



<b>Title</b>	<b>Phonological accuracy and phonological patterns in Cantonese-English bilingual children</b>
<b>Author(s)</b>	<b>Cheng, Ting-kwo, April; 鄭婷戈</b>
<b>Citation</b>	<b>Cheng, T. A. [鄭婷戈]. (2012). Phonological accuracy and phonological patterns in Cantonese-English bilingual children. (Thesis). University of Hong Kong, Pokfulam, Hong Kong SAR.</b>
<b>Issued Date</b>	<b>2012</b>
<b>URL</b>	<b><a href="http://hdl.handle.net/10722/237894">http://hdl.handle.net/10722/237894</a></b>
<b>Rights</b>	<b>The author retains all proprietary rights, (such as patent rights) and the right to use in future works.; This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.</b>

**Phonological Accuracy and Phonological Patterns  
in Cantonese-English Bilingual Children**

Cheng Ting Kwo April

A dissertation submitted in partial fulfilment of the requirements for  
the Bachelor of Science (Speech and Hearing Sciences), The University of Hong Kong,  
June 30, 2012.

## **Abstract**

This paper aimed to describe the phonological systems of Cantonese and English in bilingual children in Hong Kong, and to determine the presence and nature of interaction between the two languages. A total of 48 children aged between 4;00 and 4;11 were recruited, with 24 Cantonese-English successive bilinguals from five local international kindergartens and 24 Cantonese monolingual children from two local kindergartens. The Cantonese Segmental Phonology Test (CSPT, So, 1993) and Goldman Fristoe Test of Articulation-2 (Goldman & Fristoe, 2000) were administered. Cantonese phoneme accuracies and phonological processes were compared between the two groups to investigate on any possible interference effect. Results indicated no interference effect of learning English on Cantonese phoneme accuracies, but transfer was evident in the phonological processes in the bilingual children when compared to their monolingual counterparts.

## Introduction

Bilingualism is a complex phenomenon. There are numerous types of bilinguals using different extents of the first and second language. Valdés (2001) defined bilingualism as a continuum with different degrees of knowledge of the first and second language. The study on bilingualism mostly focused on how people process the learning of a second language (Gass & Selinker, 2008). Many researches had been undergone recently to study the effects of learning a second language on the acquisition of the phonology of the first language (Goldstein and Washington, 2001; Paradis, 2001; Anderson, 2004; Fabiano & Goldstein, 2010). Evidence revealed that bilingual speakers have phonological development patterns that are different from their monolingual counterparts (Paradis, 2001; Anderson, 2004), particularly in the types of phonological processes that the two comparison groups reveal. (Goldstein and Washington, 2001; Fabiano & Goldstein, 2010)

Building on the fact that monolinguals and bilinguals possess different phonological developmental patterns of the same language, people started to investigate on how the two groups differ in their phonological acquisition patterns. In particular, Paradis & Genesee (1996) proposed a series of *interdependence* hypotheses for the acquisition of two language systems in a bilingual child, namely transfer, deceleration and acceleration. *Transfer* was defined as the shift of language-specific features from one language to another, and it could be reflected in the phonological processes that a bilingual child exhibit. *Deceleration* and *acceleration*, on the other hand, would be demonstrated when the rate of language acquisition is slower or faster than the monolingual peers respectively. Phoneme accuracy is among one of the measures that can illustrate the presence of deceleration and acceleration effect. Fabiano & Goldstein (2010) also addressed to the hypotheses of interdependence and referred to such concepts as *interaction*. On one hand, some researches supported the hypothesis of deceleration effect, which stated that learning a

second language would slower the rate of phonological development of the first language. Among them is a recent study done by Gildersleeve-Neumann, Kester, Davis, and Pena (2008) which compare the speech samples of English-Spanish bilingual children with that of English monolingual children. It was observed that bilingual children showed more consonant and vowel errors and more phonological processes in English than their monolingual counterparts. Contrary to such findings, however, some researches demonstrated that bilinguals had a faster rate of acquisition in certain phonological skills when compared to their monolingual peers (Paradis and Genesee, 1996). Still, some found no significant differences in the phonological accuracies between bilinguals and monolinguals (Goldstein & Washington, 2001).

Another question then aroused on whether the nature of the languages that the bilingual children speak would affect the presence of interference effects and if so, the types of interference effect they manifest. The two major language families spoken by the largest number of people in the world are Indo-European (e.g. English, Spanish, German) and Sino-Tibetan (e.g. Chinese) (Lewis, 2009). While both deceleration and acceleration were evident in children who learned two Indo-European languages or two Sino-Tibetan languages (Paradis and Genesee, 1996; Gildersleeve-Neumann et al., 2008; So & Leung, 2006), certain studies did not find any noticeable deceleration or acceleration in children who learn one Sino-Tibetan and one Indo-European language (Lin & Johnson, 2010).

With so many possible factors affecting the phonological acquisitions in bilingual children, then, the present study aimed to describe the phonological accuracies and phonological patterns of Cantonese-English bilingual children in Hong Kong by investigating the presence and types of interaction between Cantonese (as native language) and English (as second language). The study also aimed to find out whether such presence and types of interaction are affected by the nature of the languages that the children learn.

To note, Cantonese, the dominant language used in Hong Kong, is a Sino-Tibetan language while English is an Indo-European language. Successive Cantonese-English bilingual children were recruited as most of the local school children in Hong Kong learn English as a second language at school (Holm & Dodd, 2006). Although several studies had already been conducted on these target subjects (Pun, 2004; Tin, 2005), it was noted that the studies did not examine the specific patterns of transfer between languages in children of a particular age range. The present study thus attempted to describe the patterns of phonological processes in bilingual children of a specific age range. Moreover, the past studies did not include any control group of monolingual children of either language. Rather, data from typical monolingual development was extracted from previous literatures for comparison. As the reliability and accuracy of the bilingual and monolingual data could not be matched or determined when they are not transcribed and analyzed by the same investigators (Anderson, 2004), the present study attempted to fill this research gap by including a comparison group of Cantonese monolinguals while describing for the phonological patterns of Cantonese-English bilingual children in Hong Kong. This is done in order to reduce methodological and analytical differences arisen during the transcription processes.

### **Cantonese and English phonology**

Cantonese is among one of the Chinese languages. It has 19 initial consonants and 6 final consonants. There are 11 vowel monophthongs and another 11 vowel diphthongs. As a tonal language in which a change in the tone of a syllable gives rise to a change in meaning, Cantonese has 6 contrastive tones and 3 allotones. Aspiration of initial consonant stops and affricates is a distinctive feature in Cantonese.

English, on the other hand, has 24 consonants, 49 initial consonant clusters, 16 vowel monophthongs and 5 vowel diphthongs. Voicing is a distinctive feature in English consonants.

In terms of syllabic structure and stress patterns, Cantonese has a monosyllabic structure and simple stress patterns. Conversely, English has a polysyllabic structure with complex stress patterns.

### **Clinical significance**

The study of the phonological system of bilingual children is important as they appear to develop in a way that differs from monolingual children. Goldstein & Kohnert (2005) had stated that the study of bilingualism is very important for the differential, as the normative phonological acquisition data for monolinguals could not accurately describe their speech sound development.

