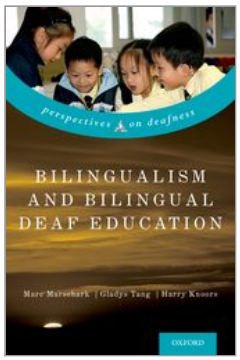

Bilingualism and Bilingual Deaf Education
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Language Development of Deaf Children in a Sign Bilingual and Co-enrollment Environment

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Abstract and Keywords

The chapter explores whether there is any interaction between the development of grammatical knowledge of Hong Kong Sign Language, Cantonese, and Mandarin Chinese by a group of severe to profoundly deaf children studying in a sign bilingual and co-enrollment program in Hong Kong. Results based on language assessment tests show that there is a positive relationship in the development of the three languages, suggesting that acquiring Hong Kong Sign Language does not impede development of spoken language. Also, early exposure to and acquisition of both a signed language and a spoken language strengthen this positive relationship. These results can be interpreted from the perspective of bilingual acquisition in which cross-linguistic influence in a bimodal fashion is possible, despite linguistic differences at the surface level.

Keywords: sign bilingualism, co-enrollment, deaf children, Hong Kong Sign Language, bilingual acquisition

The impetus for linguistic research on American Sign Language (ASL) and British Sign Language (BSL) between the 1960s and the 1980s (Klima & Bellugi, 1979; Kyle & Woll, 1985; Stokoe, Casterline, & Croneberg, 1965) has led to a continuous growth of linguistic evidence of the properties of many natural signed languages throughout the world. That work has confirmed that the abstract principles of structural organization observed in spoken languages are also shared by signed languages (see Brentari, 2010; Pfau, Steinbach, & Woll, 2012; Sandler & Lillo-Martin, 2006, for updates of the existing literature). Some studies in the 1980s also examined how deaf or hearing children born to deaf parents acquired signed language. The results revealed a developmental profile resembling that reported in the acquisition literature of spoken languages (Lillo-Martin, 1991; Newport & Meier, 1985; Petitto, 1983, 1987, 1990).

Contrary to the burgeoning of positive research findings based on sign linguistics and sign language acquisition, however, there was a lack of consensus on the role of natural signed language in raising and educating deaf children. Generally speaking, research findings revealed that deaf children lagged behind their hearing age norms in oral language, reading comprehension, and literacy development in the spoken language. The controversy regarding the linguistic advantage of deaf children born to deaf parents in literacy development still persists. While some studies documented early sign language advantage among deaf children born to deaf parents (Chamberlain & Mayberry, 2000; Hoffmeister, 2000; Padden & Ramsey, 2000; Singleton, Supalla, Litchfield, & Schley, 1998; Strong & Prinz, 1997; Wilbur, 2000), a recent study by Wauters, Van Bon, and Tellings (2006) reported that deaf children whose home language was spoken language performed better than deaf children born to deaf parents, both in terms of word identification and reading comprehension. Despite such contradictory (p.314) findings, the increasing interest in natural signed language has triggered the establishment of sign bilingual programming for deaf children primarily in special settings in different parts of Europe, the United Kingdom, the United States, Australia, and Canada (see Swanwick, Hendar, Dammeyer, Kristoffersen, Salter, & Simonsen, Chapter 12 of this volume).

Views regarding sign bilingual programming have been quite polarized (see Marschark & Lee, Chapter 9 of this volume; Pérez Martin, Valmaseda Balanzategui, & Morgan, Chapter 15 of this volume). Also, increasingly, sign bilingual programming has been facing the challenge of a global trend of inclusive deaf education supported by advanced hearing technology such as cochlear implantation, which results in

increasing opportunities for severe and profoundly deaf children to study in mainstream settings (Swanwick & Marschark, 2010). In those settings, signed language support is being reduced to a bare minimum, or is nonexistent. This phenomenon sometimes comes with the misconception among educators and parents that learning signed language impedes deaf children's spoken language development. The approach of sign bilingualism and co-enrollment in mainstream deaf education aims to address this issue. In this chapter, we report on some preliminary findings of the grammatical development of 20 severe to profoundly deaf children studying in a mainstream setting that adopted sign bilingualism and co-enrollment as two overarching philosophies for educating and raising deaf children. We focus on examining the development of the deaf children's grammatical knowledge of oral Cantonese, written Chinese, and Hong Kong Sign Language (HKSL) because knowledge of grammar has been argued to be an indispensable component in boosting literacy development in spoken language and educational attainment, among other factors (Spencer & Marschark, 2010).

Sign Bilingual Programming

Typical sign bilingual programs take natural signed languages as deaf learners' first language (L1), which is purported to support their literacy development in spoken language as their second language (L2), despite the fact that almost 95% of these learners are born to hearing parents. Proponents of this approach to educating deaf children render it important to support Deaf identity and culture in deaf children's overall development because they are perceived to be linguistically different, rather than pathologically at risk (Grosjean, 1986, 1994, 2010a, 2010b; Hoffmeister, 2000; Lane, Hoffmeister, & Bahan, 1996; Padden & Humphries, 1988; Wilbur, 2000). Many of these programs draw on Cummins's (1981) interdependence hypothesis, which assumes that there is a common, core proficiency between Language X (L1) and Language Y (L2), allowing unidirectional and subsequently (p.315) bidirectional transfer of linguistic as well as conceptual knowledge between the two languages. Note that Cummins's arguments usually center on the transfer of lexical and phonological, as well as literacy, academic, and conceptual skills. He does not explicitly reject the transfer of syntactic or morphosyntactic knowledge, but suspects that transfer may not be possible when two languages are structurally dissimilar at the surface level (Cummins, 2005).

The concept of "sign bilingual programming" to date is embraced by different educators with different forms of school practices or even different forms of signing and visual communication systems (Carlson, Morford, Shaffer, & Wilcox, 2010; Swanwick, Hendar, Dammeyer, Kristoffersen, Salter, & Simonsen, Chapter 12 of this volume). As noted earlier, views regarding the use of sign bilingual programming in special settings to support deaf children's language and literacy, as well as educational attainment, are polarized. On the one hand, continual research in different natural signed languages, as well as their acquisition by deaf children, supports the tenet that early exposure to signed language brings decided advantages in literacy skills, reading comprehension, and educational outcomes (Mayberry, 2007), as well as cognitive benefits like theory of mind (Schick, De Villiers, De Villiers, & Hoffmeister, 2007; Tomasuolo, Valeri, Di Renzo, Pasqualetti, & Volterra, 2012). On the other hand, the efficacy of sign bilingual programing has been criticized for not producing sufficient empirical evidence to meet the expectations that it has promised to offer—in particular, filling the gap of literacy development and educational attainment between sign bilingual deaf children and their hearing age norms (Knoors & Marschark, 2012; Mayer & Leigh, 2010; Spencer & Marschark, 2010). Also, Cummins's transfer view has been criticized for being theoretically unsound when applied to deaf education because (1) it

fails to capture the fact that many hearing parents of deaf children cannot provide deaf children with a strong signed language foundation as L1, (2) ASL and English demonstrate distinct differences in terms of linguistic organizations at the surface level, (3) lack of a print form for signed language makes the transfer of print knowledge to a spoken language impossible, and (4) it is difficult for deaf children to engage in discourses of academic discussions due to the difficulty in accessing speech as L2 (Holzinger & Fellinger, Chapter 5 of this volume, Mayer, 2009; Mayer & Akamatsu, 2003; Mayer & Leigh, 2010; Mayer & Wells, 1996).

