Deafness in South-East Asia*. The report also mentioned the situation in Singapore at that time. Lady Templer recalled being told when she enquired, that there were no deaf children, and hence no need for deaf education in Singapore. Little was known of the deaf community then. However, Mrs Templer soon found out that there were actually two schools for the deaf that were in operation. One was an oral school and one was based on signing. The oral school, established in 1952 and run by the Singapore Association for the Deaf, used English with lip-reading, and the signing school was opened two years later.

1.2.3. History of Sign Language in Singapore

A formal sign system was introduced into Singapore when Mr Peng Tsu Ying arrived in 1951. Mr Peng, a postlingually deaf adult, was born in Shanghai. He became deaf around the age of 6 years, and was educated at the Hong Kong School for the Deaf and the Shanghai Chung Wah School for the Deaf. He came to Singapore as a result of political changes in China, and taught some deaf children in their homes until a group of Chinese merchants decided to open The Singapore Sign School for the Deaf in March 1954.

In 1963, the oral school and the sign school merged to become the Singapore School for the Deaf, the school where I conducted this research. Within the same premises, those in the oral section of the school used English as the medium of instruction, while Chinese was taught in the signing section of the school, with Mr Peng's Shanghainese Sign Language as the medium of instruction at that time.

In a brief interview with Mr Peng, I learnt that he had encouraged one of his deaf students, Mr Lim Chin Heng, to go to America to learn English and their sign system. Mainstream education in Singapore was moving towards English education at that time and schools were beginning to switch to English as a medium of instruction. However, parents who wanted deaf children to learn English in school had to be sent to the oral school, as Shanghainese Sign Language continued to be used in the signing section. When Mr Lim graduated from Gallaudet, an American university for the deaf, he returned to Singapore and introduced American Sign Language to the deaf community in 1975.

In 1976, Ms Frances Parsons, an Associate Professor at Gallaudet, visited Singapore and introduced Total Communication (TC) to the schools. The Singapore School for the Deaf adopted the philosophy of Total Communication and implemented it in 1977. This meant the oral section of the school started using sign language and the sign section started to use oral communication where possible. Mr Lim conducted classes in American Sign Language (ASL) and trained teachers to use it with their deaf pupils.

Around this time, Signing Essential English (SEE) and Signing Exact English 2 (SEE 2) were being developed in America as a means of learning English. Unlike ASL, SEE 2 is a manually coded English sign system. SEE 2 will be discussed in detail later. Prior to SEE 2, there had been another manually coded English sign

system, SEE. SEE 2 differs from SEE in certain rules. For example, in SEE 2, compound words like “butterfly” have their own signs when the meaning of the components do not mean the same thing as the compound word.

SADeaf decided that SEE 2 was the most suitable sign system for its curriculum, so they adopted it as the official medium of instruction in the school in 1978. The Chinese Sign Section using Shanghainese Sign Language was phased out in 1983, as there were gradually fewer parents who opted for a Chinese education for their deaf children. A summary of these changes is presented in Figure 1.

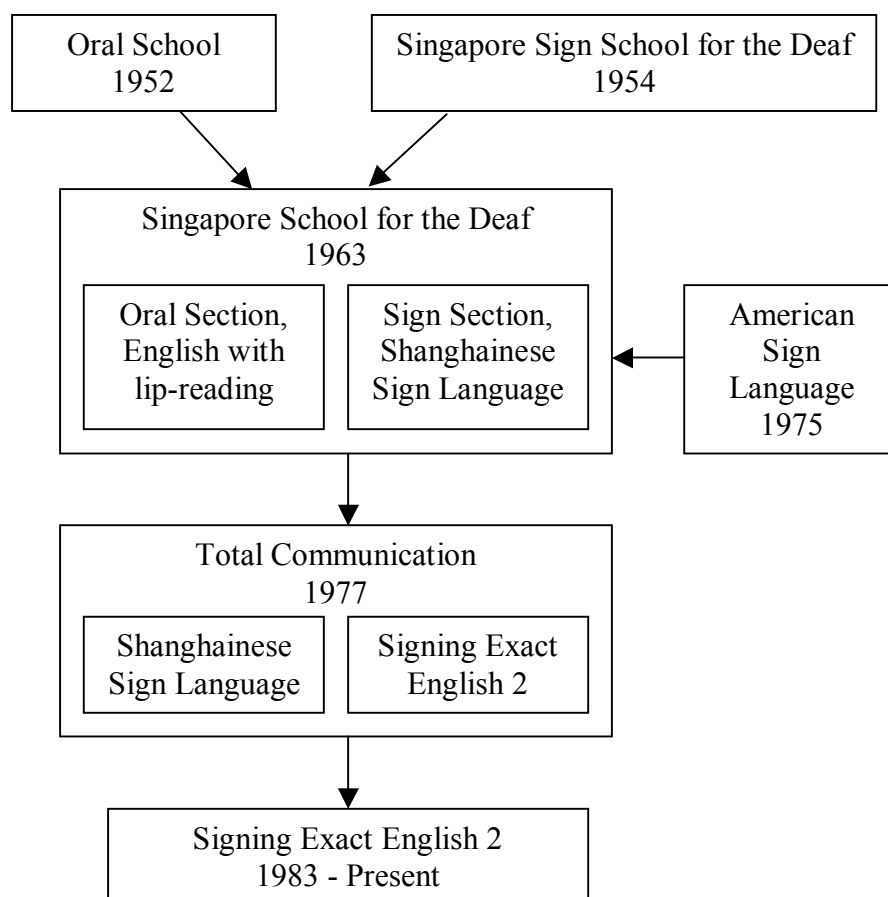


Figure 1. History of language changes in Singapore deaf education.

1.2.4. Current Approaches to Deaf Education and Programmes

There have been some changes in local deaf education since the early days and several approaches to deaf education are now used. This was made possible by an increased awareness of hearing loss management and consequently, more deaf children were being enrolled in schools. The choices of educational programmes for the deaf in Singapore parallel those in America, which were reviewed earlier.

1.2.4.1. Oral Approaches in Singapore

Parents of children with hearing impairment in Singapore who want an Oral Approach for their children have the option of enrolling them in the Canossian School for the Hearing Impaired (CSHI). The Directory of Services for the Disabled states that students at CSHI are taught using the Natural Auditory-Oral philosophy, which emphasises the use of audition. They do not use sign language, unlike the children in SSD, the only other school for deaf children in Singapore.

There are also hearing-impaired children in mainstream schools. These children access the school curriculum mainly through auditory input – using their residual hearing from hearing aids or cochlear implants. Some of the children in this situation may receive therapy for language development through services such as CSHI's programme or the Listen and Talk Programme at the Singapore General Hospital. The Listen and Talk Programme uses the Auditory-Verbal approach, which helps children access speech and language primarily through auditory input. It aims to integrate children in mainstream schools so that their hearing peers can be good language models.

Although Total Communication includes the auditory function of communication, the reality is that the SSD participants for this thesis, unlike other deaf children in Singapore, rely primarily on the visual-spatial mode. For this reason, I

decided to investigate both signed and written language production of this atypical group.

1.2.4.2. Total Communication in Singapore

The present Singapore School for the Deaf (SSD) was established in 1963. It offers classes from pre-school to primary six and follows the local mainstream education system, because it is also managed by the Ministry of Education which oversees all public education in Singapore. Speech therapy, audiological services, and counselling are also provided at the school, and it is the only deaf school that employs the Total Communication (TC) approach in Singapore. This means that teachers at SSD utilise all potentially available resources of linguistic communication, which may include sign, speech and amplification through the use of hearing aids in the classroom.

1.2.5. Observation of Sign Language Use

1.2.5.1. Signing Exact English 2 and Sign Language

In SSD, the school where I collected data, SEE 2 is used as the language of instruction in class. SEE 2 is a manually coded English sign system, which is meant to represent formal English language, with one sign for each morpheme. According to Gustason and Zawolkow (1993), SEE 2 was originally developed to help deaf students improve their grasp of English. It was hoped that children exposed to English in a gestural mode would master the structure of the language better if complete sentences and formal syntax were signed.

Unlike SEE 2, sign languages do not always share the vocabulary and syntax of the spoken language used by hearing people living in the same place. Sign language is a visual gestural language that is based on the use of the hands, eyes, face, mouth and as well as the body, and may include the use of a manual alphabet. Deaf people all

over the world are said to have their own native sign language (World Federation of the Deaf, 1993). However, since SEE 2 is essentially the English language coded in signs (SEE 2 merely substitutes signs for words in full English sentences), it is a version of English and not a sign language in its own right, unlike ASL or other native sign languages.

At present, there is no official documentation of a native sign language in Singapore. There is however anecdotal evidence from SADeaf and SSD that although SEE 2 was adopted by SADeaf as the official mode of instruction in school, the deaf population do not use SEE 2 only, to communicate. Sign language in Singapore is said to be a “continually developing blend of American, Shanghai and locally-generated signs” (1990, foreword). SSD had also included a pictorial article on the local signs used by the deaf children in school in their 45th Anniversary magazine ‘Listening eyes’ (see Appendix 1). However, this thesis looks only at SEE 2 and its effects as the main mode of instruction in school.

1.2.5.2. SEE 2 in Singapore Education

The use of SEE 2 in Singapore is complicated because not everyone understands or uses Standard English. Deaf children who do not come from English-speaking homes are likely to struggle with SEE 2, because their parents are not able to communicate with them in SEE 2. Not only are they deprived socially, they would be like the children in Padden and Humphries’ (1988) observation of deaf children in America, who lack the adult models for learning a natural language. School is usually the place where they can learn and develop intellectually, yet most of the SSD children have not mastered the medium of instruction, English.

A similar observation has already been made in the education of hearing children, regarding the use of Singapore Standard English (SSE) and Singapore

Colloquial English (SCE). Gupta (1994) notes that the use of SCE by teachers in certain circumstances may actually facilitate the learning of SSE rather than impede it, as teachers are able to use English at the level that children can understand, rather than bewilder them with the variety of English (SSE) that few had been exposed to prior to attending school.

In a multicultural and multilingual society such as Singapore, there are also normal hearing children who have never been exposed to English before beginning school, as they speak another language at home. Some common home languages are Mandarin, Malay and Tamil. Even if English is spoken, it is usually the colloquial variety (SCE), so it is no surprise that normal hearing children are also unfamiliar with Standard English (SSE). Many deaf children's parents at SSD do not speak English, so they find it immensely difficult to learn SEE 2, and they are not able to teach their children SEE 2. Most of the deaf children have never been exposed to Standard English before coming to SSD, and most will never use it at home. Imagine what an effort it is for them to learn the rules of a spoken language such as English in order to learn new concepts in school, and how frustrating it is for parents who cannot help their child with school work. Inevitably, most deaf children in SSD do not perform well in primary school.

1.2.6. Trends in Deaf Students' Enrolment in Educational Institutions

According to the Singapore Association for the Deaf Annual Report 2002, there are now 870 hearing impaired students in Singapore. For those in primary schools (which comprises of 6 levels), there are 281 in mainstream primary schools, 108 in the Singapore School for the Deaf, and 166 in the Canossian School for the Hearing-impaired. The statistics also show that there are currently only 36 students in secondary schools (which comprise of 4-5 levels, depending on the educational

programme each child is streamed to) with resource teachers who sign, and another 189 students in secondary schools with no signing resource teachers. This suggests that fewer than half the number of hearing-impaired students in primary schools receive education at the secondary level. There are 12 students in vocational institutions that offer training in specific job skills, e.g. repairing cars. The number of students decreases further in institutions of higher learning. There are only 13 who are enrolled in pre-tertiary education (which comprises two to three levels, depending on the programme each student qualifies for). Only a small number of deaf students make it to tertiary institutions, with the majority of this group enrolled in diploma courses at the polytechnics (62 persons) and only three enrolled in a university.

The Ministry of Education web site states that 96.7 percent of students (out of 50331 students) were eligible for secondary school education in year 2001. Yet for hearing-impaired students, less than 50 percent of the cohort qualified. It appears that deaf students are under-represented in secondary schools. As a result, even fewer students go on to tertiary education. Hence an investigation of their academic achievements and related issues of literacy attainment has practical as well as theoretical implications.

Chapter 2 Literature Review

2.1. Language Development

To understand the language of local deaf children better, I will highlight some of the issues raised in the literature regarding language development of both hearing and hearing-impaired children.

2.1.1. Language Development of Hearing Children

The language of normal hearing children begins with phonological development, where sounds and their patterns are learnt. This is followed by semantic development, as they start to learn the meanings of words and acquire more words in their vocabularies. Syntax and pragmatics follow, as children spend more time with adult language models. Schirmer (2001) says this is because children need to have a considerable amount of conversational experience with adults in order to learn language. Berko Gleason (2001) also notes that children begin to learn the social rules for language use during the pre-school years, where they learn to make polite requests, for example. These four components of language (phonology, semantic development, syntax and pragmatics) are interrelated and several studies have shown that the stages and sequences of acquisition in deaf children usually parallel those of hearing children. For example, Petitto (1987) examined the acquisition of personal pronouns in American Sign Language (ASL) by two profoundly and congenitally deaf signing children and found that even the errors committed are similar to those of hearing children. Observational and experimental data were collected from the two girls who learnt ASL from their deaf parents. It was found that milestones for acquiring pronouns for the deaf children were similar to those of hearing children; proper nouns in reference to people occurred first, and pronoun use occurred at 18-22 months, but

remained unstable for a period, until about 30 months, when they were used correctly. These similarities suggest that deaf children have the capacity to develop language much like hearing children, except that deaf children tend to have a poorer grasp of the spoken language as they do not have full access to every component of the language.

Brown (1973) studied the language development of three hearing children, Adam, Eve and Sarah, and gave an account of the order of acquisition of grammatical morphemes. The spontaneous speech of the children and their mothers (or occasionally, their fathers or someone else) in conversation at home was recorded and transcribed. The children's age was not a factor in this study as children may acquire language at different rates, but the length of their utterances was used for comparison. It was found that the morphemes were acquired in the order of syntactic and semantic complexity. Syntactic complexity is defined by the number of rules required for the morpheme, while semantic complexity is defined by the number of meanings encoded in the morpheme. That means morphemes with fewer rules and fewer encoded meanings are acquired earlier. This order of acquisition, which will be discussed later, is expected to be similar for deaf children learning English through SEE 2. However, for local deaf children, there are also other considerations, such as the age of language acquisition. This will be discussed further, with the description of the children's language backgrounds.

2.1.2. Language Development of Deaf Children

Perhaps the most salient aspect of deaf children's limitation in developing the societal language is their difficulty in articulation. Quigley and King (1982) point out that deaf children's speech has often been rated unintelligible. Hence phonology is one area where deaf children seem to lag behind their hearing peers. Members of the Singapore society at large are often overheard referring to deaf persons as "deaf and

dumb/mute”, in reference to their perceived inability to communicate in spoken language.