### **Hypotheses**

The present study served to describe the phonological systems of Cantonese-English bilingual children from two perspectives. First, it aimed to compare the Cantonese phoneme accuracies of Cantonese-English bilingual children with that of Cantonese monolingual children. Due to the considerable differences between the Cantonese and English phonological structures, it was hypothesized that English, as a second language, would interact with Cantonese such that a deceleration effect on the Cantonese phoneme accuracies would be expected.

The second purpose of the study was to compare the phonological patterns of the bilinguals to the patterns observed in their respective monolingual counterparts. It was predicted that with interaction, bilingual children would exhibit a bigger variety of phonological processes, among which were atypical processes that would be present due to the influence of the second language.

## Method

### *Research Design*

The cross-sectional design was adopted in the present study to explore and compare Cantonese-English bilinguals with Cantonese monolinguals aged between 4;00 to 4;11. The study explored on the differences in their phonological accuracies and phonological patterns in Cantonese word production.

### *Subject Participants*

A total of 48 typically-developing children (aged 4;00-4;11) were recruited in the present study. Demographic data of all the subjects are given in Table 1. The bilingual group included 24 Cantonese-English speaking bilingual children who were recruited from five local international kindergartens. This age group was chosen in accordance to the age of children being studied by Goldstein & Washington (2001) and Lin & Johnson (2009). These bilingual children acquired Cantonese as their first language and had learned English sequentially at home and at school through total immersion (i.e. a setting where only English is used as the medium of instruction) for at least one year. The recruitment criterion for the bilingual subjects is the ability to communicate in both Cantonese and English.

Another 24 Cantonese-speaking monolingual children were included in the comparison group. These children received education mainly in Cantonese and they had limited exposure to English.

Table 1. Demographic data of all subjects

	Bilingual group	Monolingual group
Number of children	24	24
Gender		
Female	11	13
Male	13	11
Age range	4;00-4;11	



The Hong Kong Cantonese Vocabulary Test (CRVT, Lee, Lee & Cheung, 1996) and the short form of the British Picture Vocabulary Scale (BPVT, Dunn, Dunn, Whetton & Pintilie, 1982) were two standardized assessment tests used for screening receptive language of the participants. Expressive language abilities in both languages were analyzed informally using LARSP (Crystal, 1992). All participants had passed the screening tests with a minimum of receptive language scores that did not lag behind chronological age for more than 6 months. Expressive languages were normal with syntactic and grammatical structures following the developmental normative data. There were no reported cognitive, hearing or oro-motor complications in all of the subjects recruited.

### ***Test materials***

The Cantonese Segmental Phonology Test (CSPT, So, 1993) was administered to both subject groups to assess their Cantonese phonological abilities at word-level upon picture naming.

For the bilingual group, the Goldman Fristoe Test of Articulation-2 (GFTA-2, Goldman & Fristoe, 2000) was also used to assess their English phonological abilities at word level upon picture naming.

### ***Procedure***

Subjects were tested individually in a quiet room in their kindergartens. The examiner carried out online transcription of the children's production during or immediately after the session using narrow phonetic transcription. The data were also recorded using a high-quality Samsung YP-VX1 ZB sound recorder.

### *Data analysis*

All Cantonese and English samples were transcribed by students majoring in speech and language sciences who had completed tertiary trainings in phonetics transcription using the international phonetic alphabets.

The percentage of consonants correct (PCC), percentage of vowels correct (PVC), and the number and types of phonological processes (NPP) for both Cantonese and English were calculated and used as the three analyses to describe the phonological accuracies of the bilingual and monolingual children.

The results of PCC, PVC and NPP of the bilingual children in Cantonese were then compared with that of the monolingual children recruited in the present study in order to describe for the effects of learning English on the phonological acquisition of Cantonese.

Ten percent of the data was randomly selected for transcription reliability checks. Point-to-point agreement for individual phonemes reveals inter-rater and intra-rater reliability as shown in Table 2 .

Table 2. Inter- and intra-rater reliability for Cantonese and English phonemes

	% of Agreement	
	Cantonese phonemes	English phonemes
Inter-rater reliability		
consonants	96.1%	92.3%
vowels	97.4%	96.3%
tones	100%	100%
Intra-rater reliability		
consonants	98.0%	96.7%
vowels	100%	98.8%
tones	100%	100%

## Results

### Cantonese phonological skills of bilingual and monolingual children

**Cantonese phoneme accuracy.** The means and standard deviations of PCC, PVC and NPP in Cantonese are provided in Table 3 for both Cantonese-English bilingual and Cantonese monolingual subjects. For bilingual subjects, the same measures in English are also given. No data on the English PCC, PVC and NPP are given for monolingual subjects as they were not tested on the English articulation test GFTA-2. Although phoneme accuracy is measured by PCC and PVC only, the value of NPP is also included for comparison between the subject groups.

Table 3. Descriptive statistics for average phonemic accuracy and number of phonological processes for both bilingual and monolingual subjects.

Measures	Bilinguals (n= 24)		Monolinguals (n=24)		<i>F</i>	<i>df</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Cantonese							
PCC	95.35	4.91	94.95	6.56	.06	1,46	.81
PVC	98.14	2.74	98.36	2.43	.09	1,46	.77
NPP	3.42	2.62	2.92	4.30	.24	1,46	.63
English							
PCC	88.04	7.49					
PVC	98.83	1.11					
NPP	16.33	9.17					

The multivariate analysis of variance (MANOVA) was used as a statistical method to identify the significance of differences in Cantonese scores between the two subject groups. Results indicated that there are no significant effects of language status on Cantonese PCC, PVC and NPP [ $F(1, 46) = .06, .09$  and  $.24, p = .81, .77$  and  $.63 (> 0.05)$  respectively]. In other words, the Cantonese phonological accuracies were not affected by whether a child is monolingual or bilingual.

Both bilingual and monolingual subjects attained high percentages in Cantonese PCC and PVC that are well above 90% accuracy, indicating near-complete mastery of the Cantonese phonological system in both groups before the age of five.

### **Cantonese phonological processes in bilingual children**

***Cantonese phonological processes (syllable-initial positions).*** Figure 1 compares the types of Cantonese phonological processes at syllable-initial positions observed in bilingual to those in monolingual children. The number of children producing each type of phonological processes is given in order to compare the prevalence of each type of phonological process in the subject groups. A phonological process is considered as present in a child when it occurred at least twice in the Cantonese phonology test. Hence, the table compares the types and variety of Cantonese processes observed in both groups of subjects.

As seen from Figure 1, there are certain Cantonese phonological processes that are found either only in bilingual children or only in monolingual children. Processes that are found only in Cantonese-English speaking bilingual children include gliding (insertion of a glide as in (檯) /t<sup>h</sup>ɔi35/ → [t<sup>h</sup>wɔi35]), initial consonant addition of (鴨) /ap3/ → [ŋap3] and voicing at syllable-initial position [e.g. voicing of initial consonant of (杯) /pui55/ and voicing of initial and final consonant of (腳) /kœk3/]. Processes specific to Cantonese-speaking monolingual children include affrication, aspiration, backing and deaffrication.

For bilingual children, initial consonant deletion (ICD) of /ŋ/, delateralization of /kw/ → [k] and initial-consonant voicing appear to be more prevalent than the other Cantonese phonological processes. In all the children who showed ICD, the initial

consonant /ŋ/ was omitted for the stimulus ‘eye’ (眼) /ŋan 23/→[an 23]. For delateralization, the cluster /kw/ was simplified as [k] in the second syllable of the stimulus ‘apple’ (蘋果) /p<sup>h</sup>ŋ21 kwɔ35/ in the CRVT.