Despite these arguments, in some studies deaf children's early signed language skills were found to be correlated positively with vocabulary knowledge and reading comprehension in spoken language, although a gap existed when compared with the hearing age norms (Chamberlain & Mayberry, 2008; Freel, Clark, Anderson, Gilbert, Musyoka, & Hauser, 2011; Hermans, Knoors, Ormel, & Verhoeven, (p.316) 2008; Hoffmeister, 2000; Padden & Ramsey, 2000; Singleton, Morgan, DiGello, Wiles, & Rivers, 2004; Strong & Prinz, 1997; Wilbur, 2000). One crucial issue is natural signed language input. Goldin-Meadow and Mayberry (2001) found that deaf children who failed to obtain sufficient natural language input or who received only Manually Coded English as input failed to reach native-like proficiency or a satisfactory level in either language. Mayberry and Lock (2003) also found that first language exposure being delayed until age 6 or older would have a negative impact on deaf children's grammatical development and reading comprehension.

On the oral language front, recent years have seen the introduction of newborn hearing screening and early cochlear implantation. Many studies on children with implants showed improvement in speech perception or language production with potentials for reaching age-appropriate oral language abilities. Nonetheless, children with implants still demonstrated variable outcomes, and some continued to fall short of their chronological age peers in literacy skills, reading comprehension skills, and educational attainment (Archbold & Mayer, 2012; Caselli, Rinaldi, Varuzza, Giuliani, & Burdo 2011; Geers, Moog, Biedenstein, Brenner, & Hayes, 2009; Hammer, 2010; Marschark, Sarchet, Rhoten, & Zupan, 2010). In terms of current educational practices in many countries, children with early implants are mainstreamed and are subject to a mode of education that is either purely auditory-oral or auditory-visual with visual communication systems such as cued speech, contact signs, manually coded spoken language, and the like because these strategies are assumed to bring

deaf children in “direct” and “visible” contact with spoken language (Mayer & Leigh, 2010). Under those circumstances, exposure to natural signed language appears to be superfluous and will only be accessible to deaf children when diagnostics show that they fail to demonstrate development in oral language. On some occasions, they will be advised to return to special settings for their education. As such, sign bilingual programming in those settings sometimes becomes the shelter for these so called “underperformed” deaf children, and it is the only time when they begin to acquire signed language, as late learners with not on par language learning outcomes.

The preponderance of cochlear implantation at the expense of early signed language input is being counteracted by the proposal of nurturing bimodal bilingualism with deaf children to safeguard optimal language acquisition during the critical period. Involved researchers argue that the success rate of cochlear implantation is still highly variable, and linguistic deprivation during deaf children’s critical period of language acquisition will lead to long-term negative impacts on their language, literacy, cognitive, and social development (Humphries et al., 2012). In fact, what seems to be lacking in the controversy of sign bilingual (p.317) programming is information about the processes of bilingual acquisition when deaf children are exposed to a signed language and a spoken language in the acquisition environment, enabling them to acquire two languages stemming from different modalities simultaneously.

Research on Bimodal Bilingual Acquisition

Recent years have seen a shift of orientation in signed language acquisition research, which is from monolingual to bimodal bilingual acquisition by either deaf children born to deaf or hearing parents, or hearing children born to deaf parents (i.e., CODAs). When language is perceived as innately endowed in humans, deaf children are no different from any ordinary child having the potential for acquiring more than one language, if given appropriate linguistic input. Therefore, the concept of children becoming bimodal bilinguals just develops naturally from theories of linguistics and language acquisition (Grosjean, 2010a; Lillo-Martin, 2008; Van den Bogaerde & Baker, 2005). The capacity of utilizing two grammatical systems simultaneously in language production (i.e., code-blending) has been examined in the context of interactions between deaf caregivers and child CODAs (Baker & Van den Bogaerde, 2008, on Dutch and Sign Language of the Netherlands, SLN), adult CODAs (Emmorey, Bornstein, & Thompson, 2005, on ASL and English), and deaf child acquirers (Donati & Branchini, 2013, on Italian and Lingua dei Segni Italiana, LIS; Fung & Tang, 2013, on Cantonese and HKSL). Taken together, code-blending is evidential of the interactions of two developing linguistic systems in language performance and is subject to principles of natural language organization. From an educational perspective, the recognition of code-blending enables researchers to distinguish it from simultaneous communication (SimCom). Code-blending reflects the linguistic processing of a signed language and a spoken language in language production, while SimCom is basically driven by the syntax of the spoken language where individual signs, primarily lexical in nature, are being incorporated into the spoken language syntax in language production in a serial fashion.

How Feasible Is It to Introduce Signed Language in Mainstream Settings?

As discussed earlier, sign bilingual programming is implemented primarily in special settings that cater to deaf learners with severe to profound hearing loss. Deaf children with mild or moderate hearing losses usually study in mainstream settings and have little signed language exposure. This practice of early educational placement divides deaf children between these two learning environments with different ideologies (Swanwick, 2010). Nevertheless, the use of signed language (p.318) through sign interpretation in mainstream settings to support learning is being practiced in some countries. However, there are concerns over its quality (Russell, 2010), as well as the sociocultural consequences of the interpreter and the deaf learner

being perceived as out-group in the classroom environment (Schick, Williams, & Kupermintz, 2005).

In the United States and Australia, positive effects are observed when Deaf paraprofessionals are recruited to support deaf students in mainstream settings. Their presence raises the Deaf awareness and metalinguistic awareness among hearing students as well as deaf students of the differences between spoken language and signed language (McKee, 2005). As for deaf students in mainstream settings, there have been studies showing that learning signed language in addition to speech raises grade-level scores (DeLana, Gentry, & Andrews, 2007) and supports social interactions between deaf students and their hearing peers (Bowen, 2008).