Although this erroneous label offends those in the deaf community and highlights the need to educate the public, a more pressing concern for these children is not their difficulty in articulation, but their grasp of the syntactic and semantic aspects of language. De Villiers (1991) observed that the deaf child will not pick up the average 3,000 words per year that the hearing child learns by just overhearing or reading these words in class. This is based on the study by Nagy and Herman (1987), which revealed that the average twelfth grader has a vocabulary of 40,000 word families. If the average third grader has a reading vocabulary of 5 to 10,000 words, then the hearing child must be learning 3,000 new words a year. De Villiers (1991) accurately observes that many deaf children are in a vicious cycle, where their poor vocabularies limit their reading comprehension, and consequently prevent good reading strategies and skills from developing, which in turn limits their ability to acquire adequate contextual vocabulary knowledge.

Ratner (2001) observed that besides having a poorer vocabulary than their hearing peers, deaf children also have trouble understanding passives and embedded clauses, modals, verb auxiliaries, infinitives and gerund. She made this general observation from works by Quigley and King (1982) and Scheetz (1993) on the typical writing samples of deaf children.

Deaf children’s difficulty in mastering the syntax and acquiring the lexicon of the spoken language often leads to the poor development of reading and writing. This is likely to be a widespread problem in Singapore since the English language experience is confined to school for many of the deaf children.

2.2. Literacy

2.2.1. Literacy Issues of Deaf Children in the World

The importance of literacy has been acknowledged for various reasons. It is a catalyst for social change, because written language transmits knowledge and information in ways no longer limited by the human memory. Segall, Dasen, Berry and Poortinga (1990) point out that some forms of literacy are even said to aid some specific language-processing and cognitive skills.

2.2.1.1. Standard of Literacy

It has been established that the deaf have great difficulty learning to read and write, rarely achieving a reading proficiency beyond that of a nine year-old (Trybus and Karachmer, 1977; Conrad, 1979), and many studies of deaf children have focused on ways in which literacy may be improved. For example, Kuntze (1998) suggested that learning American Sign Language may be an alternative route of English acquisition for deaf children as it facilitates the process of literacy development, while Goldin-Meadow and Mayberry (2001) found that knowing a language (even if not the one in print) can facilitate reading development in deaf children.

There are differing views about the relationship between reading and the acquisition of language. Some like Bell (1929), Pugh (1945) and Van Uden (1977) believe that deaf children develop their language from learning to read, while others like Groht (1955) believe that they need to know the language before being taught to read. Yet there are others who do not commit to one view, but point towards the common goal of improving literacy and language standards through reading, as summarised by Power and Leigh (2000) in their review of the principles and practices of literacy development for the deaf.

2.2.1.2. Reading and Writing

In order to develop educational programmes that would increase the writing and reading abilities of deaf children, it is necessary to assess their present language levels first, so that this understanding can be incorporated into instructional strategies.

Deaf children's reading has been described as delayed, in comparison to hearing children's reading. For example, Hayes and Arnold (1992) compared 15 hearing-impaired and 15 hearing children's results on a battery of reading tests and language tests and found the deaf children showed a delay because they were not developing the usual reading strategies well. Bryant and Bradley (1980) examined two reading strategies used by hearing children in normal literacy development. The first of these strategies is a visual strategy where the visual chunks, which are familiar sequences of letters, are recognised. The second strategy, which is phonological, is to recognise that words can be broken into phonetic units. Deaf children who have difficulty developing these strategies from the start may show a delay in reading. This is not surprising, given that one of the strategies is phonological.

Similarly, in a longitudinal study of both deaf and hearing beginner readers, Harris and Beech (1995) found that reading gain scores were significantly correlated with oral skills, performance on the auditory organisation task and language comprehension. The children were assessed at 3-month intervals over their first year of formal reading instruction and the results showed that the deaf children made considerably slower reading progress than the hearing children. Harris and Beech (1995) noted that while hearing children could acquire reading vocabulary through the use of logographic, alphabetic and orthographic strategies, the deaf child had difficulties in developing a grapheme-phoneme code. Thus in their second study, they set out to examine the use of phonological coding by deaf children. Two groups of

children (36 deaf children and 35 hearing children) were assessed and the results showed, not surprisingly, that hearing children were using phonological coding much more than deaf children of the same reading age.

Banks, Gray and Fyfe (1990) suggested that it might be more useful to train deaf children explicitly to construct meaning from whole passages rather than rely solely on developing isolated items of vocabulary and single-sentence syntax. Sixteen severely deaf children were given three stories to read and their written recall of the stories was compared to that of 14 hearing children with equivalent reading ages. The results showed that both groups had a similar level of recall for the passage content but the deaf children were weak in syntax as well as their ability to use story schemata in reading. Deaf children “habitually focus on the smaller units of the word and the sentence, thus limiting their residual capacity for gaining access to the global meaning of the passage” (Banks et al., 1990, p.203). This shows that there is not only a delay but also a difference in processing, which illustrates the difficulty deaf children face in reading and the help they need.

As Paul (1990) notes, it is unsurprising that they also have similarly low levels of writing abilities and spelling, since similar processes as reading are involved and there is a lack of mastery of the primary language form. The poor writing skills of deaf children have been further examined by comparing their writing with that of their hearing peers. Yoshinaga-Itano, Snyder and Mayberry (1996) found in a study that there are differences in the strategies used by hearing and deaf participants in their writing. Forty-nine hearing participants and 49 deaf participants wrote compositions based on a picture from the Peabody Language Development Kit. One of the differences found suggest that deaf children have difficulty communicating ideas in writing as their syntax skills are not so well developed. This will be of concern in the

case of deaf children in Singapore, as deaf children taking the PSLE will be required to compose a story in their English language examination. Assessed for secondary school placement together with their hearing peers, these deaf children will be disadvantaged with their less developed writing skills.

2.2.1.3. Bilingual Education

A key issue in literacy development for the deaf, especially in America is bilingual education. Since research on deaf education in Singapore is still in its infancy, it is worthwhile considering what researchers worldwide are advocating in this regard.

There is growing support for bilingual education for deaf children, with more research showing that learning two languages is not detrimental to the development of one particular language. For instance, Petitto et al. (2001) have shown in their videotaped study of three children learning *Langues des Signes Quebecoise* and French, and another three learning English and French, that both groups of children attain their early linguistic milestones in the languages at the same time.

Research on deaf children's education and literacy often examines the role of a native sign language, such as American Sign Language (ASL), and its relation to the children's mastery of the English language (Prinz et al., 1996; Rinne, 1996; Everhart and Marschark, 1988). Many have suggested that a Bilingual-Bicultural education, such as the use of both English and ASL in pedagogy, will help deaf children greatly in school. In this approach, the goal is the mastery of both English through an English-based sign system, such as SEE 2, and ASL.

For example, Prinz et al. (1996) tested the hypothesis that competence in ASL facilitates the acquisition of English literacy. Their sample of six girls and three boys were measured in their ASL proficiency, English literacy and cognitive abilities. They

found that there is preliminary evidence that there is a significant correlation between broad reading and writing achievement and fluency in American Sign Language, with those who are proficient in ASL achieving high levels of literacy in tests.

Prinz and Strong (1998) also conducted a larger study to investigate the relationship between ASL and English literacy skills among 155 students at a residential school for the deaf in California. An ASL test battery and an English literacy test battery were administered, and the results showed a significant relationship between English literacy skill and ASL proficiency. Their interpretation was that ASL skill may be a predictor of English literacy performance, with the suggestion that more research on Bilingual-Bicultural programmes for deaf children is needed, because existing models of bilingual instruction (developed for hearing populations) are not suitable for the deaf. Advocates of a bilingual education approach, Nover, Christensen and Cheng (1998), believe that bilingual education empowers students with a more active role in their own literacy development and they thus become independently engaged learners.

The school of thought advocating bilingual deaf education is not limited to the use of ASL and English alone. Besides studies that support Bilingual-Bicultural education in America, Hall (1995) suggests that a bilingual instruction model would benefit deaf children in Jamaica. In Halls' (1995) study, 12 deaf children completed tasks in writing, reading and sign language. They were found to have the ability to express complex ideas in sign language, which they had difficulty expressing in writing. It was suggested that there was a diglossic language situation that resulted in the children's limited facility with English, and that there was a need for a non-traditional approach in the teaching of the written language.

This brings to fore the much-debated issue of diglossia in sign language. This argument is interesting as it provides a framework for analysing the language situation in Singapore. Unlike America, Singapore does not have an established native sign language such as American Sign Language. While advocates of the Bilingual-Bicultural Approach may recommend using ASL for remediation in literacy development, there is no such option readily available in Singapore's context. It is not documented that the deaf population uses a language other than English (SEE 2) or even a variation of it, although there are allusions to such occurrences by the deaf community. Hence these are issues that will be explored in this study.

Following the initial discussion on diglossia by Ferguson (1959), Stokoe (1969) suggests that diglossia, the situation where the same speaker may use two or more varieties of the same language under different conditions, is helpful in explaining the linguistic situation of sign language within deaf communities. Having found all nine features of diglossia in ASL and signed English, Stokoe (1969) proposed that the acceptance of ASL as the L (low) variety and signed English as the H (high) variety of language is preferable to the opinion that sign language is not grammatical. Ferguson (1959) explained that social variation in language use is evident when considering the nine factors that will determine whether a speaker chooses the H or the L variety of language. The factors are function, prestige, literary heritage, acquisition, standardisation, stability, grammar, lexicon and phonology.

In the context of studying local deaf children's language, it may be possible to consider if there are H and L varieties of the language being used, instead of a totally different language from English, which the children are taught. However, one foreseeable difficulty is finding enough evidence to fulfil those nine factors in order to determine that there is indeed a situation of sign language diglossia here in Singapore.

This theory has in turn been examined and discussed by others (Lee, 1982; Hawking, 1983) who pointed out flaws in Stokoe's (1969) argument, and made other suggestions of their own. These included the view of bilingualism and code-switching and style-shifting being present, rather than diglossia.

Williams (1999) points out that during periods of free-writing activity, pre-school deaf children in America were observed to use ASL among themselves but they code-switched to English-like signs when they were trying to engage hearing adults in conversations about their drawing and writing. This illustrates how it might be possible that even young children are aware of the complex linguistic situation they are in, and can elect to use either a sign language or an English sign system to communicate, depending on the circumstances. It seems likely that such children would benefit from a classroom situation where they are able to utilise their knowledge of both their native sign language and a manually coded English system. This further supports the call for a bilingual education, i.e. native sign language and manually coded English, according to the demands of the task.

Given the apparent capacity for such sophisticated linguistic behaviour, even for young children, SSD children should be able to understand when to use which sign system.

Theories of diglossia and/or code-switching in bilingualism are the basis for this study on language production in Singapore's deaf community. The different language modalities used by deaf children in school are examined in order to find out if there is a bilingual situation (i.e., English and a sign language). The possible presence of diglossia is considered. The main application of this study would be to characterise the linguistic situation of the deaf in Singapore, so that education policies can be implemented to enhance the language skills of the deaf population.

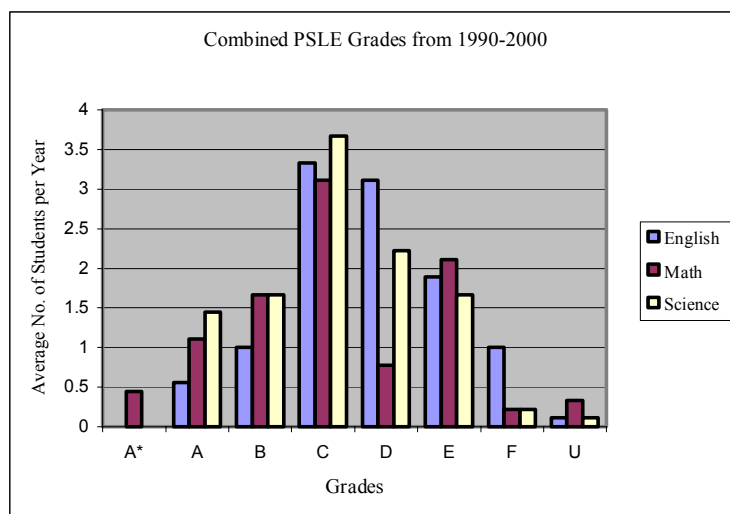
2.2.2. Literacy Issues of Local Deaf Children

In Singapore, English is the main medium of instruction in schools. Key subjects, such as mathematics and science, are taught in English and examinations are taken in English. It is also the official language used in commerce and administration. English plays an important role in cross-cultural communications among the different ethnic groups in Singapore. Without a good grasp of English, opportunities for the deaf population will remain limited.

2.2.2.1. Academic Profile of Deaf Children in Singapore

Local children complete about six years of elementary education in a primary school before they go on to take their Primary School Leaving Examinations (PSLE). This is a nationwide examination, set and administered by the local Ministry of Education. In mainstream schools, children are tested in four subjects: the English Language, a mother-tongue language (Chinese, Malay and Tamil are the usual languages offered) as well as Mathematics and Science. The children in SSD are tested in English, Mathematics and Science, as they do not receive instruction in mother-tongue at school, but this assessment may be made several years later than normal hearing peers.

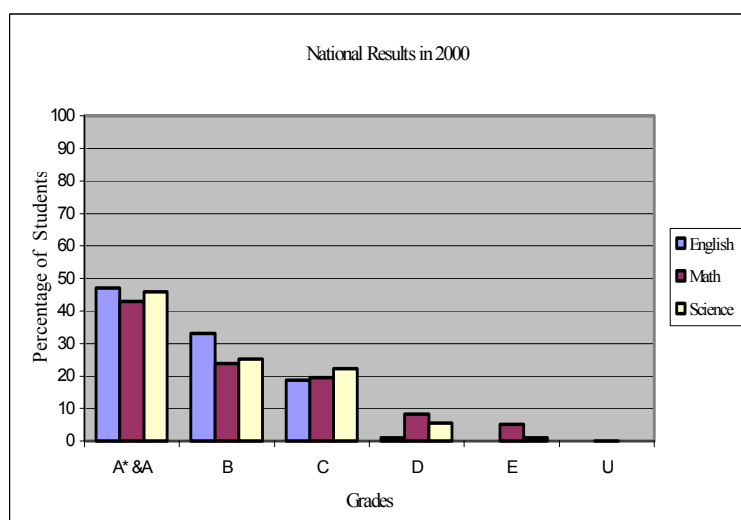
The grades of children at SSD over the last 10 years are shown in Figure 2, with the exception of 1996, where SSD had no candidates taking the PSLE examination. With A* as the highest attainable grade and F as a failing grade, C can be taken as the median grade. U is the grade given when the paper is un-graded.



(Source: Singapore School for the Deaf Students' Records)

Figure 2. Graph of Primary School Leaving Examination grades of SSD children from 1990 to 2000.

From Figure 2, there were no students who attained an outstanding grade of A* in English in all ten years at SSD. During that period, the highest proportion of students get the median grade of C and below each year.



(Source: Singapore School for the Deaf Records)

Figure 3. Graph of Primary School Leaving Examination grades in 2000 at national level.