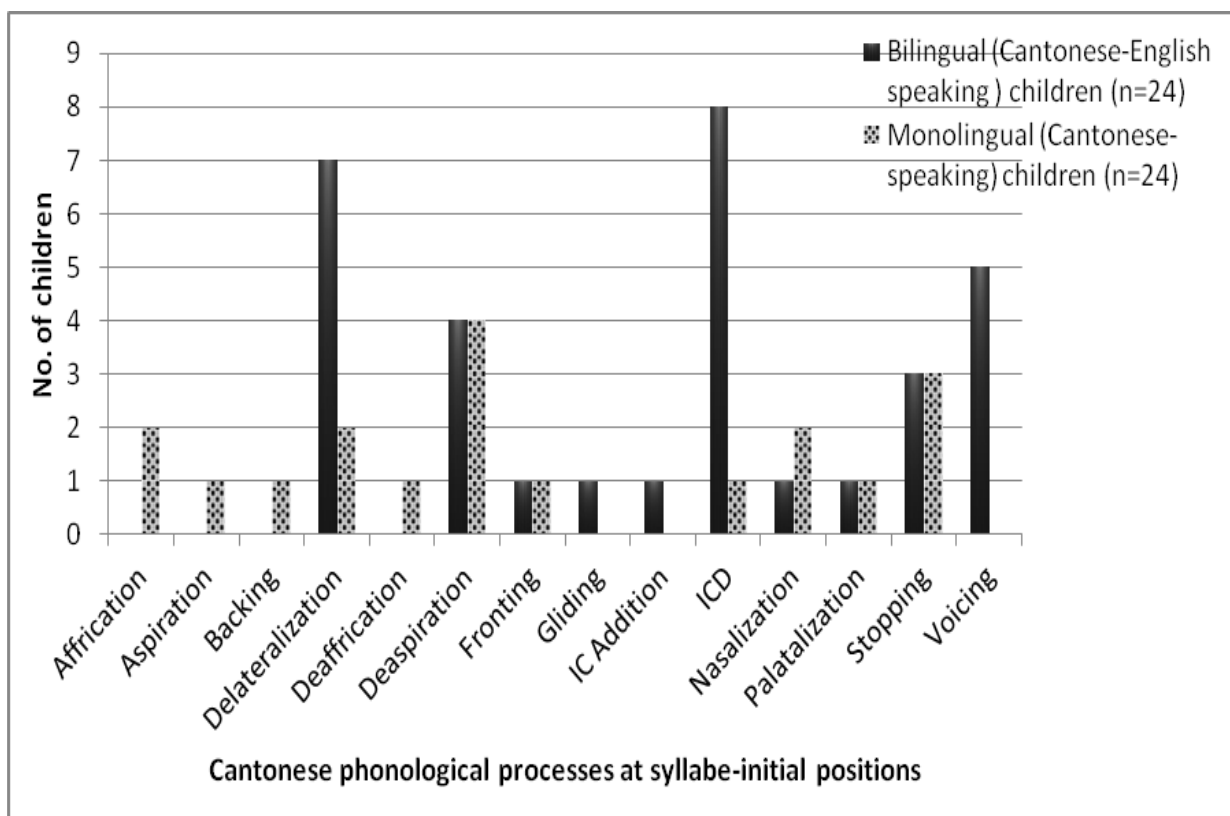


Figure 1. Prevalence of Cantonese phonological processes at syllable-initial positions in bilingual and monolingual children.

\*IC addition= initial consonant addition

\*ICD= initial consonant deletion

**Cantonese phonological processes (syllable-final positions).** Figure 2 details the types and prevalence of Cantonese phonological processes at syllable-final positions in both bilingual and monolingual children. Processes that are only found in bilingual children include final consonant deletion of /-n/, /r/ addition at syllable-final position and final consonant voicing. Final consonant addition, on the other hand, is only seen in monolingual children.

Comparing all the Cantonese phonological processes at syllable-final positions, fronting is the most prevalent in Cantonese-speaking monolingual children. Fronting of the syllable-final consonant was seen mostly as realization of the final consonant /-ŋ/ as [-n].

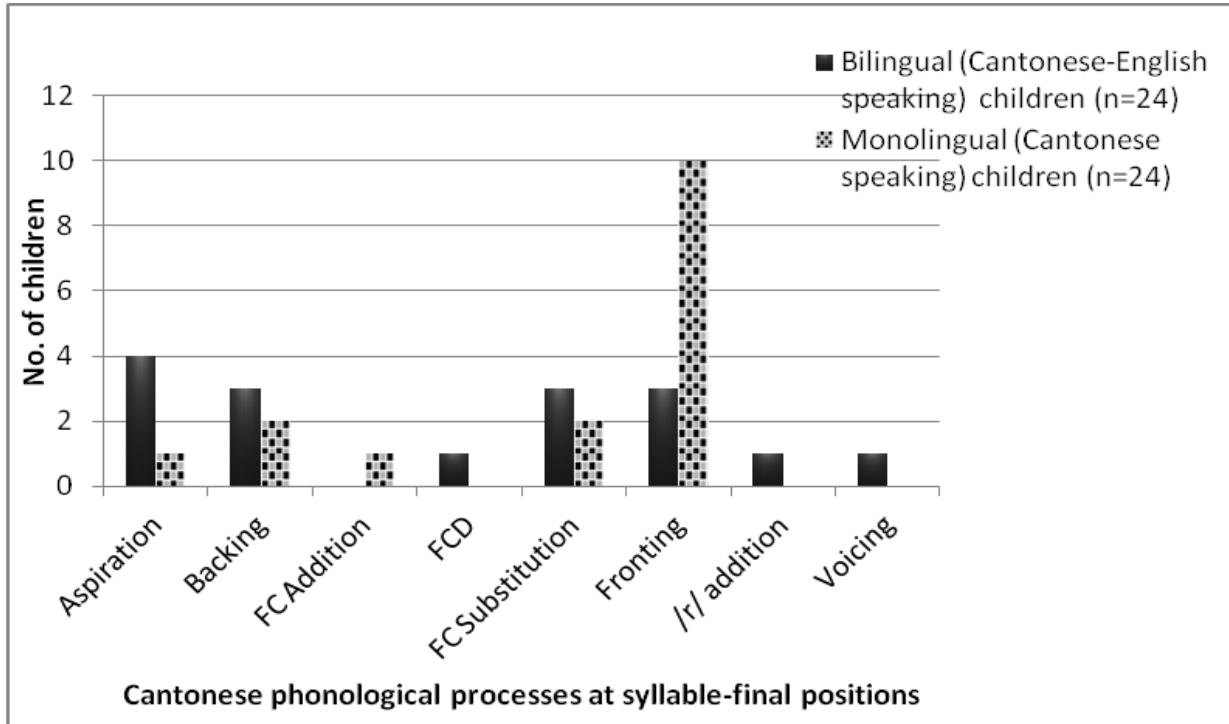


Figure 2. Prevalence of Cantonese phonological processes at syllable-final positions in bilingual and monolingual children.

\*FC Addition = Final consonant addition

\*FCD = Final consonant deletion

\*FC substitution = Final consonant substitution

[substitution of any of the three final consonants /-p, -t, -k/ occurring in syllables with entering tones to any of the two counterparts]

**Cantonese vowel error patterns.** The vowel error patterns of bilingual and monolingual children in Cantonese are compared in Figure 3. Vowel addition is the only error pattern that is specific to bilingual children. Backing and diphthong reduction occur in the same number of bilingual and monolingual children. Fronting of vowel occurs in the highest number of both bilingual and monolingual children.