Co-enrollment Programming

Knoors and Marschark (2012) argued that there is no single method of communication to satisfy the wide diversity of strengths and weaknesses of individual deaf learners in their education, and it is only practical to consider a variety of approaches to satisfy their diverse needs. They further suggested that co-enrollment be another option for educating deaf children in mainstream settings. In other words, the breaking of barriers of language and educational settings to accommodate deaf children's diverse needs may open up new venues for exploring ways of enhancing literacy development and educational outcomes.

Co-enrollment has the intrinsic characteristics of having both deaf and hearing students learning together in a regular classroom setting. Unlike conventional mainstream settings with just one or two deaf students, co-enrollment distinguishes itself from other forms of practices by a critical mass of deaf students enrolled in a regular class of hearing students, team-taught by a Deaf teacher and a hearing teacher. Since the creation of the "Tripod Program" in the United States (Kirchner 1994), there has been an increasing number of co-enrollment programs for deaf and hearing students worldwide, in (1) Madrid, Spain (Pérez, Valmaseda Balanzategui, & Morgan, Chapter 15 of this volume) (2) The Netherlands (Hermans, de Klerk, Wauters, & Knoors, Chapter 16 of this volume), (3) Arizona, United States (Antia & Metz, Chapter 17 of this volume), (4) Italy (Ardito, Caselli, Vecchietti, & Volterra, 2008), and (5) Tainan, Taiwan (Hsing & Su, 2013). From a bilingual acquisition perspective, we argue that co-enrollment programming in mainstream settings may offer an acquisition-rich environment in terms of linguistic input, as both signed language and spoken language become the language of instruction as well as the language of daily interactions (p.319) between the deaf and the hearing participants, students and teachers alike. As in special schools for deaf students, Deaf children of Deaf parents, Deaf adults, or senior students become the sources of linguistic input to the younger ones.

Being a relatively new approach for educating deaf children, research findings to substantiate its efficacy are just emerging (see Antia & Metz, Chapter 17 of this volume; Hermans, De Klerk, Wauters, & Knoors, Chapter 16 of this volume). Most studies focused on initial gains, especially gains in vocabulary knowledge in the spoken language. Based on scores on the Stanford Achievement Test (Harcourt Brace & Company, 1997), Kreimeyer, Crooke, Drye, Egbert, and Klein (2000) examined the language outcomes of 15 deaf students in grades 2 through 4 after 3 years of co-enrollment programming. The deaf students were observed to perform at grade level in reading vocabulary

but not in reading comprehension. Four years later and after 7 years of operation, McCain and Antia (2005) studied another 5 co-enrolled deaf students and found that their reading scores were better than the deaf norms but were still below the hearing age norms. Hermans, De Klerk, Wauters, & Knoors (Chapter 16 of this volume) also observed a significant growth rate in receptive vocabulary in Dutch with 12 co-enrolled deaf students, although a gap still existed when compared with the hearing age norms. Taken together, co-enrollment programming yielded some initial gains in terms of vocabulary knowledge, but long-term gains at the higher linguistic levels, as involved in reading comprehension, require further investigation.

The Hong Kong Co-enrollment Study

Reviewing a series of research projects, Spencer and Marschark (2010) identified a number of factors that impact the literacy development of deaf children. A noticeable difficulty in grammatical attainment among deaf learners was observed, which hindered both their reading and writing development (King & Quigley, 1985), as well as automaticity and processing time of print materials (Kelly, 2003). To add to the literature on co-enrollment, we examined the development of grammatical knowledge of oral Cantonese, written Chinese, and HKSL of 20 severe and profoundly deaf children studying in a sign bilingual and co-enrollment program in Hong Kong. We addressed the fundamental question of whether there is cross-modal interaction of linguistic knowledge among the languages in question, as suggested by Mayer to be unlikely or by Cummins to be suspect due to highly dissimilar linguistic structures. It is important to verify whether a relationship exists in the development of grammatical knowledge of these languages, as our ultimate goal is to improve the literacy skills of severe and profoundly deaf children. (p.320)

Sociolinguistic Context

The language policy of Hong Kong stipulates that students should be proficient in oral Cantonese (which is most children’s L1), written Chinese (which is based on Mandarin grammar and is most children’s early L2), and English (another L2 introduced at more or less the same time as written Chinese). In other words, when formal schooling begins at age 2 or 3, young children in Hong Kong will be exposed to Mandarin Chinese and English input in a parallel fashion. Note that the social milieu of Hong Kong does not encourage “written Cantonese” (i.e., written Chinese based on Cantonese grammar), with the arguments that certain Cantonese words may not have equivalent written forms, and those that exist are neither standardized nor recognized officially.

Therefore, written Chinese in Hong Kong is based on Mandarin grammar but pronounced in Cantonese.

As most parents use Cantonese at home, the prospect of becoming bilingual or trilingual rests upon access to input in the educational context. In the syllabi of kindergarten and primary education, a greater proportion of time is allotted to promoting the acquisition of written Chinese and English. From a deaf perspective, the task of acquiring language in a learning environment like Hong Kong is intriguing because deaf children must mediate with these languages not only in language acquisition terms but also in terms of using them to access education. Seen in this light, there may be many facets of language acquisition by deaf children raised in the Hong Kong environment, depending on whether they have acess to HKSL, types of schools they go to and level of hearing loss. For instance, some deaf children studying in mainstream settings who have no access to HKSL will develop Cantonese in a monolingual fashion in early childhood. They will then acquire English and the written form of Mandarin Chinese as L2s. The rapid expansion in the use of Putonghua in primary and secondary education in Hong Kong also means that students are required to learn Putonghua as a second oral language in addition to Cantonese, over and above written Chinese based on Mandarin grammar. As such, students are taught to read written Chinese using both Cantonese and Putonghua pronunciation.

While a majority of deaf students are being mainstreamed with no support of HKSL, a very small number of deaf students study in special school settings where teachers of the deaf have been encouraged to use either speech or total communication in educating their students. It is against this sociolinguistic milieu that the Jockey Club Sign Bilingualism and Co-enrollment in Deaf Education Programme (i.e., the SLCO Programme) was set up in Hong Kong in 2006. Studying under this program, deaf and hearing children are expected to add HKSL to their linguistic repertoire, becoming “multilingual” in every sense of the word, although in this project we adopted a broader definition of (p.321) “bilingualism” as having knowledge of more than one language. As the name of the SLCO Programme suggests, sign bilingualism and co-enrollment are the two overarching philosophies for raising and educating deaf children in this setting. Practically, the SLCO Programme hopes to introduce one more option to the existing oralist approach to deaf education in Hong Kong.