National PSLE results from 1990-2000 could not be obtained, but national PSLE results in year 2000 are tabulated and shown in Figure 3. Although a breakdown of the A* and A grades were not available, and neither were the F grades, a comparison of Figure 2 and Figure 3 shows a clear pattern. Most SSD children would get C and D grades while most of their peers would score A*, A and B grades.

Low et al. (2000) conducted a brief study of PSLE grades of local hearing-impaired children in the deaf schools with other children in the mainstream schools. Although no figures were given in their report, Low et al. (2000) stated that these deaf children generally had poorer results than the rest of their cohorts taking the examinations, in the year 2000.

Hence from these examination results, it can be seen that the local deaf children do not have a strong grasp of English and consequently, they do not do as well as their hearing peers in the national examinations.

2.2.2.2. Reading and Writing

Although there are no statistics from studies showing the reading and writing levels of local deaf children, I had done some reading and writing exercises with the children at SSD, in order to have a better understanding of their literacy standards. I found that the children were generally poor in these areas, just as I had been told by teachers and professionals who work with them. To illustrate what I found, I will discuss the exercises I did with them.

The Neale Analysis of Reading (Revised British Edition) was used with ten children. As many (7 out of 10 children) were not able to achieve the basal levels, their reading scores were not tabulated for analysis. They could not answer most of the comprehension questions about the passages they read, and most of them scored 0. While they were reading to me, I also noticed that they had poor sign vocabulary and

had to use finger-spelling a lot, as there were many words that they did not know the signs for.

Teachers often observe a lack of coherence in the children's writing. For example, this is an essay written during class by N.S., an 11 year-old SSD student in Primary 3 (rising 9 years level), deemed to have normal range cognitive abilities:

"Lost and Found"

He is Lenny my mother and father. We are Lost and found. I will be come is police to talk to Lenny. I will be help us. We are help will your parents. We can you parents are have another is people. There are my mother and father is her Lenny.

Given that this is fairly representative of writing standards at this level, there is considerable concern among school staff at SSD.

2.2.2.3. Language of Instruction

The rationale for using SEE 2 in the Singapore deaf school is based on the fact that it is a manually coded English sign system that helps deaf children improve their grasp of English. However, use of SEE 2 demands careful consideration of the linguistic situation in Singapore. Many deaf (and hearing) children struggle with using Standard English. The probability of English being the language used at home is low. SEE 2 may not help them much when they do not get the necessary reinforcement at home with their families. Parents who do not speak English will not be able to use SEE 2 at home. As a result, many of the children do not acquire SEE 2 or any other language until they are enrolled in SSD, due to the severity of their hearing loss. This is likely to have some effect on their language development. Mayberry (1994) found in one study that linguistic experience in childhood will determine how well sign language, and perhaps any language, can be processed later on. In the study,

postlingually deafened signers (considered second language learners) recalled complex and long ASL sentences. The number of grammatically acceptable responses they produced was compared to that of three groups of congenitally deaf signers (who are first language learners). The results showed that other than native signers (who learnt ASL from birth), these second language learners outperformed those who acquired ASL in childhood as well as those who acquired ASL late. Mayberry (1994) showed that early language experience is important for hearing-impaired children, and this is something that many of the SSD children are deprived of because they learn their first language relatively late.

The teachers and other professionals working at SSD have noted that children do not have a good grasp of oral or written English, in spite of the fact that they are taught SEE 2. This lack of proficiency in English is impeding their progress in school since all subjects and concepts are taught in SEE 2.

In the light of bilingual deaf education research, the question of whether they should be taught in their “native sign language” in addition to learning SEE 2, is difficult to answer. The native sign language, like a spoken language, will have its own morphological and phonological systems, syntax, semantics and lexicons. Presently, not much is known about a separate sign system that the local deaf children and adults seem to use and what its characteristics are. Given that local deaf education elsewhere is now moving away from the signed systems to spoken societal languages, a detailed study of their language use would be imperative. It would also take time to establish and teach educators of the deaf this local sign language. In the meantime, the results of this study will shed light on the specific areas in English that these children are having trouble with.

2.3. Signed vs. Written Language

2.3.1. Research on Deaf Children's Signed and Written Language

My interest in the difference found between deaf children's signed and written language arises from the current evaluations of how successful the use of English sign systems have been in the classrooms. These signed systems are supposed to raise literacy levels, but there are researchers who pointed out the shortcomings of learning English through a manually coded system.

For example, Suty and Friel-Patti (1982) believe that the problems deaf children have with learning English could be attributed to learning English through a spatial-gestural mode. They conducted a study of grammar and semantic content and found that the *meaning* conveyed in deaf children's signing was close to that in the sample of their age-matched hearing peers. This contrasts greatly to the 4-year gap in *grammar* between deaf children and hearing children's performance in an assessment test. The deaf children were found to differ in their language mainly in their use of grammatical functors and affixes. Although manually coded English was intended to represent English visually, English is an auditory-vocal language. Hence, as Suty and Friel-Patti (1982) found, deaf children exposed to English through these spatial-gestural signals may use the modality in a different way than that presupposed by makers of such manual codes, as seen in the results of their study.

The constraint of learning English through SEE 2 is demonstrated in a study by Supalla (1991). Deaf children were exposed only to manually coded English (SEE 2) and then asked to describe simple events in whatever way they chose. A hearing teacher of the deaf provided target SEE 2 structures for comparison with the children's production. Deaf children who had been exposed only to SEE 2 resorted to creating their own linguistic structures in order to satisfy the general modality constraints on

signed (as compared to spoken) languages. The children devised their own spatial devices and rules that were consistent with each individual, but there were distinct types when compared with other children. Supalla (1991) suggests that besides the issue of modality, the quality of SEE 2 input that the children receive could have led to these invented systems. Teachers and parents tend to leave out morphological markers and this practice is copied by children who learnt to sign from them. This possibility is considered in the present study.

Another interesting characteristic observed in the signed and written language of deaf children was made by Akamatsu and Armour (1987): Deaf children may know a certain word in sign but may not be able to use it in reading and writing. Two groups of eight severe-to-profoundly deaf students were asked to give a spontaneous writing sample after watching a cartoon, and answer written questions about a person signing a story in English. Akamatsu and Armour (1987) related how one student said she knew the answer to the written question in the second task, but did not know how to write it. This suggests that deaf children's sign language skills tend to be better than that of their written language skills. As good written language skills are crucial for attaining good academic results, it is important to help deaf children develop their full literacy potential.

Besides remediation, studying the different modes of production by deaf children also has implications for assessing their cognitive development. Everhart and Marschark (1988) compared the written productions of deaf and hearing children to their signed and oral productions in two experiments. In the first experiment five deaf and ten hearing students asked to give two stories, where one story was about being picked up by a UFO while the other was about a discovery of an underwater world. One story was to be videotaped (Signed/Oral condition) and one was to be written

(Written condition). These two modes of production and the two story themes were counterbalanced over subjects. This experiment was repeated a second time with ten deaf and ten hearing students, with a larger age range than in the first experiment. The results showed that deaf students produced more nonliteral constructions in their signed stories than their hearing peers did in their spoken stories, although they produced less nonliteral constructions in their written stories than the hearing students. Categories of nonliteral construction used were novel figurative language (trope), frozen trope, frozen gesture, supplemental gesture, pantomime, linguistic modification linguistic inventions and lexical substitutions. They concluded that although deaf children's literalness and concreteness in language may limit their interactions in social and educational settings, the literalness shown in written language is not indicative of general cognitive literalness because their signs were nonliteral.

Marschark's (1988) study shows that using English-based assessments of deaf children's academic competencies may not be an accurate reflection of their general abilities. The children's written and signed productions are evidently different and thus their psycholinguistic competencies may be different from those of hearing children. It follows that deaf children should be tested in their sign language as well as literacy skills. In some situations, English-based assessments will not be particularly helpful other than to confirm an already established fact that deaf children lag behind their hearing peers in literacy. It is thus important to understand the differences between deaf children's signed and written language.

2.3.2. Local Observations

It is difficult to determine if a bilingual (native sign language and English) education programme for the deaf in Singapore would be beneficial, since little is known about their language. There is no documented native sign language to speak of

and not much is known of the rules that govern its use. A more practical question to ask at this stage is how the English sign system, currently used by deaf children in SSD, is different from their written language form that is supposed to be English. If the children are not strictly using SEE 2, then there are likely to be differences in their expressive language.

2.4. Assessing Deaf Children's Language

2.4.1 Assessment Trends

Assessing the language and literacy abilities of deaf children provides educators and parents of deaf children with more information that might help promote language development and literacy. Testing will be in the four major components of syntax, semantics, pragmatics and phonology, and there are two ways of assessing deaf children's language. The first includes predominantly standardised tests of language, usually administered by speech-language specialists, and the second includes informal sampling of language conducted mostly by teachers. Schirmer (2001) notes that the advantage of the former is the ease of administration and consistency of use, while the latter offers the best opportunity to understand the deaf child's use of language within a natural setting, and provides a better link to remediation strategies. I will be using a standardised test, as the consistency of use will allow me to compare similarities and differences between signed and written answers.

2.4.2 Use of Action Picture Test

For the present study, a suitable test instrument is one that allows the children to give an open-ended language sample for grammar and information within a particular structure. The Action Picture Test (APT) was chosen because it can be adapted to elicit signed and written responses from the participants and has an

Information and Grammar scale. The Information scale measures content words and the Grammar scale measures function words and word endings. Renfrew (1997) designed this test to stimulate children to give spoken language samples that could be evaluated in terms of information given and the grammatical structures used and there are age norms for unilingual English speaking children with normal hearing. The test comprises ten coloured Action Pictures, scoring forms and a manual. The APT is to be administered to each child individually. The tester shows the stimulus pictures to the child one at a time, and records the responses verbatim. To elicit fuller responses, prompting by the tester is allowed. The answers are scored according to a set of criteria devised by Renfrew. The scores obtained can then be compared to the norms, in order to assess the child's language skills in the information and grammar components of the test.

In terms of reliability, no test-retest was carried out by Renfrew on a large scale, but random testing revealed that there was little difference in the child's score, if retested within a month of the initial testing. The Action Picture Test Grammar scale was correlated with the Carrow Elicited Language Inventory and high correlations between the two were found. However there are no tests that are sufficiently similar to the Action Picture Test for comparisons of the Information scale to be made.

It is helpful to examine elicited information and grammar separately because the former carries content words in language, while the latter carries function words. Further analyses of these two categories are possible when considered separately, and comparisons between the signed and written would be informative.

The Action Picture Test was normed on a normal English-speaking unilingual population. Gupta, Brebner and Yeo (1998) state that a language test should ideally be normed for the normal local multilingual population. However, in some ways the deaf

population at SSD is more like the unilingual population than like their bilingual normal hearing peers in mainstream schools. This is because children in mainstream schools are taught two languages, but the deaf children in SSD are only taught English, which is learnt through SEE 2. Although most of them come from families that use another language at home, they do not learn that language sufficiently due to their hearing loss. They may be able to understand a few words commonly used at home, but most do not know enough to be able to be able to converse in it. As a result of their hearing loss, they do not often communicate much with their families verbally, as they have little access to speech sounds. Hence English remains the only language most of them will ever learn. Whilst a direct comparison of Renfrew's norms with the deaf children's scores must be tentative, it is a useful gauge of language proficiency pending a standardised study.

Being satisfied that this was an appropriate stimulus for the purpose of this study, written permission from the publisher to use the test was then sought. This was granted in a letter dated 31 October 2000 (see Appendix 2).

2.5 Implications for Observations of Language Errors

2.5.1 Differences in Signed and Written Modes

A comparison of the errors made by the children in signed and written language production will shed some light on the difficulties they have in each particular mode. Differences found will have interesting implications for teachers at the school, who use the approach of teaching a spoken language, such as English through a signed medium. If the SEE 2 method is successful, the children will achieve scores close to the norm and commit the same errors in both modes. Any discrepancies between modes may be evidence that the children are not relying on SEE 2 exclusively.

This assumes that the children have learnt English successfully from young. However, there is concern that most of them acquired language late, which would have affected their language skills. Hence further observations of the errors made will take into account the children's language backgrounds.

2.5.2 Language Errors

For normal children, the third-person singular *-s*, plural *-s*, past tense *-ed* and progressive *-ing* are considered the most important among the morphological errors, according to James (1998). Shaughnessy (1977) observed that all learners of English learn *-s* more successfully when it is syllabic, and thus, more salient. James (1998) noted that this is phonological in cause but grammatical in effect. Shaughnessy (1977) also found that the plural *-s* is often omitted when preceded by quantifiers and other numerals. The past tense *-ed* is both omitted and overused, where analogies drawn lead to errors such as 'can walk'.

This pattern was expected for the deaf children's language as well. Mogford (1988) found that deaf children use mostly content words (like nouns and verbs) and fewer function words (such as conjunctions, auxiliaries, prepositions and pronouns). These function words, which are not often used, are less familiar to them and hence the children are more prone to committing errors when using them. Quigley and King (1982) found that deaf children have particular difficulties with the morphology of English, especially verb and noun inflections. Citing the work of Taylor (1969), where the written productions of deaf children up to 16 years of age were examined, morphemes were noted to be difficult for children even at this advanced age. For this reason, different grammatical categories were of special interest in this study.

2.6 Research Questions

In this study, I investigated the SSD children's language skills by recording their signed and written responses to the 10 picture stimuli taken from the APT (Renfrew, 1997). These responses enabled me to compare the *information* and *grammar* content in these two modalities, and make a series of predictions:-

1. *Information vs. Grammar.* The SSD children would perform better on the Information scale of the APT (in terms of Renfrew's unilingual age-norms) than the Grammar scale for both the signed and written responses because they rely heavily on content words (c.f., Mogford, 1988).

2. *Signed vs. Written Information.* The SSD children's signed Information scores would be better than their written Information scores (c.f., Akamatsu and Armour (1982) who found in their study that deaf children may not be able to use a word in writing although they may have the vocabulary item in sign).

3. *Signed vs. Written Grammar.* If the SSD children were using standard SEE 2 (i.e., complete with all grammatical components) in their everyday signed communication, their signed Grammar scores should be similar to their written Grammar scores. However, I predicted that the children's written Grammar scores would be *better* than their signed Grammar scores, because they seemed to be using their own system of signs (perhaps native signs) in everyday communication, where English grammar rules are not always adhered to.

4. *Grammatical Categories.* In a more qualitative study, I will describe the patterns seen in the answers given by three different groups of children and compare

their correct responses among the groups. Given that some of the children acquired language late, I predicted that this group of children would have the highest and lowest scores in different categories than children who are native signers as well as those who learnt SEE 2 and English as a second language (c.f. Mayberry, 1994).