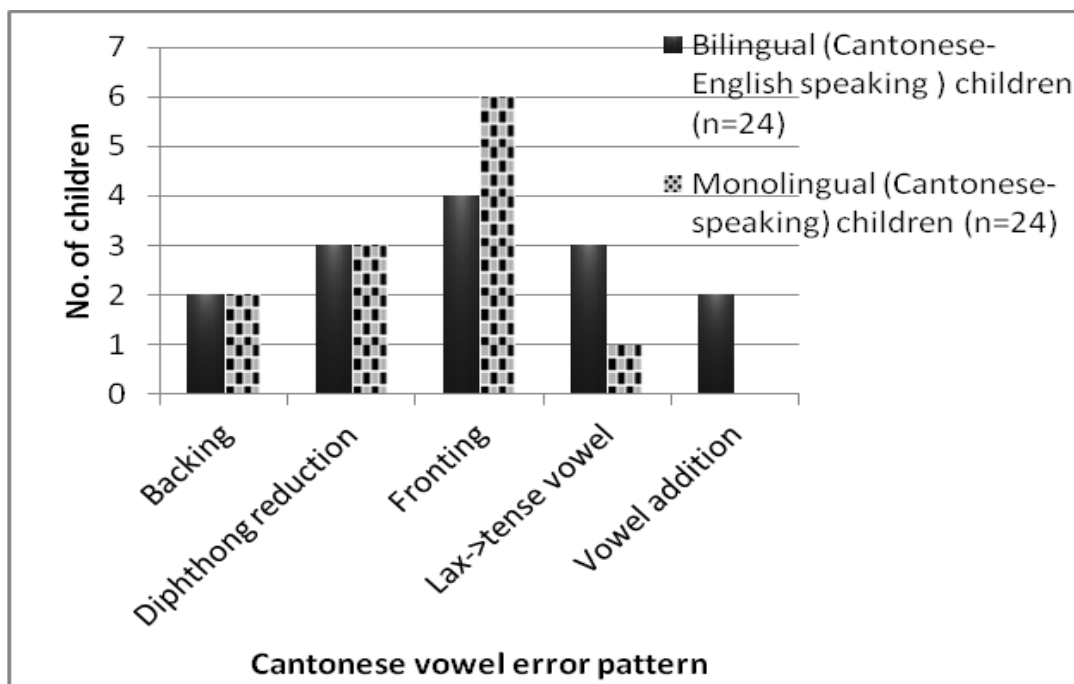


Figure 3. Prevalence of vowel error patterns in Cantonese in bilingual and monolingual children.

### **English phonological processes in bilingual children**

The English phonological processes observed in bilingual children are illustrated in Figure 4, 5 and 6. Similar to the analysis of Cantonese productions, a phonological process in English is considered as present in a child when it occurred at least twice in the English articulation test.

Figure 4 summarizes the English phonological processes at syllable-initial positions in Cantonese-English bilingual children. Cluster simplification, initial-consonant devoicing, gliding and stopping occur in the highest number of bilingual children.

For English phonological processes occurring at syllable-final positions, as seen from Figure 5, final-consonant devoicing and final consonant deletion are the most prevalent in bilingual children among all the syllable-final processes observed.

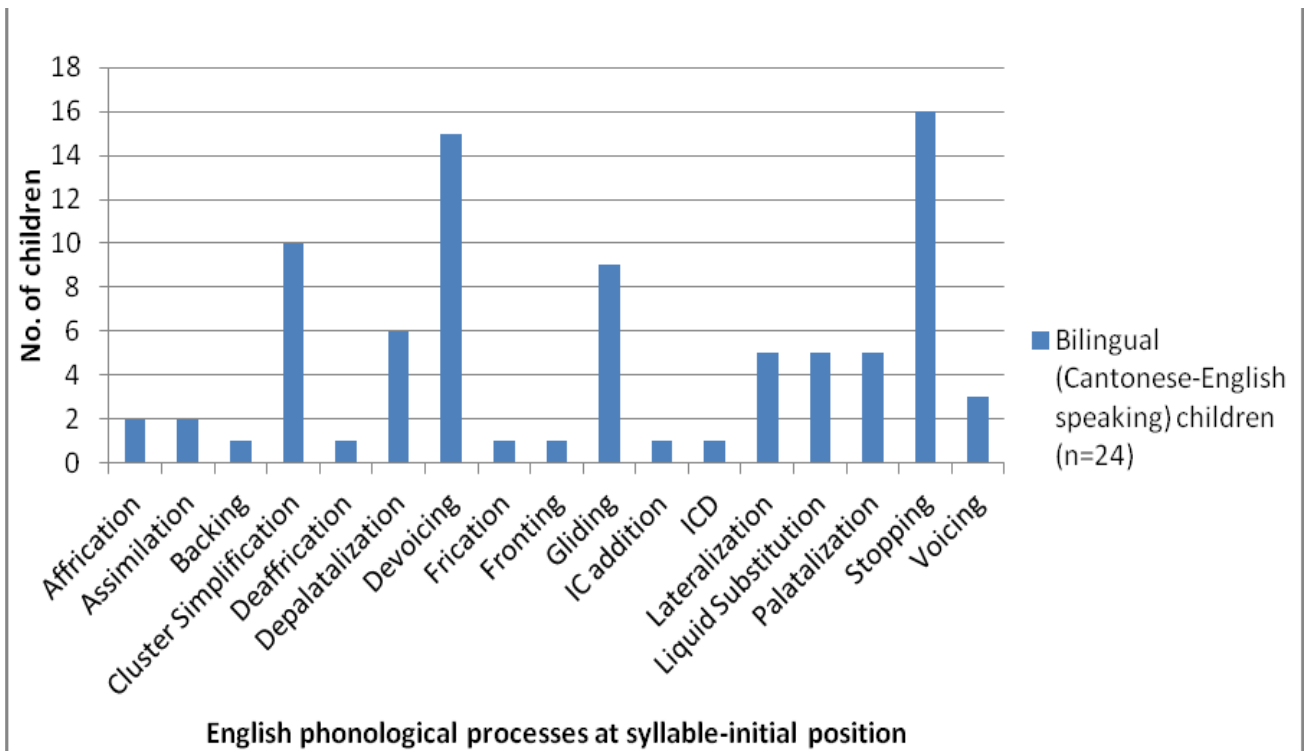


Figure 4. English phonological processes at syllable-initial positions in bilingual children