Children in the SLCO Program

Twenty deaf children studying from primary 1 (i.e., K-2 in the US system) to primary 5 (i.e., K-6 in the US system) were identified for the current study based on three criteria: (1) they enrolled in the SLCO Programme at the third and final year of kindergarten education, hence one full year of intensive, initial exposure to HKSL; (2) they had severe to profound hearing loss (i.e., average hearing thresholds higher than 70 dB); (3) they had no other disabilities. Nine deaf students did not participate in the current study, either because they had been diagnosed as having additional disabilities (i.e., 2 students), did not join the SLCO Program at kindergarten (i.e., 4 students), or they had only unilateral, mild, or moderate hearing loss (i.e., 3 students).

For those who had been selected for the study, their ages ranged from 7;7 to 13;5 (average 10;2). Fourteen of them were implanted at an average age of 2;5. For the six deaf children who wore hearing aids, one was diagnosed to be not suitable for implantation due to the lack of a cochlear in either ear, and hearing aids were fitted instead. The average age of fitting of hearing aids with these children was 1;4. Among them, four were born to Deaf parents, and they studied at three different grades. Two of them had Mainland Chinese backgrounds with exposure to Chinese Sign Language through their parents. The rest of the deaf children were born to hearing parents. Table 13.1 summarizes the backgrounds of the 20 deaf children in the analysis, in terms of their chronological age, gender, types of hearing devices, parents' hearing status, hearing level in the better ear (in dB), age of oral Cantonese input, written Chinese input, and HKSL input.

Assessment Procedures

Hong Kong Cantonese Oral Language Assessment Scale: Cantonese Grammar (HKCOLAS-CG)

Few tools on assessing syntactic and morphosyntactic knowledge of Cantonese have been designed, and HKCOLAS was the first standardized tool targeting children from kindergarten 3 (i.e., K-1) to primary 6 (i.e., K-7) (T'sou, Lee, Tung, Chan, Man, & To, 2006). There were 7 subscales in the package. In the current study, the subscale "Cantonese Grammar" (HKCOLAS-CG) was chosen. The tasks of this subscale included picture selection (i.e., verbal comprehension), responses to questions (i.e., verbal (p.322)

Table 13.1 Background of the Deaf Participants

Codes	Gender	Hearing level (dB)	Chronological age	Parents' hearing status	Hearing device	Duration of written Chinese input	Duration of Cantonese input	Duration of HKSL input	Age of written Chinese input	Age of Cantonese input	Age of HKSL input
C1-1-CTY	F	88	10;8	Hearing	CI	98	118	75	2;6	0;9	4;4
C1-2-HST	F	118	12;11	Hearing	CI	113	131	74	3;6	2;0	6;8
C1-3-LKY	M	105	12;8	Hearing	CI	110	135	75	3;6	1;3	6;4
C1-4-SMC	M	93	11;9	Deaf	HA	111	136	129	2;6	0;4	1;0
C1-5-TKH	M	108	13;5	Hearing	CI	93	136	74	5;8	2;0	7;2
C2-1-CYF	M	108	9;9	Hearing	CI	87	98	62	2;6	1;6	4;6
C2-2-SMY	F	72	10;3	Deaf	HA	93	110	123	2;6	1;0	0;0
C2-3-TWK	M	107	11;10	Hearing	HA	82	103	62	5;0	3;2	6;7
C2-5-WCY	M	87	11;6	Hearing	HA	96	102	72	3;6	2;11	5;6
C2-6-WSY	F	120	11;5	Hearing	HA	107	133	62	2;6	0;3	6;2
C3-1-CKY	F	93	9;3	Hearing	HA	69	83	56	3;6	2;2	4;6
C3-2-CKW	F	97	9;7	Hearing	CI	85	95	56	2;6	1;7	4;10
C3-5-OTN	F	118	9;7	Hearing	CI	85	90	56	2;6	1;11	4;10
C3-6-TSM	F	108	8;11	Hearing	CI	65	98	56	3;6	0;7	4;2

Codes	Gender	Hearing level (dB)	Chronological age	Parents' hearing status	Hearing device	Duration of written Chinese input	Duration of Cantonese input	Duration of HKSL input	Age of written Chinese input	Age of Cantonese input	Age of HKSL input
C4-1-CNW	F	88	8;2	Deaf	CI	62	81	79	3;0	1;3	1;6
C4-2-CWK	F	120	8;11	Hearing	CI	65	82	43	3;6	2;0	5;3
C4-3-CWL	F	120	8;11	Hearing	CI	65	82	43	3;6	2;0	5;3
C4-4-CHY	F	80	8;7	Hearing	CI	49	68	32	4;6	2;9	5;10
C4-5-GTC	F	95	8;3	Deaf	CI	69	92	87	2;6	0;6	1;0
C5-4-SLY	F	117	7;7	Hearing	CI	61	72	43	2;6	1;6	3;11

(p.323) comprehension), grammaticality judgment (i.e., verbal comprehension), and picture description (i.e., verbal expression). There were 89 test stimuli for assessing knowledge of functional categories, complex sentences, and compound sentences with logical connectives. To accommodate deaf children's verbal comprehension, an audio-visual mode in test condition was developed with permission of the publisher. HKCOLAS was adopted as a formal measurement when the deaf children entered the SLCO Programme at the primary level. The children were tested on an individual basis under the aided condition, and the scoring method strictly observed the procedures specified in the package. Since the current study did not aim at comparing deaf children's performance with age norms, raw scores were used instead of standard scores.

Assessment of Chinese Grammatical Knowledge (CGA-Primary and KG)

As tools for assessing deaf children's syntactic and morphosyntactic knowledge of written Chinese were lacking, a new assessment instrument—*Assessment of Chinese Grammatical Knowledge* (i.e., CGA-Primary and KG)—was developed, based on analyses of Chinese linguistics and child language acquisition in Chinese. In the current study, the package CGA-Primary was adopted. It was an online assessment, containing 136 test items distributed over 15 syntactic and morphosyntactic structures. There were four tasks to the assessment: word reordering, picture selection, picture-sentence matching, and fill-in-the-blank. The task instructions were presented in Cantonese or HKSL in a video format. In the current study, the assessment was conducted in a computer room at school.