Chapter 3 Method

3.1 Participants

Thirty-one deaf students participated in this study. Thirteen of them were male and 18 were female. This was the total number of students enrolled in the upper primary levels of the primary school section of the SSD. Their ages ranged from 10 years to 16 years and 2 months at the time of the test, but their chronological age was not an important consideration here because the students were enrolled in the Primary 4, 5 and 6 classes according to their academic abilities (included their language standard). For this reason, I grouped the participants according to their school levels, rather than their chronological ages. All the participants had been attending classes at SSD for at least a year. I excluded those who had only recently transferred from the other local school for hearing impaired children which employs the oral method (CSHI), because they were unlikely to have learnt sufficient SEE 2. All 31 participants reported using SEE 2 as their choice language for communication.

Information regarding the degree of their hearing loss (which ranges from moderate to profound) is detailed in Appendix 3, which also has self-reported information on the mode of communication they use at home and in school.

3.2. Materials

As noted earlier, the Action Picture Test (APT) is a standardised test that stimulates children to give samples of spoken language that can be assessed in terms of the information given and grammatical structures used. In this study, the 10 picture stimuli were presented to the participants with the accompanying questions in a fixed order.

3.3. Design

The two independent variables in this study are mode of expression (Signed vs. Written) and language component (Information vs. Grammar), and all the 31 children were tested in both modes, i.e., 2 x 2 repeated measures design. The dependent variable was the score achieved for Information and Grammar for each mode of communication but some additional qualitative analyses were also carried out.

3.4 Procedure

3.4.1. Administering the APT

Consent from the school was sought and obtained before the APT was administered to the children. The school arranged for the children to meet me individually for this purpose. The participants were tested in a room that was well-lit and quiet. There was no one else present other than the assessor and participants, so that disruptions were kept to a minimum and participants were not distracted from the task.

The deaf students were informed that they were participating in a research study on the use of sign language by deaf children in Singapore. Upon agreeing to participate, they were requested to provide some background information about themselves, which included the language used by themselves and their families. This information is given in Appendix 3.

The tasks were then explained carefully in SEE 2 to ensure that each participant understood what was required. In the first task, the assessor instructed the student in SEE 2 to look at each picture carefully. The student was then asked to respond to the question or instruction in SEE 2, and allowed to clarify with the instructor if there were questions. The answers given were videotaped. When the student had finished signing

the answers to all 10 pictures, the assessor would then give the instructions to write out the answers on paper. The pictures were shown again in the same session, with the questions and instructions signed to the student in the same sequence as the first task. The same task order was adhered to strictly for all 31 children. This was done to avoid priming them to consciously sign the answers the way they would write them, as I wanted their SEE 2 responses to be spontaneous. Hence the signed responses were noted first. The testing was carried out in a single session because the children missed classes while participating in this study.

I administered the Action Picture Test to all the children individually. The signed answers were videotaped and analysed by three adult deaf signers. Since it is possible that the participants may not use SEE 2 signs accurately (i.e., variants of the original sign) it was necessary to have the data transcribed by persons from the deaf community. A SEE 2 signer who does not know the children's language may have difficulty reading their signs if they were not standard SEE 2 signs. Hence, three deaf teachers from SSD were enlisted to transcribe the data from signed productions into written text to help facilitate the analysis of children's language and ensure rating reliability. Being deaf signers themselves, they were able to decide whether each linguistic production belonged to their language system or whether they were merely gestures and pantomimes. This is based on Nelson, Loncke and Camarata's (1993) premise that sign languages are developed within the deaf signing community, and since these teachers are a part of that community, they would therefore be able to make such judgements, being proficient in the sign language themselves. The judges first transcribed the data independently, by writing their interpretation of each sign down, before comparing the transcriptions with the other judges' transcribed data. The data was tabulated and then analysed using the statistical programme SPSS 10.0.

3.4.2. Order of Questions and Instructions

The ten questions and instructions accompanying the pictures were given to the participants in the following order:

- (1) What is this girl doing?
- (2) What is the mother going to do?
- (3) What has been done to the dog?
- (4) Tell me all about what the man is doing.
- (5) What has the cat just done?
- (6) What has happened to the girl?
- (7) What has the big girl done?
- (8) Tell me what the man is doing.
- (9) What is the boy doing?
- (10) Now, look at this picture. Tell me what's happening.

To preserve confidentiality, I will describe a few examples but not reproduce the actual pictures of the test. Picture 4 shows a man riding a horse over a wooden gate. Picture 8 shows a man climbing up a ladder towards a black cat with an arched back on the roof. Picture 10 shows a lady walking away, with a torn shopping bag and apples were falling out of the bag. A boy then bends down to pick up an apple.

3.4.3. Transcription

The deaf teachers who acted as transcribers sometimes interpreted the data differently. Since the participants did not always use standard SEE 2, it was possible for the three judges to interpret the signs and transcribe them into different words.

The judges first transcribed the data independently and following that, the transcriptions were compared. Whenever discrepancies arose, a check was made to

see if there were two of them that concurred. When two of them transcribed the data identically, this version was taken and the third person's transcription was omitted. In the case where all three versions differed, the judges were given the opportunity to discuss what they felt was the most appropriate answer and why. They would then arrived at a common consensus on which transcription to use in the analysis.

Chapter 4 Results and Discussion

4.1 Transcriptions

The three independent judges transcribed the signs from videos and inter-judge reliability was then considered before more detailed qualitative and quantitative analyses.

Table 1. Agreement in the judges' transcription.

<i>Judges' Transcription in Agreement</i>	<i>Transcribed Answers (N=310)</i>	<i>Percentage of Responses</i>
All 3 the same	267	86.13
2 out of 3 the same	37	11.94
All 3 different	6	1.93

Table 1 shows that all the judges were in agreement² slightly over 86% of the time, suggesting that the signs were transcribed reliably.

To check whether the disagreements were question-specific or participant-specific, a crosstabulation of the individual questions was carried out. There was a total of 43 disagreements (out of a total of 310 responses) and the maximum number of disagreements was 8 out of 31 for each question (26% for Question 7) and was 4 out of 10 for each participant (40% for Participant 9). In Question 7, the participants were asked to respond to a picture of a girl holding up a young child, who was posting a letter in the mailbox. The question asked was, "What has the big girl done?" Some of the participants did not know the signs for "post" and "mail" (words they seldom used)

² There is one exception to the uniformity in the transcription by the judges. There is no SEE 2 sign for 'spectacles'. However, whenever a small 'c' sign is held to the eye, it would be interpreted as the sign for 'spectacles' or 'glasses'. These two words were used interchangeable for the same non-standard sign. Although this sign is not in the SEE 2 vocabulary, it is easily recognised by all signing deaf persons as the sign for 'spectacles' or 'glasses' and is used frequently by them.

and gave varying signs to express that idea in their responses. The judges had the most disagreements in transcribing the responses of Participant 9. Her knowledge of SEE 2 was not as good as the other children's, as she transferred to SSD from an Oral Approach school for deaf children (CSHI) midway through her primary school education. She also reported not using SEE 2 at home (see Appendix 3). Despite these caveats, the relatively even distribution of disagreements suggests that the transcriptions are reliable and reasonably unbiased.

4.2. Scoring System

To measure the differences between each participant's signed and written responses to the same question, Renfrew's (1997) scoring system was adapted. In Renfrew's original scoring system, points are given for incorrect answers for grammar if the child shows an understanding of certain concepts. For example, a correct response of "mice" will earn the child two points, and if the child used "mouses" instead, one point will be awarded for this plural inflection. This recognises the process of children's language development. However, for the purpose of this analysis, where the total scores were compared, this graduated scoring system might mask differences. For instance, it would be difficult to determine if the children attained higher scores in signed responses than written responses strictly because they use the adult forms of grammar in the former but not in the latter. They could have accumulated points in sign even though the actual answers were still incorrect. Hence a simplified scoring system was used, where only the right answer was awarded one point in both modes.

This is an example of how two possible sentences were scored:

Table 2. How a sentence may be scored.

<i>Child</i>	<i>Sample of Sentence</i>	<i>Information</i>	<i>Grammar</i>
1	The cat catches the mouses.	2	0
2	The cat caught the two mouse.	2	1

Table 2 shows two children’s answers to the question “What has the cat just done?” and how their responses were scored. Child 1 was awarded two points for “catches” and “mouses” for Information conveyed in the answer. However, no points were awarded for Grammar as the verb inflections were incorrect for both words. Child 2 was awarded two points for Information for “caught” and “mouse”, and one point for “caught” but none for “mouse” as it was not in the correct tense in the Grammar segment.

The children’s scores on Renfrew’s original scoring system and this new adapted scoring were highly correlated (Spearman’s Rank, $\rho = .822$, $p < .01$ for signed answers, and $\rho = .816$, $p < .01$ for written answers). This suggests that the modified scoring system did not distort overall rankings.

4.3. Hypothesis 1: Information vs. Grammar

I predicted that the SSD children would perform better on the Information scale of the APT (in terms of Renfrew’s unilingual age-norms) than the Grammar scale for both the signed and written responses because deaf signers usually rely heavily on content words (Mogford, 1988). I have argued that, pending the development of local norms, the data from unilingual English-speaking children is the best approximation.

The participants’ mean age was 12 years 2 months (SD=1.64). This mean age is much higher than the children in Renfrew’s unilingual normative study (3 years 6 months to 8 years 5 months) yet the SSD children’s scores fell well within this range.

Table 3 summarises the mean total scores (with standard deviations) for Renfrew's oral norms and the SSD children's signed and written responses.

Table 3. Renfrew's norms and the SSD children's signed and written scores.

SSD Scores for Age Range 10;0 – 16;2 (year;month)	Modality	Score Range	Mean Score (SD)	Renfrew Age Equivalent (year:month)
<i>Information</i>	<i>Signed</i>	15–30	25.11 (2.97)	3:6 – 3:11
	<i>Written</i>	13-32	24.63 (4.49)	3:6 – 3:11
<i>Grammar</i>	<i>Signed</i>	3- 21	11.87 (5.67)	<3:6 – 3:11
	<i>Written</i>	3-18	13.19 (5.95)	<3:6 – 3:11

4.3.1. Information Scores vs. Grammar Scores

The SSD children achieved an age equivalence of less than 3 years 6 months to 3 years 11 months on the Renfrew (1997) Grammar scales for both their signed and written answers. As predicted, this was below their age equivalence of 3 years 6 months to 3 years 11 months on the Information scales, in both response modalities. In comparing the SSD children's Grammar and Information scores, the results were checked against the APT norms to ascertain language standards in terms of age-appropriate skills. It is not possible to compare their Grammar scores with their Information scores directly, as they have different scales. Hence the comparison made is through age-equivalence.

As predicted, the children at SSD did perform better for Information than Grammar for both signed and written modalities. There is a possible explanation for the relatively higher attainment for Information. The children may not be using SEE 2 but another sign system, which has different grammar rules. If the children are using a native sign language that has different grammar rules from SEE 2, their signed

grammar scores (according to APT) will be adversely affected, although their written grammar scores might be less affected, as the children will need to use Standard English grammar when writing. However, the SSD children's written Grammar scores were also poor, suggesting that their basic syntax development is not age appropriate either, or keeping pace with the very limited information content.

4.3.2. Language Development of SSD Children

Table 3 shows information scores attained by the children with age-equivalence of 3 years 6 months to 3 years 11 months and grammar scores with age-equivalence of less than 3 years 6 months to 3 years 11 months. It is clear language development is severely delayed, relative to unilingual English-speaking children with normal hearing. This may seem an unfair comparison group, but as I have argued earlier, these are the most appropriate norms for the children at SSD.

Although deaf children often lag behind their hearing peers in language (c.f., De Villiers, 1991; Ratner, 2001), the marked difference in scores between the SSD participants and unilingual norms gives cause for concern. For this reason, I looked at Information and Grammar in more detail.

4.3.2.1. Information: SSD vs. Norms

The SSD children's information scores are markedly below the norms. For Information scores, such a great delay in language development was surprising. SSD children do not appear to have difficulties communicating with each other while at play, suggesting that the semantic content of their signing is adequate, albeit more limited than a casual observer might predict.

A study of grammar and semantic content by Suty and Friel-Patti (1982) found that the meaning conveyed in deaf children's signing was close to that in the sample of their age-matched hearing peers, but there was a four-year delay in grammar for deaf

children. The deaf children in Suty and Friel-Patti's (1982) study were found to differ in their language mainly in their use of grammatical functors and affixes. Although manually coded English was intended to represent English visually, English is an auditory-vocal language. Hence deaf children exposed to English through these spatial-gestural signals may use the modality in a different way than that presupposed by the makers of such manual codes. The results of this study seem to show that delay is not always confined to grammar given that the SSD children's Information scores were on average several years behind (see Appendix 4 and Appendix 5).

This discrepancy between the results of the local children and the children in Suty and Friel-Patti's (1982) study raises questions about the Singapore deaf children's ability to benefit from SEE 2. The SSD children in this study have already been assessed by the school for their academic abilities, and were separated from those who are developmentally slower and need special instruction. In fact, the SSD children are deemed able to take a national examination, like their hearing peers, on completion of their primary school education. Even though they usually take the Primary School Leaving Examinations (intended for rising 12 year olds) late, their consistently low language abilities suggest a specially tailored curriculum might benefit almost all SSD children.

4.3.2.2. Grammar: SSD vs. Norms

Although SEE 2 is specifically designed to help the children learn the grammar rules of English, the SSD children seem to continue to perform poorly in both their signed and written Grammar scores. One reason for this might be that the production of English in two modes simultaneously (speech and manual signing, i.e. Total Communication) may impose a cognitive overload. Marmor and Petitto (1979) studied how well simultaneous communication in the classroom represented English grammar

by looking at the speech and sign productions of two hearing teachers. The results of the study showed that the signed output of the teachers was mostly ungrammatical although both were fluent in spoken English. This led to the suggestion that using two modes to communicate a thought simultaneously is too demanding, as both teachers used better grammar signs when reading aloud than when they had to communicate spontaneously. If the use of two modes could lead to an overload for the hearing adults, then it is likely to be more taxing for deaf children. The SSD teachers who are teaching English through SEE 2 may also experience difficulties signing grammatically due to this reason and so SSD children might not have good models of language for grammar.

From the comparison of SSD children's results with those of Renfrew's norms, it is clear that their language skills are much poorer than hearing children their age. The gap is alarming though this is not a new finding (c.f., De Villiers, 1991; Ratner, 2001). A more interesting issue is why there is a difference between their SEE 2 and their written English.

4.4. Hypothesis 2: Signed vs. Written Information

I predicted that the SSD children's signed Information scores would be better than their written Information scores because Akamatsu and Armour (1987) found that deaf children are not always able to use a word in writing that they can use in sign. I was surprised to find that there was no significant difference between signed Information scores and written Information scores using the Wilcoxon Test ($Z = -.803$, $p = .422$).

One explanation for this lack of difference is that the SSD children had difficulty answering fully because they were weak in understanding question forms.

Hence Information scores are uniformly low. It may be possible that they performed poorly in the content segment of the APT because they lacked the necessary vocabulary and did not understand the questions asked. Another possibility is that they did not know the grammatical rules well enough to be able to answer the questions correctly. For a sample of the general writing ability of the SSD children, I asked six children with different writing abilities to compose an original story based on a series of four pictures taken from an assignment that was given by the teachers, which is shown in Figure 3:



Figure 3. Four pictures that the SSD children wrote about.