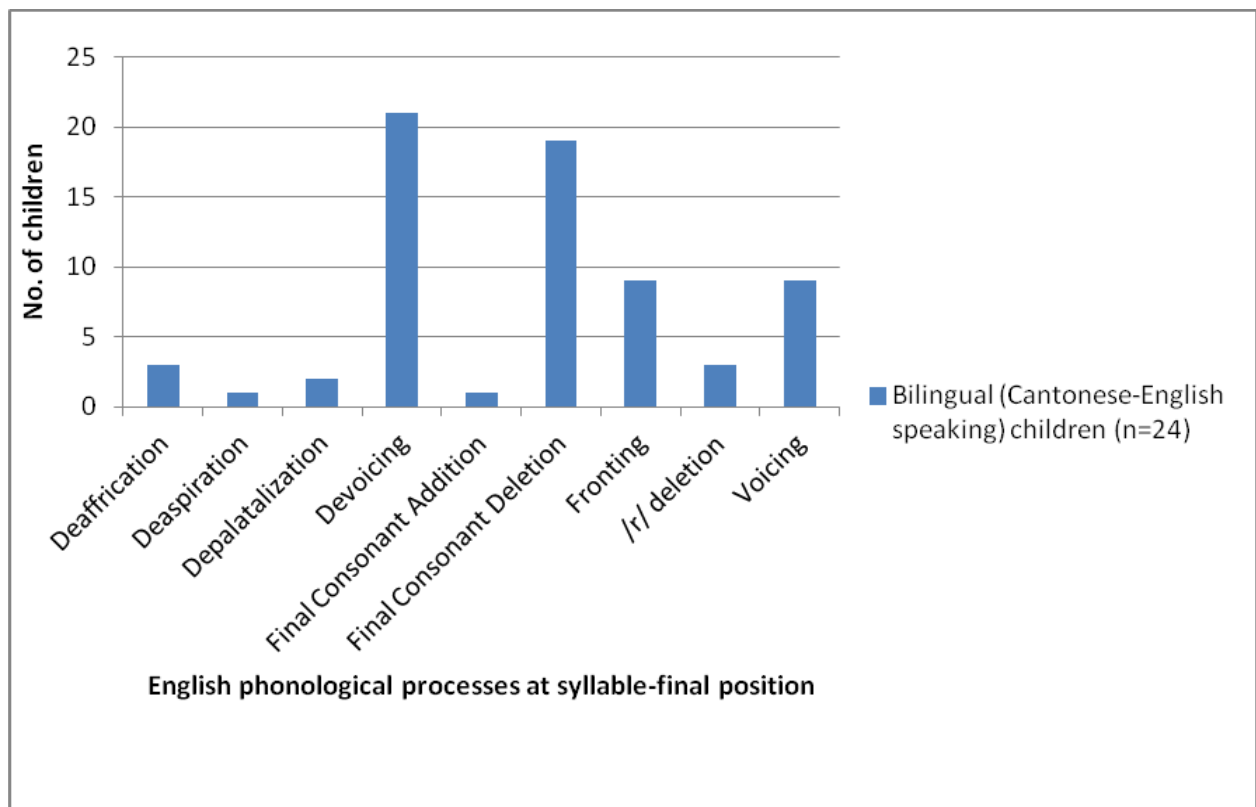


Figure 5. English phonological processes at syllable-final positions in bilingual children.



The vowel patterns observed in English production in bilingual children are detailed in Figure 6. Backing and fronting of vowels, together with derhoticization, occur in more bilingual children when compared to the other vowel error patterns. Both the substitution of lax for tense vowels and tense for lax vowels were observed in the English word productions of the bilingual children.

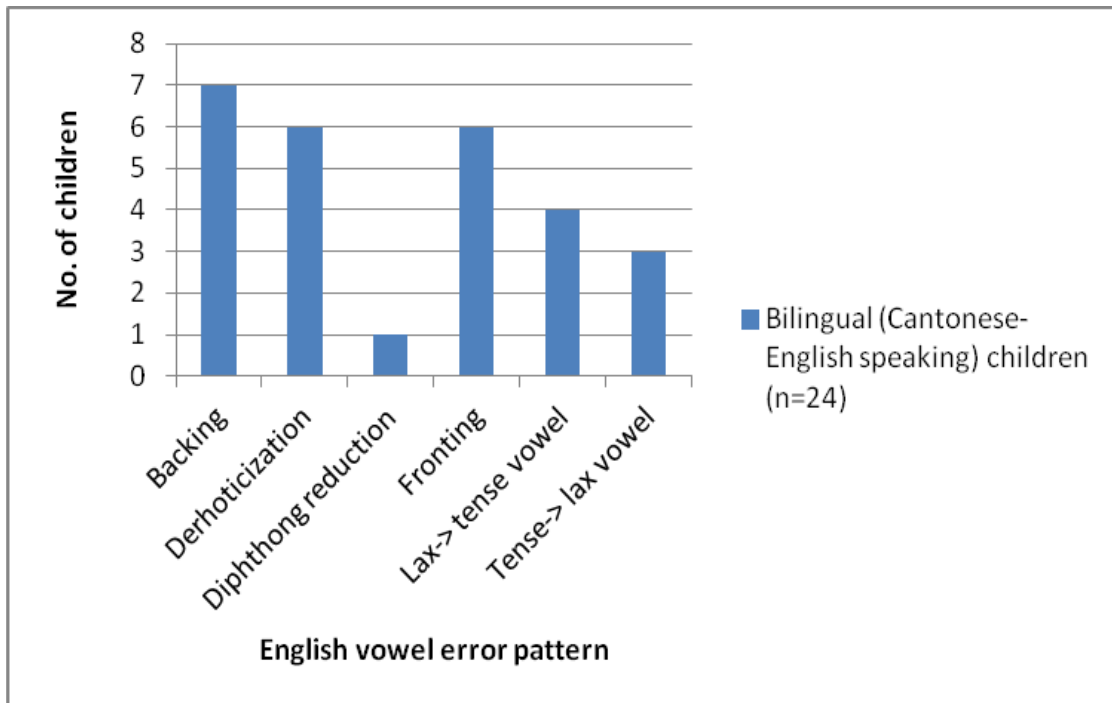


Figure 6. Vowel error patterns of English in bilingual children.

## Discussion

### *Cantonese phonological abilities of bilingual and monolingual children*

The first hypothesis of this study was that learning English would decelerate the phonemic acquisition of bilingual children as reflected from their phoneme accuracies. From the overall results of the standardized Cantonese phonology test, however, no significant differences were found between bilingual and monolingual children in terms of their phoneme accuracies and number of phonological processes in Cantonese. It might therefore be deduced that for bilingual children at the age from 4;0 to 4;11, then, no deceleration effect of exposure to English was evident on the phoneme accuracies of their native language. This rebuffed the first hypothesis made in this study that learning English would slow down the rate of phonological acquisition in bilingual children. Two reasons may explain for this observation. First, a deceleration effect of English exposure might never have existed on Cantonese in terms of phonological accuracies and number of phonological processes. The second possible reason is that at this age range, the Cantonese phonological systems of bilingual children had already developed so well that it had outgrown any deceleration effects that might exist in Cantonese before the age of four.

Comparing the above results with the studies on bilingual children learning other language pairs, it could be seen that the phonological skills of bilingual children are generally similar to those of their monolingual counterparts regardless of the types of languages they are acquiring. For instance, in the study of Goldstein and Washington (2001) on 4-years-old typically-developing bilingual children, no significant differences were found between the Spanish-English bilinguals and their Spanish and English monolingual counterparts in terms of the percentage of consonants correct, percentage of consonants for sound class correct and percentage of occurrence of phonological patterns. Similarly, in the

study of Lin & Johnson (2010) on 25 successive Mandarin-English bilingual children and 23 Mandarin monolingual children aging from 4 to 5-years-old in Taiwan, it was found that the bilinguals did not differ from their monolingual peers in Mandarin phoneme accuracy in a context where English is not the dominant language. It could therefore be put forward that bilingual children are able to maintain the rate of acquisition of both of their phonological systems as their monolingual counterparts, at least at the age range of 4 to 5-years-old. Also, it could be concluded that the rate of acquisition of speech sounds in both languages would not be affected even when the two phonological systems differ a lot on their phonological structures.