Hong Kong Sign Language Elicitation Tool (HKSL-ET)

This tool was developed to profile the HKSL development of deaf children in terms of their HKSL production and judgments of grammaticality. The grammatical components included wh-questions, yes/no questions, negation and modals, classifier constructions, non-manual adverbials, and verb agreement. These linguistic structures were reported in previous studies either in terms of the linguistics of HKSL or its acquisition (Tang & Sze, 2002, Tang, 2003; Lee 2006; Tang, 2007; Tang, Sze, & Lam, 2007; Tang, Lam, Sze, Lau, & Lee, 2008; Lam, 2009). There were two major components of HKSL-ET: (1) one judgment task, as our goal was to assess deaf children's knowledge of appropriate non-manual adverbials and syntactic word order of wh-questions, negation, and modals; and (2) three production tasks, namely picture description for eliciting classifier predicates, elicited producton for word order of negation, wh-questions, and yes-no questions, as well as story retelling for modals and verb agreement. All production data were transcribed using ELAN and scored with reference to a set of criteria based on reported analyses of HKSL. (p.324)

Outcome Assessments

Table 13.2 shows the scores of the three assessments and some of the factors to be adopted in the current analysis. At the outset, our goal was to verify whether any relationship existed between the development of grammatical knowledge of oral Cantonese, written Mandarin, and HKSL. Pearson Product correlational analyses were used to verify if there was any linear progression among the scores based on HKCOLAS-CG, CGA-Primary, and HKSL-ET. The results indicated that there was a significantly positive correlation between HKCOLAS-CG and CGA-Primary, suggesting that the development of grammatical knowledge between the two varieties of Chinese was highly related. The linear relationship between CGA-Primary and HKSL-ET was also significantly correlated, as was the linear relationship between HKCOLAS-CG and HKSL-ET. These findings suggest that the children's developing grammars of the three languages were highly correlated, to the extent that the development of one language may predict a commitment development of the other. One possible interpretation is that these three languages may share some common underlying cross-linguistic properties beyond the surface level. Hence, from a language acquisition

Table 13.2 Deaf Children's Performance on HKCOLAS-CG, CGA, and HKSL-ET

Codes	HKCOLAS-CG (%)	CGA (%)	HKSL-ET (%)
C1-1-CTY	83.13	89.71	75.13
C1-2-HST	38.55	80.15	45.84
C1-3-LKY	34.94	74.26	61.33
C1-4-SMC	83.13	88.97	78.67
C1-5-TKH	36.14	72.06	50.55
C2-1-CYF	32.53	57.35	53.26
C2-2-SMY	75.90	92.65	63.18
C2-3-TWK	81.93	84.56	57.86
C2-5-WCY	61.45	88.97	71.92
C2-6-WSY	45.78	84.56	47.72
C3-1-CKY	83.13	93.38	47.95
C3-2-CKW	44.58	76.47	43.58
C3-5-OTN	31.33	52.21	25.64

Codes	HKCOLAS-CG (%)	CGA (%)	HKSL-ET (%)
C3-6-TSM	78.31	85.29	49.19
C4-1-CNW	32.53	61.76	45.21
C4-2-CWK	50.60	59.56	44.21
C4-3-CWL	61.45	79.41	45.98
C4-4-CHY	27.71	50.00	49.36
C4-5-GTC	49.40	84.56	63.41
C5-4-SLY	24.10	29.41	32.23

(p.325) perspective, the acquisition of a certain property of one language will have a positive effect on the other, as the result suggests.

Hermans, Ormel, and Knoors (2010) reported a lack of significant interaction between signing and vocabulary skills initially with younger learners under age 5;1, when they had just entered primary education. They hypothesized that transfer would only take place when there was some threshold knowledge of SLN in place. To investigate this issue, we asked if duration of exposure (i.e., sustained input) had any effect on the interactions of grammatical knowledge of the three languages. The deaf children were divided into two groups based on the criterion of 60 months of language exposure to each of the three languages (approximately 5 years).

For the eight deaf children with fewer than 60 months of exposure to each of the languages, correlational analyses showed that there was a highly significant interaction between oral Cantonese and written Chinese only. This could be due to the relatively earlier access to oral Cantonese and written Chinese before joining the SLCO Program, or the typological proximity between the two linguistic systems. There was a moderately significant interaction between written Chinese and HKSL, but no significant correlation between oral Cantonese and HKSL was observed. Since these deaf children were only exposed to HKSL when they joined the SLCO Program, a weaker relationship was expected, probably due to their lack of threshold knowledge of HKSL. In this way, the current finding is similar to that reported in Hermans et al. (2010). For the remaining 12 deaf children who had sustained input from the three languages for longer than 60 months, significant interactions were observed between each language pair.

One interpretation of the findings is the crucial role played by the duration of sustained input from each of the three languages, which consistently bolster the relationships among them. In other words, the longer the deaf children were immersed in the co-enrollment

environment, the stronger the relationship between the languages. Such a relationship was first observed between oral Cantonese and written Chinese, and eventually extended to HKSL with either variety of Chinese. The closer relationship between oral Cantonese and written Chinese is expected due to linguistic proximity, as well as early access to both languages by deaf children with the support of hearing aids or cochlear implants, in addition to speech and language therapy training.

Since the sample size was quite small and eyeballing the data found interesting individual variation, we decided to run a cluster analysis to group the deaf children statistically based on their performance in the three assessments. Centroid Method (with squared Euclidean distance measure) of hierarchical clustering was applied to categorize the children based on their performance on HKCOLAS-CG, CGA-Primary, and HKSL-ET. Two clusters of deaf children resulted, with two deaf (p.326) children C3-5-OTN and C5-4-SLY being filtered out as outliers because of their extremely poor performance (hence difficult to measure and qualify in the cluster analysis. Table 13.3 presents the distribution of the deaf children according to their cluster membership. Next, some variables were isolated in order to examine the underlying attributes that formed these two clusters. A non-parametric analysis (Spearman Correlation) was applied, incorporating the variables of hearing level in the better ear, speech perception, and hearing devices, as well as initial age of oral Cantonese, written Chinese, and HKSL input. Note that for speech perception, scores were obtained based on the deaf children's performance in the *Cantonese Lexical Neighborhood Test* (i.e., CLNT, Yuen et al., 2008). Results showed that speech perception, hearing devices, and age of first sign language exposure correlated significantly with the forming of the two clusters, while other factors did not yield any significant relationships (e.g., hearing level, age of written Chinese input, age of Cantonese input). These findings suggest that a complex relationship exists between speech perception abilities, hearing devices, and age of sign language input, which impacts deaf children's development of grammatical knowledge in oral Cantonese, written Chinese, and HKSL. Table 13.3 summarizes the distribution of the deaf children within each cluster. In what follows, we will qualitatively describe the two clusters of deaf children.

A few observations can be made regarding the two clusters of deaf children. First, the mean scores of the three tests were much higher in cluster A than in cluster B, suggesting that the deaf children in cluster A were better at developing grammatical knowledge of the three languages than those in cluster B. Among the three tests, HKCOLAS-CG revealed a more obvious difference between clusters (i.e., mean

scores: A = 73.09% vs. B = 38.15%), which is understandable, as the CLNT scores (i.e., speech perception) of the deaf children in cluster A were much higher than those in cluster B (i.e., mean scores: A = 91.56% vs. B = 43.56%). In other words, despite sharing a similar level of hearing loss, those deaf children with better speech perception abilities were able to perform well on the oral language assessment. Hence, speech perception is a crucial determinant for developing Cantonese grammar in the Hong Kong context, in the absence of a formal written mode for this dialect of Chinese.