They were given 30 minutes to complete their composition, and were asked not to discuss the content with each other. A check was carried out to see if the children conveyed the following key ideas in their writing; *strong wind, caught in rain, waiting in rain, bad traffic, sick/ill/cold/fever, in bed, took medication.*

Table 4. Stories the SSD children composed.

(yrs: mths) Hearing loss	Written Response
Case 1 (10:11) Profound	<i>The boy is no umbrella is wind. The boy is run fast hurry people. The boy is wait is lorry, van, car. The boy is sleeping is medicine. The boy is tried beacome he has a bed.</i>
Case 2 (12:9) Moderate - Profound	<i>When he saw rain he was sad because There was many car, van and taix late Than he was sick and sick higher Just two day there was medicine he is very couch and cold when he can go to so that last jast at End he had umbrella onece day He never do angin</i>
Case 3 (11:3) Severe	<i>The see windy is brother a see windy tree. I am see windy umbrella brother. The rain run wet see book. The hurry wet shoe run brother. The car more wet sick is brother. The sleep tried sleeping sick medicine</i>
Case 4 (12:9) Severe	<i>He saw cloud has start rain. He was hurry to go home. Then there has many cars so he can't go across. He must wait. Then there has no cars. So he was become sick.</i>
Case 5 (9:5) Profound	<i>Tom saw that it was windy. Tom is running away for rain. The people is umbrella for rain. Tom so many is car hurry in the running. Tom is sick because he is medicine is bedroom sick. Tom is sleeping bedroom because he is sleep the tried. This is a house. Tom see is windy the house. There are 5 many is running away rain. The saw is wet the going home. Tom is file is over hair. The people is car, van, and taxi so many tom is wet.</i>
Case 6 (11:5) Severe- Profound	<i>He is there my windy. They are run and rain. We are car rain boy so long. There are my at home. It is so sick high hot. I am rest sick and tried are medicine.</i>

As the stories in Table 4 show, most children understood the pictures even though their grammar is poor. They all focussed on key aspects of the story. They would have attained a reasonable score for content had this been an assessment. Yet on the APT, some SSD children did not interpret and answer the questions about the pictures sufficiently well and attained Information scores as low as 15 and 13 points (out of a maximum of 40) for signed and written information responses respectively. This analysis of free writing by a random pool of students suggests that the SSD children may have some problems answering specific questions in the APT because

they do not have the level of language ability required (such as answering questions grammatically), rather than a general learning difficulty.

4.5. Hypothesis 3: Signed vs. Written Grammar

If the SSD children were using standard SEE 2 (i.e., complete with all grammatical components) in their everyday signed communication, their signed Grammar scores should be similar to their written Grammar scores. However, I predicted, and found, that the children's written grammar scores are *better* than their signed grammar scores, using the Wilcoxon Test ($Z = -2.275, p = .023$). This may be because they do not strictly use SEE 2 signs in everyday communication. The children may not always follow the rules of SEE 2 in signing.

The corollary is that SSD children have more knowledge of English grammar rules than their signed communication suggests. When the task involves writing, they make more use of their grammar knowledge. By studying the error patterns in their signed responses, I hoped to find particular differences between their signed and written English. An error analysis would also provide a better understanding of the children's language development.

4.5.1. Written Grammatical Categories Used More Frequently

Again, using the non-parametric Wilcoxon Test, it was found that there were significant differences between the following signed and written grammatical categories:

Table 5. Grammatical categories where there was a significant difference between correct signed and written responses.

<i>Grammatical Category</i>	<i>Z</i>	<i>P < .05 (2-tailed)</i>	<i>Direction</i>
Noun Phrase	-2.000	.046	written > signed
Auxiliary	-2.530	.011	written > signed
Plural Noun (irregular ending)	-2.309	.021	written > signed

As Table 5 shows, the SSD children used noun phrases, auxiliary verbs and plural nouns with irregular endings more frequently in their written language than in their signed language. These discrepancies suggest SEE 2 does not accommodate all grammatical categories equally well. This emphasises how different signed and written communication must be for SSD children. Perhaps many of them pick up grammar from reading rather than their signing SEE 2.

Wilson and Emmorey's (1997) study of American Sign Language, where 24 participants took part in two experiments, showed that an articulatory process was possibly being used to translate stimulus pictures into a phonological code for memory maintenance. This suggests that working memory has the potential to develop a language-based rehearsal loop in the visuospatial modality. However, it is not known whether this is applicable to manually coded English. It is possible that the use of SEE 2 is too cumbersome and the cognitive load is higher, compared to a native sign language such as the American Sign Language, thus rendering it less effective for teaching the children grammar. SEE 2 probably imposes a greater memory load than native sign language because Wilson and Emmorey (1997) also found evidence that there are structural differences between the sign loop and the phonological loop for speech. Using simultaneous communication in the classroom (as these children are

expected to) would mean that they have to sign and speak simultaneously, with a need to use both sign and phonological loops at the same time.

Recall that the APT elicited more Noun Phrases in the SSD children's answers when they wrote down their answers, rather than when they signed. They may have used the same content words in their answers, but noun phrases, and nouns with determiners, were rarely used when they signed. For example, children often write "there is a boy" when asked to give a written response to the question, but for the same question, most would start the answer with "boy" when they are signing it. This kind of contraction was observed in conversational signing as well. Phrases like "there is a" do not hold much content, and thus appear to be redundant in their signing. Noun phrases are relegated to writing only, which is akin to a more formal form of their language. Again, SEE 2 was not being used, and it does not appear to have influenced the way they write. It seems that SEE 2 is too formal to be useful in sign and too taxing to be a model for writing.

The same pattern was observed for the use of Auxiliary Verbs, which are also used significantly more often in writing than in signing. Again, the intended message is less dependent on the use of these auxiliary verbs, than on content words. This explains why auxiliary verbs are not often used in sign, whereas the children consciously use them when they write. This brings to mind issues of diglossia that were discussed earlier: The SSD children seem to use writing as the High variety and signing as the Low variety of the language, even though SEE 2 is supposed to be a particularly formal version of English. This begs the question of whether SEE 2 is the most effective sign system especially when the Singapore hearing population also has some aspects of such language diglossia, where a High and Low form of English is

used on different occasions. However, diglossia is not easy to demonstrate conclusively without a more in-depth study.

As for plural nouns with irregular endings (like “mice”) there are often different signs to distinguish them from the singular noun (“mouse”). It was found that most of the children did not know that there was a different sign for the word “mice”. Most thought it was just the addition of the “s” inflection to the sign for “mouse”. As a result, there were more correct answers in this category for written responses, than in signed responses. This is consistent with the observation that the children’s knowledge of SEE 2 is not as extensive as it should be. A lot of signs are modified for their own use within the community, such that words like “mice” are inflected with an “s”, when it is actually a different sign in SEE 2.



Figure 4. SEE 2 signs for “mice” and “mouse”.

Although having a separate sign for “mouse” signals that its plural inflection is more than just adding an “s”, this does not appear to have led to significant differences in the children’s writing. They still recognise that the plural form of “mouse” is “mice”, whether or not they used the sign for “mice”. Most of the children have generalised the rule for plural inflection in sign language to just including an “s” sign. This is an interesting situation where the children’s knowledge of SEE 2 is incomplete,

and yet they managed to learn some of the rules of English grammar in spite of that. Hence this is an issue to do with the children's familiarity with SEE 2 rather than their knowledge of the English language.

If the children are learning English not only through SEE 2, then it is possible that they pick up vocabulary and some grammar through reading. This was also suggested by Kuntze (1998), who believes that successful deaf readers have taken an alternative route as the process through which they learnt to read is not explained by the assumption that it involves breaking the code to recognise a familiar language in an unfamiliar form. Kuntze (1988) feels that deaf readers probably acquired English competency *through* reading instead. Perhaps if written and signed language are represented differently, then the curriculum could be adapted to the informal sign system that the SSD children use. Reading and writing could then be used in place of SEE 2 to learn grammar.

4.5.2. Signed Grammatical Errors vs. Written Grammatical Errors

Knowing what kind of errors the children consistently make has practical implications for teachers of the deaf. The data suggest that a grammatical form in one response mode can be correct, but not in the other mode. The differences noted between the modes might also explain why it is difficult for SSD children to learn English even though (or perhaps because) they are taught SEE 2.

To determine which error was committed more often for signed or written grammatical forms in the study, the Wilcoxon Test was used to check for differences.

Table 6. Differences in the use of specific grammatical categories between signed and written responses (incorrect answers).

N o.	Grammatical Category	Z	p (2-tailed)	Direction
1	Present Tense Verb (inconsistent ending)	6.602	.001	written > signed
2	Present Tense Verb (consistent, regular ending)	-2.646	.008	signed > written
3	Present Tense (consistent ending)	-.962	.336 NS	written = signed
4	Present Tense (auxiliary + verb)	-1.512	.131 NS	written = signed
5	Present Tense (past tense auxiliary + verb)	-.277	.782 NS	written = signed
6	Present Tense (passive + verb)	-1.000	.317 NS	written = signed
7	Present Tense (consistent ending, correct irregular ending)	-1.732	(.083) (border-line)	written = signed
8	Past Tense Verb (regular ending)	-1.414	.157 NS	signed = written
9	Past Tense Verb (inconsistent ending)	-2.000	.046	signed > written
10	Past Tense Verb (correct irregular ending)	-2.000	.046	signed > written
11	Past Tense Verb (auxiliary + verb)	-1.414	.157 NS	written = signed
12	Past Tense (inconsistent ending, present auxiliary + verb)	-.229	.819 NS	written = signed
13	Past Tense (inconsistent ending)	-1.000	.317 NS	written = signed
14	Present Participle	-2.744	.006	signed > written
15	Present Participle (without auxiliary)	-1.000	.317 NS	written = signed
16	Past Participle	-2.309	.021	signed > written
17	Future Tense	-.378	.705 NS	written = signed
18	Conjunction (co-ordinating)	-1.291	.197 NS	written = signed
19	Conjunction (subordinating)	-1.000	.317 NS	written = signed
20	Plural Noun (regular ending)	-.905	.366 NS	written = signed
21	Plural Noun (correct regular ending)	-1.000	.317 NS	written = signed
22	Nominal Singular Pronoun/Noun	2.668	.008	written > signed
23	Possessive Noun/Pronoun	-1.000	.317 NS	written = signed

Although I had found, in Hypothesis 3, that written grammar scores were better than signed responses, a study of the types of errors committed showed that some categories of mistakes were more prevalent in written than in signed responses and vice versa. As Table 6 shows, there were two categories of incorrect answers which occurred more frequently in sign than in writing, and five categories of incorrect answers which occurred more frequently in writing than in sign. The two categories

where there were more signed errors were Present Tense Verb (inconsistent ending) and Nominal Singular Pronoun/Noun. The five categories where there were more written errors than signed errors were Present Participle, Past Tense Verb (inconsistent ending), Past Tense Verb (correct irregular ending), Past Participle and Present Tense Verb (consistent, regular ending). I will discuss these errors in turn.

The first of these errors was the SSD children made more errors in their signed answers of the present tense verb with an inconsistent ending (e.g., the plural inflection for “he walks”, where the “s” inflection should be used with the singular pronoun but is missing), regardless of the question form. This absence of the “s” inflection when a present tense verb is used with a singular pronoun is consistent with informal descriptions that the children tend not use this inflection in daily conversations. When queried, many of the children report that it is “troublesome” and redundant to use an additional sign when the receiver of the message would understand the signed content, whether or not the verb is inflected. It seems that in this instance, the “s” inflection is assumed. This begs the question of how appropriate SEE 2 is for teaching all the grammatical rules of English. It appears here that SEE 2 had not been successful in reinforcing the grammar rules of English. The complexity of adding on more signs to a basic sign may cause the SSD children to omit such inflections.

Second, the SSD children also tended to give a nominal singular pronoun/noun (e.g., “he/she/it/they”) answer inappropriately. The finding that there were more signed than written errors in the nominal singular pronouns/noun category means that the children may not understand fully when such pronouns/nouns should be used when signing. When asked, “What has been done to the dog, a child signed “He is dog left grass” but wrote, “The dog is sad”. This child used the nominal singular pronoun “he” inappropriately in sign but in response to the same question in writing, she used an

appropriate noun phrase, “the dog is”. There seems to be a lot of redundancy in the use of pronouns in sign. It could also be a mirror of the informal signing style, which is used locally.

Present and past participle verbs are not used as often in signing as writing. Hence more errors may be committed from incorrect usage. On the other hand, since the children do not often use these verbs in sign, fewer errors in these categories are recorded in the signed responses. A possible explanation for this difference in frequency of use is again, the complexity of having to add multiple signs to the basic verb sign. The children tended to just use the basic sign in their communication or the present tense form, in both their signed and written answers, although none of the test questions sought to elicit an answer in the present tense. According to SEE 2 rules, when present/past participle forms of the verb are used, there are at least two inflections besides the basic sign. For example, when the present participle of the word “go” is used, besides the basic sign “go”, there is a need to use the sign “is” and then add on the “ing” sign for “going”. Hence more effort has to be put in for using these forms. It seems that the SSD children tend to avoid these forms are unsure of when to use these forms, but may use them more in written language, while sticking to the simpler verb forms when signing.

This notion is in tandem with a study by Brown (1973) where he found that linguistic complexity predicted the order of acquisition for grammatical morphemes well. In this case, where identical grammatical categories are compared and only their modality differs, it is not their semantic complexity that is examined, but the complexity of the way the signs are formed. This complexity is reflected in the number of inflections that have to be made to the basic word. The more inflections

that are needed, the more likely it is that the children will get it wrong in sign, compared to their written language.

Third, a category where more written errors are committed than signed errors, is the past tense verb with an irregular ending. An instance of this is the word “caught”. Many SSD children did not seem to know how to spell the word, since it is irregular (i.e., it is not just a regular “ed/d” inflection for past tense). Five children wrote the correct word “caught” while two wrote “catched”. All the other answers were in the wrong tense form. Many just left it as “catch” without any inflections in their written responses, but inflected the word with the past tense sign when giving their answer in sign. One possible explanation is that the SSD children did not know how to spell “caught”. Some of their written responses showed that they knew the past tense form of the word is spelled differently as they cancelled out attempts to spell it correctly before finally settling for “catch”. Their weak spelling skills raises concern, as this is a common and simple word. There is also an inconsistency in the SEE 2 system, where some signs are different from the basic sign when inflected (“mice”) while others remain the same except for the extra inflection (“caught”). Although one is a noun while the other is a verb, this seems to increase the number of rules for using SEE 2 unnecessarily. SEE 2 might confuse the children, who need to determine what sort of past tense verb inflection to use, and when there is a different spelling to the basic word and when there is no change.