One point to note is that bilingual children tend to make more unusual vowel error patterns like substitution of lax vowels with tense vowels and substitution of tense vowels with lax vowels. This is most probably due to the greater number of vowels in the English phonetic inventory that leads to confusion of vowel usage in Cantonese productions. Further studies on the actual patterns of vowel errors and perhaps the use of acoustic analysis would be useful in understanding the use of vowels in bilingual children when compared to their monolingual counterparts.

### **Phonological processes in bilingual children**

***Cantonese phonological processes.*** For Cantonese phonological processes, the presence of initial consonant addition and the more prevalent delateralization and initial consonant deletion (ICD) in bilingual children than in monolingual children are consistent with the result from Holm & Dodd (2006), who suggested that the higher frequencies of these errors could reflect overgeneralizations of language-specific rules (in Cantonese, delateralization in certain syllable (e.g. /kw ɔ35/ (果)) and initial consonant deletion of /ŋ/ are acceptable).

English-influenced Cantonese productions are evident in the over-generalization of aspiration feature of final aspirated consonants in English to Cantonese productions, thus leading to the higher frequency of final consonant aspiration in bilingual children. On the other hand, processes that were only present in bilinguals, including voicing at syllable-initial positions, voicing at syllable-final positions and /r/ addition at syllable-final positions also indicated possible interference effect of transfer of English phonology to Cantonese phonology. This is because voicing contrast and the /r/ phoneme should only occur in English.

***English phonological processes.*** When compared to the normative data for English monolinguals from Dodd et al. (2003), bilingual children in the present study showed higher than expected occurrence of devoicing of consonants and stopping at syllable-initial positions.

For phonological processes at syllable-final positions, the exceptionally high occurrence of final consonant deletion, devoicing and voicing would probably be evidence of Cantonese-influenced English productions, and these English phonological processes in Cantonese-bilingual children happen to coincide with the high frequency phonological processes as seen in the English productions of Mandarin-English bilingual children (Lin & Johnson, 2010). Mandarin and Cantonese are both Chinese languages that share a lot in common in their phonological structures: both of them are tonal languages with monosyllabic structure. It is therefore not surprising to find similar observations in Cantonese-influenced and Mandarin-influenced English productions in bilingual children. For example, the lack of morphological complexity in Cantonese and Mandarin may have led to the frequent final consonant deletion in both Cantonese-English and Mandarin-English bilingual children. In Cantonese and Mandarin, there are no inflectional morphemes to

mark the tense in verbs or plurals in nouns. Rather, the tense or plurals are denoted by separated words put in front or after the main verb/ noun. Therefore, bilingual children learning Cantonese or Mandarin as their native language and English as second language tend to omit morphemes at the end of English words, which in turn contributed to the high frequency of final consonant deletion. The high percentages of final consonant devoicing, on the other hand, is probably due to the phonotactic constraints in Cantonese and Mandarin, as both of the Chinese languages do have voiced phonemes at word-final positions.

***Bi-directional transfer between Cantonese and English.*** From the observations of English-influenced Cantonese productions and Cantonese-influenced English productions, the theory of transfer (Paradis and Genesee ,1996) is evident between the Cantonese and English phonological systems in bilingual children. Furthermore, such transfer appeared to occur in a bi-directional manner, from English to Cantonese and also from Cantonese to English. As transfer was also found in previous literatures that studied on Cantonese-Putonghua and French-English bilingual children (So & Leung , 2006; Paradis and Genesee, 1996), it appeared that interaction effect of transfer between two phonological systems is not affected by the nature of languages that the children learn. Rather, transfer between languages can occur in bilingual children who learn any combinations of languages, no matter the language pairs are two Sino-Tibetan languages, two Indo-European languages or one Sino-Tibetan and one Indo-European language (as in the present study). However, as seen from some literatures, the degree and frequency of transfer happened to be smaller in bilingual children of certain language pairs. . For example, among the 24 Spanish-English bilingual children that Fabriano-Smith & Goldstein (2010) studied, 25% of them demonstrated bi-directional transfer. This figure is far less than the finding in the present study in which about 80% of the Cantonese-English bilingual children demonstrated bi-

directional transfer. This observation could possibly be explained by a linkage between the degree of transfer and the degree of similarity between the two phonological systems that the bilingual children acquire. With the fact that Spanish and English are both polysyllabic languages with complex stress patterns, it appears that when the two phonological systems share more similarities in term of phonetic inventory, syllable structure and stress patterns, the degree and frequency of transfer decreases.

### **Conclusion**

From the results of the present study, interactions did occur between the two phonological systems in Cantonese-English bilingual children. Although no deceleration or acceleration effect on Cantonese phoneme accuracies was found as the bilingual children acquire English as a second language, bi-directional transfer was evident in the Cantonese and English productions of the bilingual children. While the presence of interaction of transfer appeared not to be affected by the nature of languages that the children speak, as past studies on transfer all indicated at least some transfer from one language to the other, the degree and frequency appeared to be related to the degree of similarity between the two phonological systems that the bilingual children acquire.

### **Clinical implications**

The findings of the present study deepen our understanding of the interaction between Cantonese and English, especially on the relationship of bi-directional transfer between the phonology of the two languages when compared to bilingual children of other language pairs. Due to language-specific features in both of the languages, certain phonological processes that are regarded as atypical in monolingual children are likely to occur in a higher frequency in bilingual children. Speech therapists should be careful to take these

considerations into account when diagnosing between language disorders and language differences in bilingual children

### **Limitations and directions for further studies**

Even though the present research design attempted to minimize methodological and analytical errors by recruiting a group of Cantonese monolingual children as control subjects, no English monolingual counterparts growing up in a Cantonese-dominant context were included for comparison of English phonological abilities.

Further investigations should try to include monolingual counterparts of both languages in order to make more legitimate comparisons between bilinguals and their monolingual counterparts.

Furthermore, as the present study employed the cross-sectional design, a longitudinal research is suggested to investigate on any possible change of interaction or transfer patterns in bilingual children across different age ranges.

### **Acknowledgements**

I would like to express my deepest gratitude to Dr. Lydia So for her unconditional support and continuous guidance throughout the course of the dissertation. I would like to thank my classmates for their support and company, especially those whom we had gone through the ups and downs together in making this dissertation possible.

## References

- Anderson, R. T. (2004). Phonological acquisition in preschoolers learning a second language via immersion: a longitudinal study. *Clinical Linguistics & Phonetics*, 18, 183-210.
- Crystal, D. (1992) *A dictionary of linguistics and phonetics*. (4<sup>th</sup> ed.). Oxford: Blackwell.
- Dodd, B., Holm, A., Hua, Z., & Crosbie, S. (2003). Phonological development: a normative study of British English-speaking children. *Children Linguistics & Phonetics*, 17, 617-642.
- Dunn, L. M., Dunn, L. M., Whetton, C. & Pintilie, D. (1982). *British Picture Vocabulary Scale Short Form*. Berkshire: NFER-NELSON.
- Fabiano-Smith, L., & Goldstein, B. A. (2010). Phonological Acquisition in Bilingual Spanish-English Speaking Children. *Journal of Speech, Language & Hearing Research*, 53 (1), 160-178.
- Gass, S. M., & Selinker, L. (2008). *Second language acquisition: An introductory course*. New York: Routledge.
- Gildersleeve-Neumann, C. E., Kester, E. S., Davis, B. L., & Pena, E. D. (2008). English speech sound development in preschool-aged children from bilingual English-Spanish environments. *Language Speech and Hearing Services in Schools*, 39, 314-328.
- Goldman, R., & Fristoe, M. (2000). *Goldman Fristoe Test of Articulation-2* (Circle Pines, MN: American Guidance Service).
- Goldstein, B., & Kohnert, K. (2005). Speech, language, and hearing in developing bilingual children: current findings and future directions. *Language, Speech & Hearing Services in the Schools*, 36, 264-267.
- Goldstein, B., & Washington, P. S. (2001). An initial investigation of phonological patterns in typically developing 4-year old Spanish-English bilingual children. *Language, Speech & Hearing Services in the Schools*, 32, 153-164.