Second, even though 8 out of 9 deaf children in cluster B had a cochlear implant but 5 out of 9 deaf children in cluster A wore hearing aids, on average, the deaf children in cluster A performed better than those in cluster B. This suggests that hearing devices may not be a factor for predicting language performance as far as this study is concerned.

Third, all deaf children in clusters A and B showed a better command of grammatical knowledge of written Chinese (i.e., CGA-Primary) than oral Cantonese (i.e., HKCOLAS-CG) and HKSL (i.e., HKSL-ET). This

(p.327)

Table 13.3 Clusters of Deaf Children Based on HKCOLAS-CG, CGA and HKSL

Codes	HKCOLAS-CG (%)	CGA (%)	HKSL-ET (%)	CLNT (%)	Hearing level (dB)	Hearing device	Parents' hearing status	Age/ duration of Cantonese input (month)	Age/ duration of written Chinese input (month)	Age/ duration of HKSL input (month)
Cluster A										
C1-1-CTY	83.13	89.71	75.13	100.00	88.00	CI	Hearing	0;9 (118)	2;6 (98)	4;4 (75)
C1-4-SMC	83.13	88.97	78.67	100.00	93.00	HA	Deaf	0;4 (136)	2;6 (111)	1;0 (129)
C2-3-TWK	81.93	84.56	57.86	72.00	107.00	HA	Hearing	3;2 (103)	5;0 (82)	6;7 (62)
C3-6-TSM	78.31	85.29	49.19	100.00	108.00	CI	Hearing	0;7 (98)	3;6 (65)	4;2 (56)
C3-1-CKY	83.13	93.38	47.95	92.00	93.00	HA	Hearing	2;2 (83)	3;6 (69)	4;6 (56)
C2-2-SMY	75.90	92.65	63.18	92.00	72.00	HA	Deaf	1;0 (110)	2;6 (93)	0;0 (123)
C4-3-CWL	61.45	79.41	45.98	84.00	120.00	CI	Hearing	2;0 (82)	3;6 (65)	5;3 (43)
C2-5-WCY	61.45	88.97	71.92	96.00	87.00	HA	Hearing	2;11 (102)	3;6 (96)	5;6 (72)
C4-5-GTC	49.40	84.56	63.41	88.00	95.00	CI	Deaf	0;6 (92)	2;6 (69)	1;0 (87)
Average	73.09	87.50	61.48	91.56	95.89			1;6 (102.67)	3;3 (83.11)	3;7 (78.11)
Cluster B										
C1-2-HST	38.55	80.15	45.84	8.00	118.00	CI	Hearing	2;0 (131)	3;6 (113)	6;8 (74)

Codes	HKCOLAS-CG (%)	CGA (%)	HKSL-ET (%)	CLNT (%)	Hearing level (dB)	Hearing device	Parents' hearing status	Age/ duration of Cantonese input (month)	Age/ duration of written Chinese input (month)	Age/ duration of HKSL input (month)
C3-2-CKW	44.58	76.47	43.58	84.00	97.00	CI	Hearing	1;7 (95)	2;6 (85)	4;10 (56)
C2-6-WSY	45.78	84.56	47.72	0.00	120.00	HA	Hearing	0;3 (133)	2;6 (107)	6;2 (62)
C1-3-LKY	34.94	74.26	61.33	0.00	105.00	CI	Hearing	1;3 (135)	3;6 (110)	6;4 (75)
C1-5-TKH	36.14	72.06	50.55	68.00	108.00	CI	Hearing	2;0 (136)	5;8 (93)	7;2 (74)
C2-1-CYF	32.53	57.35	53.26	4.00	108.00	CI	Hearing	1;6 (98)	2;6 (87)	4;6 (62)
C4-1-CNW	32.53	61.76	45.21	64.00	88.00	CI	Deaf	1;3 (81)	3;0 (62)	1;6 (79)
C4-4-CHY	27.71	50.00	49.36	72.00	80.00	CI	Hearing	2;9 (68)	4;6 (49)	5;10 (32)
C4-2-CWK	50.60	59.56	44.21	92.00	120.00	CI	Hearing	2;0 (82)	3;6 (65)	5;3 (43)
Average	38.15	68.46	49.01	43.56	104.89			1;7 (106.56)	3;6 (85.67)	5;4 (61.89)
Outliers										
C3-5-OTN	31.33	52.21	25.64	32	118	CI	Hearing	1;11 (90)	2;6 (85)	4;10 (56)
C5-4-SLY	24.1	29.41	32.23	12	117	CI	Hearing	1;6 (72)	2;6 (61)	3;11 (43)

(p.328) phenomenon was most obvious among the deaf children of cluster B. It seems that with these children, better grammatical knowledge of written Chinese (i.e., CGA-Primary) and HKSL (i.e., HKSL-ET) compensates for their poor speech perception abilities (i.e., CLNT) and poor performance in oral Cantonese (i.e., HKCOLAS-CG). In fact, as most children only learned HKSL when they entered the SLCO Program, it stands to reason that the HKSL scores of some deaf children were lower than those of the other two languages.

Fourth, more children in cluster A displayed a balanced performance with the three language assessments, much more so than the children of cluster B, most of whom scored lower than 50% in either HKSL-ET or HKCOLAS-CG, or both. Fifth, there was little difference in the initial age of exposure to oral Cantonese (cluster A = 1;6 vs. cluster B = 1;7) and written Chinese (cluster A = 3;3 vs. cluster B = 3;5), probably due to the universal hearing screening policy in Hong Kong and the relatively more uniform age of formal schooling among the children. However, the age of exposure to HKSL was much younger with children in cluster A than in cluster B (cluster A = 3;7 vs. cluster B = 5;4). A closer examination found a concentration of deaf children born to deaf parents. There were three in cluster A and only 1 in cluster B. It seems that the combined effects of early sign language exposure, early fitting of hearing aids, and strong speech perception abilities supported the development of the three languages with these children in the study. Deaf children with poor speech perception, on the other hand, would rely more on HKSL and written Chinese in their language performance, due to their relatively poor oral language input and output.

Implications of the Findings

This study of language acquisition by a group of severe and profoundly deaf children in a sign bilingual and co-enrollment program found a significantly positive relationship between their development of syntactic and morphosyntactic knowledge of oral Cantonese, written Chinese, and HKSL. Also, we observed no adverse effects on the development of oral Cantonese or written Chinese when the deaf children were acquiring HKSL; otherwise, statistically, we should be expecting a negative correlation between the scores of HKCOLAS-CG and HKSL or CGA-Primary and HKSL (cf. Spencer & Marschark, 2010). The results do not seem to show a significant difference in the types of hearing technology these children were prescribed with, as most children in cluster A were fitted with hearing aids rather than cochlear implants and they performed better than those in cluster B. However, as there were deaf children born to deaf parents in cluster A, their better performance may skew the results somewhat. What we have

learned from the current study is that, (p.329) for severe and profoundly deaf children, speech perception abilities rather than hearing levels have an effect on the development of oral Cantonese grammar.