Fourth, a category with more errors in written form is the past tense verb with auxiliary, e.g. “is hugged” and “was cried”. There are probably more such errors in written answers than signed ones because these are unsuccessful attempts to use the present participle forms. The example “is hugged” was given in response to the question “What is the girl doing?” This seems to show the children’s inability to grasp

the rule of present and past participles. A lot more work has to be done to teach them the correct form of this verb.

Finally, more present tense verbs with a consistent regular ending, (e.g. “he crys”) are used erroneously in written than in signed responses, which highlights the possibility that the children generalised the signs they learnt, to write them the way they signed them. English grammar rules usually require a change in the lexicography of a word with a “y” ending when it is given an “s” inflection. This rule may stumble young children with normal hearing as well. It is an error which the SSD children make which is consistent with that of their hearing peers learning English.

4.5.3. Verbs/Tense Markings

Out of the seven types of Grammatical Errors that were committed and found to have significant differences between the signed and written modes, six were verb errors. For this reason, I looked into the difference between the children’s grasp of verbs in signed and written forms, using a more thorough analysis of error patterns.

The number of times a particular verb category was used in place of the expected answers is shown in Tables 7, 8 and 9.

Table 7. Types of verb used as substitutes for the past tense verb.

Verb Substitute	Number – Signed (Percentage) (max = 62)	Number – Written (Percentage) (max = 62)
Present Tense	56 (90.3%)	41 (66.1%)
Present Participle	8 (16.1%)	19 (30.6%)
Past Tense *	5 (8.1%)	11 (17.7%)
Future Tense	4 (6.5%)	5 (8.1%)
Past Participle	0 (0%)	4 (6.5%)

* The participants may not use the past tense verb in the correct form, even if they gave a past tense answer. E.g. Instead of “The cat has caught two mice”, the

(incorrect) answer could be “The cat is caught two mice” or “The cat is caught two mice”. The verbs in these two erroneous answers will be recognised as past tense, but they would still have been errors.

Table 8. Types of verb used as substitutes for the future tense verb.

Verb Substitute	Number – Signed (Percentage) (max = 31)	Number (Percentage) (max = 31)
Present Tense	16 (51.6%)	13 (41.9%)
Present Participle	6 (19.4%)	9 (29.0%)
Past Tense	3 (9.7%)	3 (9.7%)
Past Participle	0 (0%)	1 (3.2%)

Table 9. Types of verb used as substitutes for the present participle tense verb.

Verb Substituted	Number – Signed (Percentage) (max = 31)	Number – Written (Percentage) (max = 31)
Present Tense	21 (67.7%)	19 (61.3%)
Past Tense	6 (19.4%)	9 (29.0%)
Past Participle	5 (16.1%)	5 (16.1%)
Future Tense	2 (6.5%)	1 (3.2%)
Present Participle **	1 (3.2%)	1 (3.2%)

** The use of the Present Participle form of the verb is erroneous here because the child used it without the auxiliary, i.e. “The boy crying” instead of “The boy is crying”.

From Tables 7, 8 and 9, it can be seen that the participants used the Present Tense form of the verb most often. The present tense form appears to be the most frequently used verb, although it is not a targeted grammatical category in the APT. The children evidently only have a very basic grasp of the grammar of English, and so they use the simplest present tense form in most situations.

The children at SSD need to be more sensitive to which form of verb the question is asked in, and to use that particular form in the reply. This awareness will help them in their academic work. Verbs are clearly a class of words that SSD children need more help with.

To summarise, SSD children's grasp of verb forms is especially poor in their sign language. They used the present tense form as a substitute for all categories, both for signed and written responses, but the frequency of use in signed answers was sometimes higher than in their written answers.

4.6. Hypothesis 4: Grammatical Categories

I predicted that the children who acquired language late would show different patterns of scores across grammatical categories from those of native signers and children who learnt SEE 2 and English as a second language. This is because as Mayberry (1994) found in her study, native signers and children who learnt sign language as a second language are likely to produce more grammatically acceptable responses in their signing than children who acquired sign language late.

To test this, I made a simple dichotomy between highest and lowest scores and split the 14 APT categories elicited by the APT (shown in Table 10) in terms of content words versus function words. The responses were divided this way because the children were expected to use more content words than function words (c.f. Mogford, 1988), and so by separating these broad categories gave a clearer picture of language ability.

Table 10. Responses elicited by the APT.

No.	Grammatical Category	Examples
1.	Future Tense Verb	going to <i>put-</i> on her boots
2.	Past Tense Verb (regular word ending)	<i>killed</i> the mice, <i>smashed</i> her glasses
3.	Past Tense Verb (irregular word ending)	<i>caught</i> two mice, has <i>broken</i> her glasses
4.	Present Participle	<i>hugging</i> the bear
5.	Noun Phrase	<i>There is a/A/The lady/boy...</i>
6.	Auxiliary	<i>is, has, was</i>
7.	Coordinating Conjunction	<i>and</i>
8.	Subordinating Conjunction	<i>to, so (that), because</i>
9.	Nominal Singular Noun	<i>it, he, she</i>
10.	Possessive Noun	<i>the girl's, her</i>
11.	Relative Pronoun	<i>that, which, who</i>
12.	Pronoun referring to previous Noun	<i>it, them, they</i>
13.	Plural Noun (irregular ending)	<i>mice</i>
14.	Passive Verb	<i>got</i>

The participants were divided into three groups, according to the age of language acquisition. (1) 'Native signers' were those who learnt to sign at birth from parents or siblings who were deaf themselves and were able to sign; (2) 'Late acquisition signers' were those who learnt to sign only when they were enrolled in school, with no prior language experience, such as learning a spoken language from home; (3) 'Second language signers' were those who had more residual hearing and were thus able to learn some spoken language at home, before learning to sign. According to these criteria, 8 participants were identified as native signers (2, 3, 4, 16, 20, 26, 29 and 30), 3 participants were identified as second language signers (11, 14 and 15), and 20 participants belonged to the late acquisition signers group (1, 5, 6, 7, 8, 9, 10, 12, 13, 17, 18, 19, 21, 22, 23, 24, 25, 27, 28 and 31).

The average number of times each participant scored a point for using words in a correct category is counted and presented in Appendix 6, but summarised in Table 11:

Table 11. Highest and lowest scores for content words and function words obtained by native signers, late acquisition signers and second language signers.

Group	Score	Mode	Content Words	Function Words
Native n = 20	Highest	Signed	Noun Phrase	Coordinating conjunction, Subordinating conjunction
		Written	Noun Phrase, Nominal Singular Noun	Coordinating conjunction
	Lowest	Signed	Relative Pronoun	Auxiliary
		Written	Relative Pronoun	Auxiliary
Late Acquisition n = 8	Highest	Signed	Nominal Singular Noun	Auxiliary, Coordinating conjunction
		Written	Noun Phrase	Coordinating conjunction
	Lowest	Signed	Passive Verb	Subordinating conjunction
		Written	Passive Verb	Auxiliary
Second Language n = 3	Highest	Signed	Noun Phrase, Nominal Singular Noun	Coordinating conjunction
		Written	Noun Phrase, Nominal Singular Noun	Coordinating conjunction
	Lowest	Signed	Future Tense Verb, Past Tense (regular), Past Tense (irregular), Relative Pronoun, Pronoun referring to Previous Noun, Passive Verb	Auxiliary
		Written	Future Tense Verb, Relative Pronoun, Pronoun referring to Previous Noun, Passive Verb	Auxiliary

1. Content Words. For content words, there is a consistent pattern where all three groups attain the highest score(s) in the Noun Phrase and Nominal Singular Noun categories. Although the number of children in each group differs, the majority used words in these two categories correctly. It was also found in Hypothesis 3 that these SSD children used noun phrases more frequently in their written responses than in their signed responses (see Table 5). Similarly, late acquisition signers had higher scores for the Noun Phrase in their written responses than in signed responses, while

the other two groups achieved high scores for Noun Phrase in both signed and written modes. It appears that although a Noun Phrase is used more often in writing than in sign, the native and second language signers get the answer correct just as often in either mode. The exception is the group that acquired language late; they do not give the correct answer as often in sign as in writing. This finding warrants further work.

As for the category of content words where the children score the lowest marks in, there is no observable pattern since the second language signers did poorly in many categories. However, all native signers failed to score for Relative Pronoun correct and the late acquisition signers failed to get any correct answers for Passive Verb. Again, the three groups have different highest and lowest scores in different categories here.

2. Function Words. For function words, each group scored the highest in coordinating conjunctions, for both signed and written modes. However, for the late acquisition signers, the use of Auxiliaries is highest for signed answers and lowest for written answers, whilst the use of Auxiliaries is uniformly low for the native and second language signers in both modes. Interestingly, although Auxiliaries are used more often in writing than in signing, the children are not using this category of words correctly as often in writing. This suggests that the children may be more conscious about using auxiliaries in writing, but they make more mistakes.

The group sizes are small, but the differences noted suggest that late language acquisition would adversely affect written language more than signing. In summary, like the observation of the correct use of the Noun Phrase, the children who acquired language late have shown some differences from the other two groups, as predicted. If task demands are perceived differently, direct comparison across modes requires cautious interpretation, and is a limitation of the present study.

Chapter 5 General Discussion and Conclusions

The purpose of this study is to examine the language production of deaf children in Singapore, where English is the medium of instruction in all schools. I made a series of predictions before administering the Action Picture Test (APT) to the children at the Singapore School for the Deaf (SSD), and will now consider these in turn, in the light of the results. I will then proceed to highlight implications for deaf education in Singapore.

5.1. Discussion of Results

1. The first prediction was that SSD children would perform better on the Information scale of the APT than the Grammar scale for both signed and written language because they rely heavily on content words in their communication (c.f., Mogford, 1988). The results showed that the SSD children did perform better on the Information scale for both signed and written modalities. Although both grammar and information content were weak, the SSD children were able to express themselves better on the Information scale than on the Grammar scale. This would not be the case if Signing Exact English 2 (SEE 2) was helping the SSD children learn the grammar rules of English through signs. Hence the assumption that using SEE 2 will help the SSD children learn Standard English and improve their literacy skills needs to be examined further.

2. The second prediction was that the SSD children's signed Information scores would be better than their written Information scores because Akamatsu and Armour (1982) found in their study that deaf children may not be able to use a word in

writing although they may have the vocabulary in sign. I found that there was no significant difference between signed and written Information scores.

The children's ability to communicate is not in doubt here. They have been observed to play and quibble with each other at the playground, much like hearing children their age. However, they are falling way behind their hearing peers in mainstream schools in their academic achievements. This led to the erroneous assumption that SSD children are weak in their production of written language, though not in their production of signed language. The results of this study showed that there is no significant difference in the Information scores achieved by the children for signing and writing as measured by the APT. Both were similarly low. Although the signed responses were obtained before the written responses in a single session, which may possibly cause a practice effect where the written Information scores were better than signed Information scores, there was none. The SSD children do not just repeat the signed version of their responses in writing, even when conducted in a single session. For example, one child's signed response to the question "What has been done to the dog?" was "The dog is bite red belt dog". The same child's written answer was "The dog is wood to bark". Another child's signed and written responses to the last picture were "He saw he was saw lose apple" and "The man see apple take is gave her" respectively.

One explanation for these differences is that the SSD children probably did not understand the question well enough, as it was signed to them in SEE 2. This leads to another point of consideration that the children do not have a good grasp of SEE 2. This will be discussed later.

Although it was found that the SSD children's written language was better than their signed language, the overall results still show that there was a severe delay in

their written language development. If, as it seems, SEE 2 is not effective for teaching SSD children Standard English, then alternative methods need to be considered. This alternative route could be developing their reading skills further.

If it can be established that the SSD children are learning English through the printed mode, rather than through the manual mode, more emphasis could be placed on developing their reading skills. The choice of reading materials is an important factor but texts should not be altered (such as manipulating the syntax, sentence length or vocabulary) to suit their lower linguistic abilities. Instead of helping the children understand what they are reading better, such alterations may have the opposite effect on their level of comprehension. For example, Israelite and Helfrich (1988) found that deaf readers do not score as well when tested on their comprehension of revised materials, than when they were tested on the originals. In an effort to make texts more readable, they end up being less coherent and more difficult for the deaf reader to understand.

Instead of simplifying materials, teachers at SSD could develop “emergent literacy”, which McAnally, Rose and Quigley (1999) used as an inclusive term, to refer to behaviours that are directly associated with reading, such as page turning, pointing to pictures, illustrating compositions, and inventing spelling. Some of these behaviours are easy to encourage in the SSD children. Parents could provide an environment that stimulates the children’s reading interests and ensure that there are meaningful literacy experiences at home and in school. For example, even if parents are not able to read English, they could encourage their children by taking them to the libraries.

In advocating that SSD children be taught to read to advance their English language skills, teachers at the school should note Goldin-Meadow and Mayberry’s

(2001) observation that deaf readers seem to map English sentences onto a visual code based on sign language. They argue that deaf children do not seem to be able to learn a first language through print. Given that deaf children have difficulty in reading by mapping what they see onto a phonological code, if they are taught to read through *chaining*, they may be able to map the English sentences they read onto a visual code. *Chaining* is a teaching technique that encourages children to see the relation between print and the sign system they use (Padden and Ramsey, 2000). For instance, a word is finger spelled and its printed equivalent is pointed out to the children at the same time. This method is helpful only if the children already have a language system in place. If the children at SSD already have a language system, even if it is not Standard English, they will be able to learn English through reading. Hence this appears to be a possible alternative route to teaching those SSD children who are native signers or second language learners of SEE 2 and English.

3. The third prediction was that the SSD children's written Grammar scores would be better than their signed Grammar scores, as they seemed to be using some non-standard SEE 2 signs in everyday communication. The SSD children were found to have better written Grammar scores than signed Grammar scores. Noun phrases, auxiliaries and plural nouns were used more often in writing than in signing. Another observation was that although their written Grammar is generally better than their signed Grammar, the SSD children made more written than signed Grammar errors in certain grammatical categories. This is probably because they used more varied grammatical categories in writing than in signing, albeit incorrectly. An analysis of the verbs used in the study showed an especially poor grasp of the use of verbs in signed responses. The SSD children frequently used the present tense verb although it is not a targeted response in the APT.

The observation that their written answers are more grammatically correct than their signed answers affirms the SSD children's poor grasp of SEE 2. They had identified the grammar rules of English and tried to use them in writing, but were unable to reproduce these in SEE 2. This paradox, where the order of acquisition seems to be reversed, may suggest that SEE 2 is not supporting the development of literacy skills well. They are supposed to learn the rules through SEE 2 and translate these to written English. Yet this has not been achieved. Hence it suggests that SSD children do not use SEE 2 *strictly* to communicate and their knowledge of SEE 2 is limited.

Having established that the children have particular difficulties with different word classes (e.g., verbs), the next step for remediation is to teach them the correct use of these types of words. This should improve their literacy standard and their ability to use English well. In summary, it is important for educators to understand the specific types of errors the SSD children make so that intervention can be more effective.