- Holm, A., & Dodd, B. (2006). Phonological development and disorder of bilingual children acquiring Cantonese and English. In Z. Hua & B. Dodd (Eds.), *Phonological development and disorders in children. A multilingual perspective* (pp. 286-325). Clevedon: Multilingual Matters.
- Lee, K. Y. S., Lee, L. W. F., & Cheung, P. S. P. (1996). *Hong Kong Cantonese Receptive Vocabulary Test*. Hong Kong: Child assessment Service.
- Lewis, M. P. (Ed.). (2009). *Ethnologue: Languages of the World* (16<sup>th</sup> ed.). Dallas, Tex.: SIL International.
- Lin, L. C., & Johnson, C. J. (2010). Phonological patterns in Mandarin-English bilingual children. *Clinical linguistics & phonetics*, 24, 369-386.
- Paradis, J. (2001). Do bilingual two-year-olds have separate phonological systems? *International Journal of Bilingualism*, 5, 19-38.)
- Paradis, J., & Genesee, F. (1996). Syntactic acquisition in bilingual children: Autonomous or interdependent? *Studies in Second Language Acquisition*, 18, 1-25.
- Pun, A. W. M. (2004). *The phonological patterns of bilingual (Cantonese-English) children*. Hong Kong: University of Hong Kong.
- So, L. K. H. (1993). *Cantonese Segmental Phonology Test*. The University of Hong Kong: Department of Speech and Hearing Sciences.
- So, L. K. H., & Leung, C. S. (2006). Phonological Development of Cantonese-Putonghua bilingual children. In Z. Hua & B. Dodd (Eds.), *Phonological development and disorders in children. A multilingual perspective* (pp. 286-325). Clevedon: Multilingual Matters.
- Tin, C. C. Y. (2005). *Description of bilingual phonology in Cantonese-English preschoolers*. Hong Kong: University of Hong Kong.

Valdés, G. (2001). *Learning and not learning English: Latino students in American Schools*.

New York: Teachers College Press.

## Appendices

### APPENDIX 1 *School consent form*

THE UNIVERSITY OF HONG KONG  
Faculty of Education

Dear Principal,

**Research Project on**  
**“Phonological Accuracy and Phonological Patterns in**  
**Cantonese-English Bilingual Children”**

As part of my B. Sc. Speech and Hearing Sciences degree I am required to conduct a small-scale study of my teaching. This will involve conducting a simple language screening test and an articulation test on each participant in the school. The assessment for each student will last for about half an hour. No risk will be induced on the student after participating in the research

According to the University’s policy on the ethical conduct of research, I am writing to ask your consent for these procedures.

I will make sure that the information students provide to me will be treated with the utmost confidentiality and anonymity. Students’ participation is voluntary. They have the right not to be included in my analysis, and if I find out that a student does not wish to be included, I will act according to that wish and not include the student. They can also choose to withdraw from the study at any time without negative consequences.

Data collected may be audio-taped with a sound recording pen and the records will be kept in password-locked storage device in a locked drawer and destroyed 5 years after completion of the study. Participants and their parents will have the right to review and erase the audio-recordings taken if they wish to do so. The information collected will only be used for the current dissertation after the dissertation grade has been approved.

If you agree to these procedures, please sign one copy of this letter and return it to me. If concerns arise about this aspect of my work, please feel free to contact me [name, contact no.], or Dr. Lydia So [email address]. If you have questions about your rights as a research participant, please contact the Human Research Ethics Committee for Non-Clinical Faculties, HKU (tel.2241-5267).

Yours sincerely,

April Cheng Ting Kwo  
Division of Speech and Hearing Sciences  
Faculty of Education  
The University of Hong Kong

Supervisor:  
Dr. So, Lydia K. H.  
Associate Professor  
Division of Speech and Hearing Sciences  
Faculty of Education  
The University of Hong Kong

### **Reply Slip**

I agree to the procedures set out above to facilitate Cheng Ting Kwo April to conduct the research project in my school.

Endorsed by:

Date:

\_\_\_\_\_ (dd/mm/yy)

\_\_\_\_\_  
(Signature)

Name of principal:

Name of kindergarten:

## Parent/Guardian Consent Form

9 Feb, 2012

Dear Parents,

I am April Cheng, a fourth year student studying Speech and Hearing Sciences at the University of Hong Kong. I will conduct a research project on the phonological accuracy and phonological patterns in Cantonese-English bilingual children and would like to invite 4 to 5-years-old kindergarten students to take part in the study. The study aims to find out the difference between the speech productions of Cantonese-English bilingual children when compared to Cantonese monolingual children.

Students who participate in this research will complete a simple language screening test and an articulation test at their own school during break times. The procedure will take around half an hour. No risk will be induced on the student after participating in the research and participants are allowed to withdraw anytime during the process without any negative consequences.

Data collected may be audio-taped with a sound recording pen and the records will be kept in password-locked storage device in a locked drawer and destroyed 5 years after completion of the study. You and your child can review and/or delete your records if you wish to do so.

Please complete the reply slip below to indicate whether you would allow your child to participate in this research. Your child's participation could greatly contribute to the research development of bilingual education in Hong Kong and would be mostly appreciated. Participation is entirely voluntary, and all information obtained will be used for research purposes only. If you have any questions about the research, please feel free to contact **April Cheng (Tel: )**. If you want to know more about the rights as a research participant, please contact the Human Research Ethics Committee for Non-Clinical Faculties, the University of Hong Kong (2241-5267).

Your help is very much appreciated.

Yours sincerely,

***Person-in-charge:***

***April Cheng Ting Kwo***

Division of Speech and Hearing Sciences

Faculty of Education

The University of Hong Kong

Supervisor:

Dr. So, Lydia K. H

Associate Professor

Division of Speech and Hearing Sciences

Faculty of Education

The University of Hong Kong

---

**Reply Slip**

Student Name: \_\_\_\_\_

Class: \_\_\_\_\_

Class No.: \_\_\_\_\_

I \*\* will / will not give permission for my child to participate in the research.  
(\* \*\* Please delete if inappropriate.)