In fact, positive interactions in deaf children's assessments based on vocabulary, narratives, and reading comprehension between a signed language and a spoken language have been reported in recent studies (Hermans et al., 2010, on SLN and Dutch; Menéndez, 2010, on Catalan Sign Language and English; Niederberger, 2008, on Langue des Signes Française and French). Some other studies went further by adopting a bilingual processing model, with evidence revealing cross-modal activation of sign language knowledge (e.g., phonological or semantic) during written word recognition by sign bilinguals (Morford, Wilkinson, Villwock, Piñar, & Kroll, 2011, on ASL in English word recognition by deaf adults; Ormel, Hermans, Knoors, & Verhoeven, 2012, on SL in Dutch word recognition by deaf children; see Ormel & Giezen, Chapter 4 of this volume).

The current study adds to the pool of evidence of this positive relationship through examining severe and profoundly deaf children's syntactic and morphosyntactic knowledge of three target languages. It should be pointed out that we made no specific attempts in this study to compare the linguistic structures of the three languages cross-linguistically and by way of which we isolated certain "direct" evidence of cross-linguistic transfer in the data. Instead, we examined deaf children's grammatical knowledge at the broader level by designing stimuli that reflect the syntax or morphosyntax of the three languages, as all natural languages are bound to display such properties through various means.

How do we explain such a phenomenon? One plausible interpretation of the significantly positive correlations between the language pairs could be maturation. As the deaf children were drawn from P1 to P5, and if the linguistic environment was conducive enough, we should be expecting growth of grammatical knowledge of each of the languages over time, hence the positive correlations. A plausible outcome of increasing grammatical knowledge of the three languages may result in cross-linguistic transfer during the course of language development. Indeed, acquisition studies constantly allude to the transfer of linguistic knowledge from L1 to L2 in second language acquisition or from the more dominant to the less dominant language in bilingual acquisition. If this assumption holds, then the findings may suggest that cross-modal, linguistic transfer of grammatical knowledge between a signed language and a spoken language at some higher linguistic levels is

likely. This runs counter to some earlier claims that surface structural differences or the lack of a print form in a signed language does not encourage cross-modal transfer of linguistic knowledge (Mayer & Akamatsu, 2000; Mayer & Wells, 1996, p. 105). As (p.330) noted earlier, although Cummins emphasizes the possibility of transfer of conceptual and linguistic knowledge from one language to the other, he also casts doubt on the possibility of linguistic transfer in some specific domains of linguistic knowledge, especially syntactic and morphosyntactic knowledge of dissimilar languages. The current findings run counter to his assumptions.

The earlier observation by Hermans and colleagues (2010) that initial cross-modal transfer is unlikely when there is insufficient threshold knowledge of language also found some support in the current study. When systematic exposure to the three languages was less than 60 months, the lack of correlation initially between the scores of HKSL and oral Cantonese was observed. This is understandable because most of these children did not develop HKSL until after they had joined the SLCO Programme, and acquiring oral Cantonese solely via the auditory-oral mode was difficult initially, given their speech perception abilities. However, a significant correlation between oral Cantonese and written Chinese, and between HKSL and written Chinese, was observed with this group of children. For oral Cantonese and written Chinese, it may be due to the benefit of the early intervention policy of Hong Kong, where deaf children are fitted with either hearing aids or cochlear implants, enabling early exposure to oral Cantonese and subsequently written Chinese.

If the transfer view holds, unimodal, cross-linguistic transfer at the syntactic and morphosyntactic level is likely with similar languages, and written Chinese may support the long-term development of oral Cantonese. Second, the closer relationship between HKSL and written Chinese also suggests that severe and profoundly deaf children rely heavily on HKSL and written Chinese in their language development. It is especially crucial with those children who have poor speech perception abilities. Still another possibility is that there is no “direct” transfer per se, but the “multilingual” learning environment offers enriched linguistic input from different languages, which supports deaf children’s overall language development (Volterra, personal communication).

How do we situate our current findings with reference to Cummins’s interdependence hypothesis? Although this hypothesis on L1 transfer is narrowly defined and is hypothesized to be applicable to general conceptual knowledge and certain domains of linguistic knowledge

only, one can still align this transfer view with current theories of language acquisition, particularly the concept of cross-linguistic influence in second language acquisition and bilingual acquisition. According to these paradigms of linguistic research, abstract knowledge of principles and parameters of Universal Grammar manifest themselves in natural languages, hence the possibility of linguistic transfer given certain conditions. In accounting for code-blending within the framework (p.331) of distributed morphology, for instance, Lillo-Martin, Koulidobrova, de Quadros, and Chen (2012) argued that bimodal bilinguals have one computational system but two lexicons at their disposal. In deriving the structure, they may transfer knowledge of syntax from one language to the other. In spelling out the structure, bimodal bilinguals may employ two independent phonetic forms (i.e., speech and sign), hence the code-blending phenomenon.

In the context of the current study, such a facility of transferring linguistic knowledge at the abstract level may be perceived as having a scaffolding effect, supporting deaf children's dynamic processes of bilingual acquisition rather than hindering them, resulting in the positive correlation between HKCOLAS-CG, CGA-Primary and HKSL-ET. We observed that at least deaf children from cluster A demonstrated such effects. In language acquisition terms, language learners are bound to utilize their developing linguistic resources to support the acquisition process at any given point of development, be it second language acquisition or bilingual acquisition.

Adopting the premise that deaf children may undergo bilingual acquisition, a highly dynamic bioprogram across the life span, it is important to analyze the timing of input of the languages involved and the nature of linguistic input in the home and school environment, as they play a pivotal role in supporting bilingual if not multilingual development. In terms of the timing of linguistic input, bimodal bilinguals may acquire two languages in either a simultaneous or sequential fashion. Simultaneous bilingual acquisition refers to the processes whereby children are given early exposure to two languages between ages 0–3. Early exposure to a second language between ages 4–6 (i.e., before formal schooling begins) and after mastering an L1 will be characterized as sequential bilingual acquisition (Meisel, 2004). Therefore, the acquisition of signed language and spoken language by CODAs naturally pertains to simultaneous bilingual acquisition. However, Deaf children born to Deaf parents nowadays also stand a good chance of undergoing simultaneous bilingual acquisition to some extent. They receive early signed language input through their parents; at the same time, universal hearing screening and fitting of hearing

devices at an early age enable them also to gain early access to spoken language input, as evidenced by those deaf children born to deaf parents in both clusters A and B.