4. Lastly I predicted that children who acquired language late would attain the highest and lowest scores in different categories than native signers or second language learners of SEE 2 and English. The results found showed this to be so, in the use of Noun Phrase and Auxiliaries. This alerts to the possible effects not learning a second language at birth has on these children.

5.2. Other Implications for SSD

Given the increase in the number of educational options available for deaf children in Singapore, the Total Communication approach employed by the teachers at SSD needs to be examined further to assess its effectiveness. The limitations shown by the results of this study should be considered by both educators and parents of deaf

children. This will ensure that the deaf child eventually reaps the most benefit from an education that will lead to a fruitful and fulfilling life.

Although this study set out to investigate the difference between the children's signed and written languages, the characteristics observed in these different modes have practical implications for the education of the deaf here. It appears that the direction for education of the deaf in Singapore is changing. Enrolment in SSD is declining, as more parents opt for an oral education approach for their children. This situation raises important issues in the teaching of SEE 2, such as whether it is indeed effective and how it can be utilised successfully in teaching the deaf children.

The reason for this shift in educational strategy for the deaf, and implicit failure of SEE 2 to achieve its primary goal, is probably the fact that it is difficult to impose the gestural modality of SEE 2 on English. As Supalla (1991) has shown, children who are only exposed to SEE 2 manage to convert it into a system that was more appropriate for the visual/gestural modality. It is conceivable that the SSD children are learning the rules of English separately and creating their own linguistic rules for using SEE 2. This situation is perpetuated as each generation of students continues to use modified SEE 2, as a result of interaction between senior and junior students. Thus when they are asked to do a formal assessment task such as the Action Picture Test, they are not fully aware of the rules of SEE 2. In other words, unlike the children in Williams' (1999) study who were able to code-switch, these children are not able to distinguish SEE 2 from their own modified version. If they had been able to, they would be likely to use SEE 2 with all the grammar rules of the English language since the assessment task called for the formal use of language. They, however, did not do so in the study. This is also contrary to the expectations of diglossia, since function (i.e. performing the tasks on a language assessment such as the APT) is one of the

factors that determine the use of the H or L form of language. Therefore it is difficult to ascertain from the results of this study if there is indeed a diglossic situation in the SSD children's use of English, as they would have used SEE 2 instead of the signed answers that they gave. A more in-depth study of the modified sign system is required before the SSD children's sign language skills can be described further.

Learning English through SEE 2 also assumes that the SSD children learn SEE 2 in its intended form. However, there are limitations as they are dependent on teachers who may find it difficult to use SEE 2 in the classroom, as seen in Marmor and Pettito's (1979) research. Parents may not know much English, and so the use of SEE 2 at home is limited as well.

Before a bilingual (native sign language and English) educational approach can even be considered, there is a need to establish the presence of a possible native sign system. Given that this takes time, the next best solution is to work on the identified difficulties that the children have with either signed or written English. Efforts to improve their English will give the SSD children more opportunities later in life.

In summary, there is a need to correct the children's use of noun phrases, auxiliary verbs and plural nouns in SEE 2. They were able to use them well in their written responses, but not in signed responses.

Another area that needs work on is the use of the present tense verb with a consistent ending. The SSD children also need to be taught when to use the nominal singular pronoun/noun as they often use this class of words inappropriately.

The errors that the children make in writing are quite different from the SEE 2 errors. The grammatical categories of words that they need to be taught to use include present and past participle verbs, as well as the past tense verb with a consistent auxiliary. One particular rule that seems to be confusing for the SSD children is the

present tense verb inflection for a singular pronoun. Teachers need to emphasise that in English, the “y” ending in verbs usually changes to “ie” when it is given an “s” inflection, e.g., “carry” to “carries”.

Deaf education in Singapore has come a long way since the 1950s when there was considerable ignorance of the existence and needs of this population. Nevertheless, this study has clearly demonstrated that SSD children’s language development is severely delayed. Perhaps a bilingual (native sign language and English) approach to education may be more effective. When a native sign language is identified, parents who do not speak Standard English can also communicate with their children, as it might be easier for them to learn native signs rather than to learn Standard English in order to learn SEE 2. Such a bilingual approach may lead to better communication between a deaf child and hearing parents.

This present choice of educational approach in Singapore makes it necessary to reconsider the implications for the development of SEE 2 and signing as a mode of communication for the deaf community. This has to be examined carefully, as it may consequently detract from attempts to build up a deaf culture within the local community. There are also individuals who may find the other approaches unsuitable or unacceptable, and as such, there is a need to provide an optimal language-learning environment for this group. This again calls for more research on SEE 2 and the native sign language of the Singaporean deaf community.

Showing the children the difference between their signed and written English may help them improve their standard of English. Akamatsu and Armour (1987) collected data from two groups of eight severe to profoundly deaf high school students, where the students translated signed English stories on videotape and wrote out answers to questions about the stories. The results showed that highlighting the

differences in grammar rules used between the signed and written English consequently helped their writing to improve at the grammatical level.

5.3. Directions for Future Research

Although most of the discussion has been on remediation issues thus far, there is scope for future research.

One potential area of research is comparing the standard of language attained in the different educational approaches, and to assess the advantages of each approach. Deaf populations elsewhere may have unresolved debates over this particular issue, which are unique to them, yet Singapore ought to have its own studies done to determine which approach is best suited for improving the educational standards of the local deaf population. The linguistic situation in Singapore is different from monolingual populations elsewhere. Standard English may be the mother-tongue of parents and teachers of deaf children in these populations. Thus learning and using SEE 2 is natural for them. However, in Singapore, the parents of deaf children may not speak English, so learning SEE 2 is a very difficult task for the entire family.

The suggested strategy to overcome the difficulty of learning English and to improve literacy levels often includes a bilingual approach, where the deaf children are allowed to develop their native sign language alongside SEE 2. This approach in the classrooms has much support elsewhere (c.f., Petitto et al., 2001; Prinz et al., 1996; Hall, 1995). However, this presumes that there *is* a native sign language and that the children know the difference between this and SEE 2. Unfortunately, SEE 2 is the only officially recognised sign system that is used by the deaf community here, although many deaf signers allude to the presence of a native sign language. Most report that they prefer to use the other (native) language when conversing among

themselves, instead of SEE 2, which they often find cumbersome. The presence of a native sign language has been inferred although there are no official records or documentation of its existence. A thorough investigation and comparison of the two sign systems will be a necessary development, to understand its applicability to the local context.

Another area that merits further research is suggested by the discovery that SSD children who learn English (through SEE 2) late with no prior language experience tend to show some differences from the native and second language signers. The effects that learning language late has on these children need to be established, as it appears that a substantial number of them fall within this category. More research is needed to ascertain if these are adverse effects and if so, to what extent.

Presently, assessment tools that are used to gauge the development of local deaf children are mostly unsuitable. Such tools need to be locally normed. They are unsuitable even with the local hearing population. To get an accurate picture of how these children's language development, assessment tools for local deaf children need to be developed.

The suggestion to teach reading as a means of increasing the standards of English literacy needs to be supported by studies that determine the advantages of the various methods that will be employed. For instance, there is a need to determine how effective *chaining* is and how this will make a difference to the SSD children's reading abilities.

The effect of being able to read well also needs to be examined in order to establish that it is indeed possible for the deaf children to learn English mainly through

this route, since this study demonstrates that SEE 2 does not seem to fulfil this purpose well.

5.4. Conclusions

The SSD children's signed and written language skills are severely delayed and the age at which the children acquired language appears to have an effect on how well they would subsequently learn English. These are likely to be the result of the struggles the children have with learning English through SEE 2, and the consequence of a complex language situation in Singapore.

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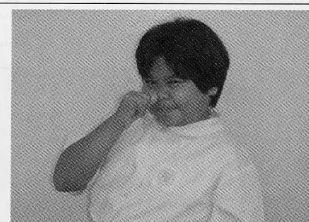
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Appendix 1

Local Signs of Deaf Kids



"Don't Know"



"Don't Want To Do"

by Ms Catherine Low Yoke Peng and Mr Dennis Tan Lian Seng

"Very much like the hearing Singaporeans speaking English, our deaf kids in school also have their own brand of signing. This adaption of the English Language, however, does not hinder their language ability, but instead spurs them to be more expressive, creative and innovative in sign language."



"Depress"



"Insult"



"Shut Up"



"Don't Have" or "Deny"



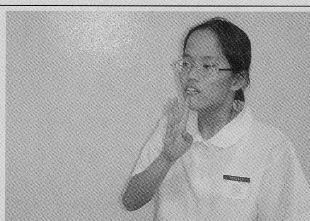
"Bluff"



"Crazy"



"Pain"



"What For?"



Guess what is this?
Go to page 24 for answer.

Appendix 2

**WINSLOW**

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Mandy Phua
27 Hillview Avenue
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31 October 2000

Dear Mandy Phua

Re: The use of *Action Picture Test* (Catherine Renfrew)

Thank you for writing to me about the use of the *Action Picture Test*. I am pleased that you have found these valuable in your work and that they have successfully contributed to the language development of the children you are working with in Singapore.

We are happy to give you permission to use the data collected in your thesis and I wish you success in attaining your MSc at university.

Yours sincerely

Ian Franklin
Publisher

Email: ianf@winslow-press.co.uk

Appendix 3

Participants' Biodata and Language Background

No.	Name (M: male, F: female)	Date of Birth	Age at time of study (yrs:mths/ class)	Date of Enrolment/ Years in School (yrs:mths)	Degree of hearing loss	Reported home language (any deafness in family)	Reported School language	Ethnic group
1	H. T. R. (M)	22.06.87	12:10/Pr. 6	03.01.95/ 5:04	Profound	Written English	SEE 2	Chinese
2	M. H. B. (M)	21.10.86	13:06/Pr. 6	08.05.90/ 10:00	Profound	SEE 2 (2 siblings)	SEE 2	Malay
3	N. W. R. (F)	22 .01.89	11:04/Pr. 6	02.01.92/ 8:04	Profound	SEE 2 (parents, sister)	SEE 2	Chinese
4	Y. Z. W. (M)	12.05.88	12:00/Pr. 6	02.01.92/ 8:04	Severe- Profound	SEE 2 (parents)	SEE 2	Chinese
5	N. A. H. (F)	09 .05.85	15:00/Pr. 6	03.01.89/ 11:04	Severe- Profound	Gestures	SEE 2	Malay
6	C. M. L. (F)	25.10.85	14:06/Pr. 6	03.01.89/ 11:04	Profound	Some spoken Mandarin	SEE 2	Chinese
7	C. P. S. (F)	09.02.87	13:03/Pr. 6	02.01.91/ 9:04	Severe- Profound	Some SEE 2	SEE 2	Chinese
8	L. C. L. (M)	05.04.87	13:01/Pr. 6	01.01.94/ 6:04	Severe- Profound	SEE 2 + Written English	SEE 2	Chinese
9	T. W. Y. (F)	15.06.84	15:11/Pr. 6	04.01.99/ 1:04	Profound	Written English	SEE 2	Chinese
10	C. Z. W. (F)	17.02.86	14:02/Pr. 6	08.05.90/ 10:00	Severe- Profound	Some SEE 2	SEE 2	Chinese
11	O. Z. J. (M)	29.07.89	10:09/Pr. 5	24.03.99/ 1:02	Moderate -Severe	Spoken Mandarin	SEE 2	Chinese
12	L. C. D. (M)	04.01.90	10:04/Pr. 5	02.07.93/ 6:10	Severe- Profound	Some SEE 2	SEE 2	Chinese
13	L. J. H. (M)	25.07.87	12:09/Pr. 5	11.04.91/ 9:01	Profound	Some SEE 2	SEE 2	Chinese
14	R. K. (F)	28.11.86	13:05/Pr. 5	04.01.99/ 1:04	Severe- Profound	Spoken English	SEE 2	Indian
15	M. I. M. (M)	20.06.87	12:10/Pr.5	11.04.91/ 9:01	Moderate - Profound	Spoken English + Malay	SEE 2	Malay
16	S. Q. M. (F)	04.02.89	11:03/Pr. 5	12.02.93/ 7:03	Profound	SEE 2 (sister)	SEE 2	Javanese
17	G. Z. Y. (M)	02.03.86	14:02/Pr. 6	02.01.91/ 9:04	Severe	Some SEE 2	SEE 2	Chinese
18	K. C. C. (M)	06.12.88	11:05/Pr. 4	03.01.95/ 5:04	Profound	Written English	SEE 2	Chinese
19	C. M. T. (F)	21.11.88	11:06/Pr. 4	02.01.92/ 8:04	Profound	Some SEE 2	SEE 2	Chinese
20	C. Y. Q. (F)	16.03.84	16:02/Pr. 6	20.04.99/ 1:01	Mod. Severe - Severe	Some SEE 2	SEE 2	Chinese

21	G. E. L. (F)	29.10.88	11:06/Pr. 6	01.07.93/ 6:10	Severe - Profound	Some SEE 2	SEE 2	Chinese
22	T. Y. Y. (F)	30.04.90	10:00/Pr. 4	03.01.94/ 6:04	Profound	Some SEE 2	SEE 2	Chinese
23	P. W. Z. (F)	01.10.89	10:07/Pr. 4	03.01.94/ 6:04	Severe - Profound	Written + spoken English	SEE 2	Chinese
24	N. H. H. (F)	12.07.87	12:10/Pr. 4	03.01.94/ 6:04	Mild - Profound	SEE 2 + spoken Malay	SEE 2	Malay
25	L. Y. C. (F)	04.07.88	11:10/Pr. 5	02.01.92/ 8:03	Profound	Written + spoken English	SEE 2	Chinese
26	S. N. A. (F)	14.02.89	11:03/Pr. 5	01.02.93/ 7:03	Profound	SEE 2 (sibling)	SEE 2	Malay
27	M. F. T. (M)	12.07.88	11:10/Pr. 4	02.01.92/ 8:03	Mod. Severe - Profound	Some SEE 2	SEE 2	Javanese
28	M. K. S. (M)	19.03.90	10:02/Pr. 4	02.01.93/ 7:03	Severe - Profound	Some SEE 2	SEE 2	Malay
29	M. R. M. (M)	19.11.88	11:06/Pr. 4	03.01.94/ 6:04	Severe - Profound	Some SEE 2 (brother)	SEE 2	Malay
30	S. N. H. (F)	01.07.88	11:10/Pr. 4	03.02.92/ 8:03	Profound	SEE 2 (brother)	SEE 2	Indian
31	N. H. L. (F)	09.01.89	11:04/Pr. 4	09.01.92/ 8:04	Profound	Some SEE 2	SEE 2	Chinese

Note: Mod. refers to Moderately.