As for deaf children born to hearing parents, one has to accept the fact that they seldom enjoy the facility of signed language input as L1 in the home environment. That situation underlies the usual arguments against diverting deaf children's attention to acquiring a signed language initially, especially when cochlear implantation suggests chances of success (Mayer & Leigh, 2010). However, it is possible to assume that, given sufficiently early linguistic input, deaf children born to hearing (p.332) parents may undergo a relatively longer period of simultaneous bilingual acquisition when compared with their "Deaf of Deaf" peers and typically developing bilingual child acquirers. In fact, it is sometimes difficult to draw a clear-cut distinction between simultaneous and sequential bilingual acquisition processes, even in typical acquisition conditions. In monolingual first language acquisition, age 3 marks the mastery of certain fundamental properties of the target language grammar (Guasti, 2004, offers an excellent summary), but not its entirety.

The acquisition literature also reveals that full attainment of some specific domains of syntax, such as long passives, will occur at age 6 (Borer & Wexler, 1992), or development of formal representations of semantic, as well as pragmatic and discourse knowledge, will extend into adolescence (Nippold, 1988). In other words, even under typical conditions, early L2 acquisition may occur in parallel with advanced L1 acquisition. Put in the context of deaf children born to hearing parents, if universal hearing screening and early intervention are in place to ensure early access to spoken language input, these children may also be candidates for simultaneous or sequential bilingual acquisition if they are given early and sustained input in signed language, albeit not in the home context as reported in typical bilingual acquisition studies. For those who do not develop strong speech perception abilities due to various reasons, an early injection of signed language input is only to their advantage. This echoes Goldin-Meadow and Mayberry's (2001, p. 226) observation that "early detection of hearing loss, early entry into an educational system, and early and continuous contact with fluent signers together may go a long way toward ensuring that profoundly deaf children have access and learn a language."

If the assumption holds that deaf children raised in a sign bilingual and co-enrollment environment enjoy an early access to signed language and undergo simultaneous or sequential bilingual acquisition, Cummins's earlier stipulation for a strong, initial L1 foundation and

some threshold knowledge of L2 in order for transfer to take place becomes redundant. Also, the promotion of signed language being deaf children's L1 needs to be redefined, on grounds of the timing of L1 input to delineate simultaneous and sequential bilingual acquisition, as discussed previously. Where deaf children have the opportunities for early exposure to more than one language and develop knowledge of these languages accordingly, it is likely that they will have both spoken language and signed language as their L1s in a simultaneous or sequential acquisition fashion. For some sign bilingual deaf children, especially those with poor speech perception abilities, HKSL may become their dominant language in due course; for some others it may become their less dominant language, as opposed to oral Cantonese or written Chinese, given the benefits of cochlear implantation, and some deaf children may choose the oral path (Archbold & Mayer, 2012; Mayer & (p.333) Leigh, 2010). It is at least a bottom-up decision from the learners, rather than a top-down one from the educators.

The second factor is the nature of linguistic input. The crux of the matter is whether deaf children are given the opportunity for immersion in an acquisition-rich environment with sustained input in both signed language and spoken language. From a simultaneous bilingual acquisition perspective, dual language input has been generally accepted to be beneficial to bilinguals in the spoken language literature (Genesee, 2009). Thordardottir (2011) also claimed that bilingual children need at least 40% of waking hour exposure to a language if their competence in that language is to be comparable to that of monolingual children. The positive effects of linguistic immersion on the bilingual development of hearing children born to deaf parents were also reported in Kanto, Huttunen, and Laakso (2013).

In other words, when deaf children undergo bilingual development while at the same time using the languages to access education—especially for severe and profoundly deaf children such as those from the SLCO Program—the school environment is crucial, as it is the breeding ground of linguistic input, especially HKSL. In addition to immersion in naturalistic spoken language input through daily interactions with hearing peers and teachers, the critical mass of deaf children and Deaf teachers also sustains the input in HKSL in the co-enrollment environment. The daily presence of Deaf teachers in the classrooms (i.e., 6–8 in the current co-enrollment setting), in particular, alleviates the pressure on the hearing teachers in conveying the curriculum content in two different modalities and thus safeguards

adequate linguistic input when the signing skills of the hearing teachers are still improving.

The current study shows that this sustained dual/trio linguistic input creates an acquisition rich environment in a way akin to immersion programs in Canada whereas in the current context for deaf children's bilingual if not multilingual development, and more importantly, their access to a regular curriculum. This is especially true for severe and profoundly deaf children born to hearing parents who do not receive input in signed language at home; the early, sustained input in spoken and signed language as occurred in a co-enrollment environment becomes crucial in supporting their sign bilingual acquisition. In fact, some signed language acquisition studies already indicate that deaf children's linguistic output can potentially surpass their "impoverished" or "inconsistent" input, given a sustained period of signed language exposure (Singleton & Newport, 2004; Senghas & Coppola, 2001).

Concluding Observations

Swanwick, Hendar, Dammeyer, Kristoffersen, Salter, and Simonsen (Chapter 12 of this volume) argue that instead of adopting a polarized (p.334) view separating language from educational approaches, it would be more beneficial, if not healthier, if the field of deaf education were injected with a view of linguistic pluralism, accepting the differences in strengths and weakness of the different modes of communication in the educational process for deaf children. The sign bilingual and co-enrollment approach to deaf education as implemented in the Hong Kong context shares this objective, coming from research on sign linguistics and bilingual acquisition. As Grimes, Thoutenhoofd, and Byrne (2007) claim, parents must be well informed about a menu of options before they decide on a monolingual approach to educating their deaf child. This is just as important as when parents opt for a sign bilingual approach; sign bilingual development is to be expected and should be viewed as an enrichment rather than as a disadvantage.

Finally, as the SLCO Program is still at the stage of experimentation, the initial findings are encouraging but highly preliminary for reasons such as the reliability and validity of the new assessment tools for measuring deaf children's linguistic competence in different target languages. Presently, the small number of students in the program was also due to the small size of the deaf student population in Hong Kong (i.e., about 5,000 school-age deaf students from kindergarten to upper secondary and all hearing levels). In addition, the lack of a written form for oral Cantonese also prevents the researchers from developing assessment tools using this mode. Also, HKCOLAS-CG which was conducted primarily via verbal comprehension may be biased against those deaf children with poor speech perception abilities in the testing condition. Information from their verbal production may give an additional dimension of their oral Cantonese abilities. Future research may involve comparative analysis of deaf children studying in a co-enrollment environment as against those in regular mainstream settings, to further evaluate the efficacy of the sign bilingual and co-enrollment approach in the broader context of deaf education in Hong Kong.

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