Appendix 4

Information Scores and Age-Equivalence

No.	Name (M: male, F: female)	Chrono- logical Age at time of study (yrs:mths)	Scores: signed/ written	APT Inform- ation Age (signed)	Age delay for Signed Inform- ation	APT Inform- ation Age (written)	Age delay for Written Inform- ation
1	H. T. R. (M)	12:10	21.0/21.0	3:06-3:11	8:11-9:04	3:06-3:11	8:11-9:04
2	M. H. B. (M)	13:06	22.5/19.0	3:06-3:11	9:07-10:00	3:06-3:11	9:07-10:00
3	N. W. R. (F)	11:04	26.5/28.5	4:00-4:05	6:11-7:04	4:06-4:11	6:05-6:10
4	Y. Z. W. (M)	12:00	27.5/29.0	4:00-4:05	7:07-8:00	4:06-4:11	7:01-7:06
5	N. A. H. (F)	15:00	21.0/24.0	3:06-3:11	11:05- 11:06	3:06-3:11	11:05- 11:06
6	C. M. L. (F)	14:06	22.0/24.5	3:06-3:11	10:07- 11:00	3:06-3:11	10:07- 11:00
7	C. P. S. (F)	13:03	29.0/27.5	4:06-4:11	7:04-8:09	4:00-4:05	8:10-9:03
8	L. C. L. (M)	13:01	28.5/31.5	4:06-4:11	8:02-8:07	5:06-5:11	7:02-7:07
9	T. W. Y. (F)	15:11	30.0/27.0	5:00-5:05	10:06- 10:11	4:00-4:05	10:06- 11:11
10	C. Z. W. (F)	14:02	26.5/26.0	4:00-4:05	9:09-10:02	4:00-4:05	9:09-10:02
11	O. Z. J. (M)	10:09	24.5/25.0	3:06-3:11	6:10-7:03	3:06-3:11	6:10-7:03
12	L. C. D. (M)	10:04	25.5/26.5	4:00-4:05	5:10-6:04	3:06-3:11	6:05-6:10
13	L. J. H. (M)	12:09	25.0/25.0	3:06-3:11	8:10-9:03	3:06-3:11	8:10-9:03
14	R. K. (F)	13:05	25.5/28.5	3:06-3:11	8:06-9:11	4:06-4:11	7:06-8:11
15	M. I. M. (M)	12:10	24.5/28.5	3:06-3:11	8:11-9:04	3:06-3:11	8:11-9:04
16	S. Q. M. (F)	11:03	25.5/23.5	3:06-3:11	7:04-7:09	3:06-3:11	7:04-7:09
17	G. Z. Y. (M)	14:02	23.0/27.5	3:06-3:11	10:03- 10:08	4:00-4:05	9:09-10:02
18	K. C. C. (M)	11:05	27.5/29.5	4:06-4:11	6:06-6:11	4:06-4:11	6:06-6:11
19	C. M. T. (F)	11:06	26.5/22.5	4:06-4:11	6:07-7:00	3:06-3:11	7:07-8:00
20	C. Y. Q. (F)	16:02	27.5/30.0	4:06-4:11	11:03- 11:08	5:00-5:05	10:09- 11:02
21	G. E. L. (F)	11:06	25.5/28.5	3:06-3:11	7:09-8:00	4:06-4:11	6:09-7:00
22	T. Y. Y. (F)	10:00	22.5/19.5	3:06-3:11	5:05-6:06	3:06-3:11	5:05-6:06
23	P. W. Z. (F)	10:07	29.0/32.0	4:06-4:11	5:08-6:01	6:00-6:05	4:02-4:07
24	N. H. H. (F)	12:10	25.0/24.0	3:06-3:11	8:11-9:04	3:06-3:11	8:11-9:04
25	L. Y. C. (F)	11:10	26.0/23.5	4:00-4:05	7:05-7:10	3:06-3:11	7:11-8:04
26	S. N. A. (F)	11:03	28.0/25.5	4:06-4:11	6:04-6:09	3:06-3:11	7:04-7:09
27	M. F. T. (M)	11:10	25.0/22.0	3:06-3:11	7:11-8:04	3:06-3:11	7:11-8:04
28	M. K. S. (M)	10:02	22.0/20.5	3:06-3:11	6:03-6:08	3:06-3:11	6:03-6:08
29	M. R. M. (M)	11:06	22.0/21.0	3:06-3:11	7:09-8:00	3:06-3:11	7:09-8:00
30	S. N. H. (F)	11:10	22.5/16.0	3:06-3:11	7:11-8:04	3:06-3:11	7:11-8:04
31	N. H. L. (F)	11:04	15.0/13.0	<3:06-3:11	7:05-7:10	<3:06-3:11	7:05-7:10

Appendix 5

Grammar Scores and Age-Equivalence

No.	Name (M: male, F: female)	Chrono- logical Age at time of study (yrs:mths)	Scores: signed/ written	APT Grammar Age (signed)	Age delay for Signed Grammar	APT Grammar Age (written)	Age delay for Written Grammar
1	H. T. R. (M)	12:10	5/5	<3:06-3:11	>8.11-9.04	<3:06-3:11	>8.11-9.04
2	M. H. B. (M)	13:06	6/6	<3:06-3:11	>9:07- 10:00	<3:06-3:11	>9:07- 10:00
3	N. W. R. (F)	11:04	16/17	3:06-3:11	8:05-8:10	4:06-4:11	8:05-8:10
4	Y. Z. W. (M)	12:00	21/18	4:06-4:11	7:01-7:06	4:06-4:11	7:01-7:06
5	N. A. H. (F)	15:00	7/6	<3:06-3:11	>11:01- 11:06	<3:06-3:11	>11:01- 11:06
6	C. M. L. (F)	14:06	4/5	<3:06-3:11	>10:07- 11:00	<3:06-3:11	>10:07- 11:00
7	C. P. S. (F)	13:03	12/12	3:06-3:11	9:04-9:09	3:06-3:11	9:04-9:09
8	L. C. L. (M)	13:01	12/11	3:06-3:11	9:02-9:07	3:06-3:11	9:02-9:07
9	T. W. Y. (F)	15:11	5/11	<3:06-3:11	>12:00- 12:05	3:06-3:11	12:00- 12:05
10	C. Z. W. (F)	14:02	5/6	<3:06-3:11	>10:03- 10:08	<3:06-3:11	>10:03- 10:08
11	O. Z. J. (M)	10:09	9/17	3:06-3:11	6:10-7:03	4:06-4:11	5:10-6:03
12	L. C. D. (M)	10:04	9/8	3:06-3:11	6:05-6:10	3:06-3:11	6:05-6:10
13	L. J. H. (M)	12:09	7/11	<3:06-3:11	>8:10-9:03	3:6-3:11	8:10-9:03
14	R. K. (F)	13:05	6/9	<3:06-3:11	>9:06-9:11	3:06-3:11	9:06-9:11
15	M. I. M. (M)	12:10	5/6	<3:06-3:11	>8:11-9:04	<3:06-3:11	>8:11-9:04
16	S. Q. M. (F)	11:03	9/9	3:06-3:11	7:04-7:09	3:06-3:11	7:04-7:09
17	G. Z. Y. (M)	14:02	7/9	<3:06-3:11	>10:03- 10:08	3:06-3:11	10:03- 10:08
18	K. C. C. (M)	11:05	12/14	3:06-3:11	7:06-7:11	3:06-3:11	7:06-7:11
19	C. M. T. (F)	11:06	6/9	<3:06-3:11	>7:07-8:00	3:06-3:11	7:07-8:00
20	C. Y. Q. (F)	16:02	11/10	3:06-3:11	12:03- 12:08	3:06-3:11	12:03- 12:08
21	G. E. L. (F)	11:06	14/16	3:06-3:11	7:07-8:00	3:06-3:11	7:07-8:00
22	T. Y. Y. (F)	10:00	11/12	3:06-3:11	6:01-6:06	3:06-3:11	6:01-6:06
23	P. W. Z. (F)	10:07	10/8	3:06-3:11	6:08-7:01	3:06-3:11	6:08-7:01
24	N. H. H. (F)	12:10	8/8	3:06-3:11	8:11-9:4	3:06-3:11	8:11-9:4
25	L. Y. C. (F)	11:10	8/8	3:06-3:11	7:11-8:04	3:06-3:11	7:11-8:04
26	S. N. A. (F)	11:03	7/10	<3:06-3:11	>7:06-7:11	3:06-3:11	7:06-7:11
27	M. F. T. (M)	11:10	6/8	<3:06-3:11	>7:11-8:04	3:06-3:11	7:11-8:04
28	M. K. S. (M)	10:02	3/6	<3:06-3:11	>6:03-6:08	<3:06-3:11	>6:03-6:08
29	M. R. M. (M)	11:06	5/4	<3:06-3:11	>7:07-8:00	<3:06-3:11	>7:07-8:00
30	S. N. H. (F)	11:10	6/7	<3:06-3:11	>7:11-8:04	<3:06-3:11	>7:11-8:04
31	N. H. L. (F)	11:04	5/3	<3:06-3:11	>7:05-7:10	<3:06-3:11	>7:05-7:10

Appendix 6

Mean of Correct Answers

Late Acquisition signers	Mean of correct answers: Content Words Categories (signed/written)																					
	1		2		3		4		5		9		10		11		12		13		14	
	(# out of 1 try)		(# out of 2 tries)		(# out of 4 tries)		(# out of 4 tries)		(# out of 1 try)		(# out of 2 tries)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)	
	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
1	0	0	0	0	0	0	0	0	1	1	0.5	1	1	1	0	1	0	0	0	0	0	0
5	0	0	0	0	0	0.25	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
6	0	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0
8	0	0	0	0	0.25	0	0.50	0.50	1	1	1	1	1	1	1	1	1	1	0	0	0	0
9	0	0	0	0	0	0	0.50	1	0	1	0.50	1	1	1	0	0	0	0	0	0	0	0
10	0	0	0	0	0.25	0.50	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
12	0	0	0	0.50	0.25	0	0.25	0.25	1	1	1	0.50	1	1	0	0	0	1	0	0	0	0
13	0	0	0	1	0.25	0.50	0.25	0.25	1	1	1	1	0	0	0	0	0	1	0	1	0	0
17	0	0	0	0.50	0.25	0.50	0.25	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0
18	1	1	0	0.50	0.25	0.25	0.75	0.75	1	1	1	1	1	0	0	0	0	1	0	0	0	0
19	0	0	0	0	0	0.25	0.50	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0
21	0	0	0.50	1	0.75	0.75	1	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0
22	1	1	0	1	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0
23	0	0	0	0	0	0	0.75	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
24	0	0	0	0	0.50	0	0.25	0.75	1	1	1	1	0	1	0	0	0	0	0	1	0	0
25	0	0	0	0	0	0	0.25	0.75	1	1	1	1	1	1	0	0	0	0	1	1	0	0
27	0	0	0	0	0.25	0.75	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0
31	0	0	0.50	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Category Total	0.15	0.20	0.05	0.20	0.13	0.19	0.36	0.46	0.80	1	0.95	0.98	0.70	0.75	0.05	0.10	0.15	0.25	0.05	0.35	0	0

Native signers	Mean of correct answers: Content Words Categories (signed/written)																					
	1		2		3		4		5		9		10		11		12		13		14	
	(# out of 1 try)		(# out of 2 tries)		(# out of 4 tries)		(# out of 4 tries)		(# out of 1 try)		(# out of 2 tries)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)	
	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
2	0	0	0	0	0.50	0.25	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
3	1	1	0	0	0.50	0.50	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0
4	0	0	1	1	0.75	0.25	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1
16	0	0	0	0	0	0	1	0.75	1	1	0.50	1	1	1	0	0	0	0	0	1	0	0
20	0	0	0	0.50	0	0.25	0.25	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0
26	1	0	0.50	0.50	0	0.50	0	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0
29	1	0	0.50	0	0	0.25	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0.25	0	0.25	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Category Total	0.38	0.13	0.25	0.25	0.22	0.41	0.41	0.50	1	1	0.94	1	0.88	0.75	0	0	0.25	0.25	0.25	0.38	0.25	0.13

Second language signers	Mean of correct answers: Content Words Categories (signed/written)																					
	1		2		3		4		5		9		10		11		12		13		14	
	(# out of 1 try)		(# out of 2 tries)		(# out of 4 tries)		(# out of 4 tries)		(# out of 1 try)		(# out of 2 tries)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)		(# out of 1 try)	
	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
11	0	0	0	0.50	0	1	0.25	0.75	1	1	1	1	1	1	0	0	0	0	1	0	0	0
14	0	0	0	0.50	0	0.25	0	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0
15	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0	0
Category Total	0	0	0	0.33	0	0.42	0.08	0.25	1	1	1	1	0.67	0.67	0	0	0	0	0.33	0.67	0	0

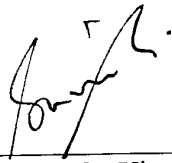
Late Acquisition Signers	Mean of correct answers: Content Words Categories (signed/written)					
	6		7		8	
	(# out of 1 try)		(# out of 1 try)		(# out of 4 tries)	
	S	W	S	W	S	W
1	0	0	1	1	0	0
5	1	0	1	1	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0.50	0.50
8	0	0	1	1	0.50	0.50
9	0	0	0	0	0.25	0.75
10	0	0	0	0	0	0
12	0	0	1	1	0.50	0.50
13	0	0	1	1	0.25	0
17	0	0	0	1	0.25	0
18	1	0	0	1	0.50	0.75
19	1	0	0	0	0	0
21	1	0	1	1	1	0.50
22	1	0	1	1	0.25	0.25
23	1	0	0	0	0.25	0
24	1	0	0	0	0.25	0
25	1	0	0	0	0	0
27	0	0	1	1	0	0
28	0	0	1	1	0	0.25
31	1	0	0	0	0	0
Category Total	0.45	0	0.45	0.55	0.24	0.20

Native Signers	Mean of correct answers: Content Words Categories (signed/written)					
	6		7		8	
	(# out of 1 try)		(# out of 1 try)		(# out of 4 tries)	
	S	W	S	W	S	W
2	0	0	0	0	0	0
3	0	1	1	1	0.50	0.75
4	1	1	1	1	0.75	0.75
16	0	0	1	1	0.25	0
20	0	0	1	1	0.75	0.50
26	0	0	0	0	0.25	0.50
29	0	0	0	0	0	0
30	0	0	0	0	0.50	0.25
Category Total	0.13	0.25	0.38	0.50	0.38	0.34

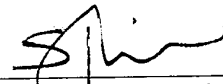
Second Language Signers	Mean of correct answers: Content Words Categories (signed/written)					
	6		7		8	
	(# out of 1 try)		(# out of 1 try)		(# out of 4 tries)	
	S	W	S	W	S	W
11	0	0	1	1	0.50	0.1
14	0	0	1	1	0.25	0.25
15	0	0	1	1	0.25	0
Category Total	0	0	1	1	0.33	0.42

Appendix 7

In accordance with the requirements of the National University of Singapore, I, Mandy Phua Su Yin (Matriculation number HD992531W), have sought the permission of the The Ethics Committee of the Department of Social Work and Psychology, National University of Singapore to conduct a study with the hearing-impaired students at the Singapore School for the Deaf.



Mandy Phua Su Yin



A/P Susan Rickard Liow
Thesis Advisor