Parent Name: \_\_\_\_\_

Parent Signature: \_\_\_\_\_

Date: \_\_\_\_\_

APPENDIX 3 Parent consent form (Cantonese version)

香港大學  
幼兒語音發展研究  
父母/監護人同意書

敬啟者：

本人是 香港大學言語及聽覺科學部的本科生，將在 北角衛理堂幼稚園幼兒園進行一項關於中英雙語發展兒童-音韻模式與準確性的學術研究，對象為四至五歲的學生。研究旨在探討雙語及單語發展的學童在廣東話及英語發音上的差異。是項研究將有助教育工作者理解雙語學生在語言方面的學習歷程及改善教學方法。

研究測試會於學校內進行。參與此研究的同學會在課堂時間完成一個簡單的語言測試及一個發音測試（共需時20分鐘）。參與的學生將不會承受任何風險，亦可於研究進行期間任何時候退出，而退出亦不會引起任何不利後果。

研究所收集的資料將會收錄於錄音筆，而所有記錄將會保存於設有密碼鎖的儲存裝置及存放於上鎖的抽屜內。所有資料及數據會於研究完成後五年內消毀。您和您的孩子將可以隨時提出審查/ 刪除任何有關的記錄。

請閣下填妥背後回條，以表示你是否同意 貴子弟參與是項研究。如你同意子女參與，煩請填寫附上的語言背景問卷調查，並將回條及問卷於 二零一二年 二月十日 前 交回學校。

希望閣下能對此研究給予支持，讓 蔽子弟參與其中。參與純屬自願性質，所有資料及數據只作研究用途。如閣下對是項研究有任何查詢，請與研究員鄭婷戈聯絡（電話：）。如閣下想知道更多有關研究參與者的權益，請聯絡香港大學非臨床研究操守委員會（電話：2241-5267）。

此致  
XXXXX幼兒園XX班 家長

負責研究員：  
香港大學教育學院  
言語及聽覺科學部本科生  
鄭婷戈

監督導師：  
香港大學教育學院  
言語及聽覺科學部副教授  
蘇周簡開博士

謹啟

二零一一年二月三日

家長回條

學生姓名：\_\_\_\_\_ 班別：\_\_\_\_\_

聯絡電話：\_\_\_\_\_

本人 \*\* 同意 / 不同意 子弟參與是項研究。  
(\*\*請刪去不適用者)

家長姓名：\_\_\_\_\_

家長簽署：\_\_\_\_\_

日期：\_\_\_\_\_

APPENDIX 4 Parent report on children's language status

**語言背景問卷調查**  
**Questionnaire on Language Background**

學生姓名 Name of Student \_\_\_\_\_ (中文) \_\_\_\_\_ (English)  
 年齡 Age \_\_\_\_\_ 歲 years-old  
 出生日期 Date of Birth \_\_\_\_\_ (dd/mm/yy)  
 性別 Sex \_\_\_\_\_  
 班別 Class (學號 Class no.) \_\_\_\_\_ ( )

請填妥以下問卷並於 二零一一年十二月十三日 或以前 交回學校班主任。

**Please complete the following and hand in to the form teacher as soon as possible.**

以下問題關於小朋友在日常生活所用的語言的分配情況。  
 問題並沒有“對”或“錯”。請如實填寫。  
 請在適合的方格填上“√”，不適用的問題請填上“X”。

The questions below are about the language in which your children talk to different people and the language in which certain people speak to your child.  
 Please answer as honestly as possible. There is no right or wrong answer.  
 Please tick in the appropriate box and put a cross if a question does not fit your child's position.

甲部. 小朋友用甚麼語言跟以下人士對話？

**Part A: In which language(s) does your child speak to the following people?**

	最常用廣東話 Always in Cantonese	用廣東話比英文 多 More Cantonese than English	平均地用兩 種語言 Use both languages evenly	用英文比廣 東話多 More English than Cantonese	最常用英文 Always in English
父親 Father					
母親 Mother					
兄弟姊妹 Brothers/sisters					
祖父母 Grandparents					
其他親戚 Other relatives					
鄰居 Neighbours					
老師 Teachers					
校內朋友 Friends in Classroom					
校外朋友 Friends outside school					
社區人士 Community					

乙部. 以下人士用什麼語言跟小朋友說話?

**Part B: In which language(s) do the following people speak to your child?**

	最常用廣東話 Always in Cantonese	用廣東話比英文多 More Cantonese than English	平均地用兩種語言 Use both languages evenly	用英文比廣東話多 More English than Cantonese	最常用英文 Always in English
父親 Father					
母親 Mother					
兄弟姊妹 Brothers/sisters					
祖父母 Grandparents					
其他親戚 Other relatives					
鄰居 Neighbours					
老師 Teachers					
校內朋友 Friends in Classroom					
校外朋友 Friends outside school					
社區人士 Community					

丙部. 小朋友進行以下活動時會用什麼語言?

**Part C: Which language does your child use for the following activities?**

	最常用廣東話 Always in Cantonese	用廣東話比英文多 More Cantonese than English	平均地用兩種語言 Use both languages evenly	用英文比廣東話多 More English than Cantonese	最常用英文 Always in English
看電視 Watching TV					
聽音樂 Listening to CDs					
聽收音機 Listening to Radio					
購物 Shopping					
打電話 Talking on the phone					
參加興趣小組 Taking part in clubs					

丁部. 其他事項

**Part D: Others**

*請圈出適用者.*

*Please circle the appropriate.*

1. 小童學習 中文 有多久? 從小在家裡接觸 / 自上學以後 / 其他 (請註明: \_\_\_\_\_)  
How long has your child been learning Cantonese?     
Has been using Cantonese at home/ only from school/ others (please specify: \_\_\_\_\_)  
請註明年數: \_\_\_\_\_  
Please indicate the number of years: \_\_\_\_\_
2. 小童學習 英文 有多久? 從小在家裡接觸 / 自上學以後 / 其他 (請註明: \_\_\_\_\_)  
How long has your child been learning English?     
Has been using Cantonese at home/ only from school/ others (please specify: \_\_\_\_\_)  
請註明年數: \_\_\_\_\_  
Please indicate the number of years: \_\_\_\_\_
3. 小童有沒有任何智力/ 聽覺/ 口肌 問題? 有 / 沒有  
Does your child have any cognitive/ hearing/ oro-motor complications? Yes/ No  
(如有, 請列明: \_\_\_\_\_ )  
(If yes, please specify: \_\_\_\_\_ )

- 問卷完 -

**End of Questionnaire**

感謝您的參與!

**Thank you for your support.**



**APPENDIX 5** *Items in Cantonese Segmental Phonology Test (So, 1993)*

No.	Stimuli	IPA	Word meaning
1	眼	/ŋan23/	Eye
2	襪	/mæt2/	Sock
3	脷	/lei22/	Tongue
4	鈕	/nœu35/	Button
5	餅	/pɛŋ35/	Biscuit
6	水	/sœi35/	Water
7	琴	/k <sup>h</sup> em21/	Piano
8	碗	/wun35/	Bowl
9	蕉	/tsiu55/	Banana
10	雞	/kœi55/	Chicken
11	檯	/t <sup>h</sup> œi35/	Table
12	裙	/kw <sup>h</sup> en21/	Dress
13	花	/fa55/	Flower
14	蘋果	/p <sup>h</sup> iŋ21 kwɔ35/	Apple
15	西瓜	/sœi55 kwa55/	Watermelon
16	刀	/tou55/	Knife
17	貓	/mau55/	Cat
18	魚	/jy35/	Fish
19	床	/ts <sup>h</sup> œŋ21/	Bed
20	巴士	/pa55 si35/	Bus
21	鴨	/ap3/	Duck
22	龜	/kwœi55/	Tortoise
23	筷子	/fai33 tsi35/	Chopsticks
24	鞋	/hai21/	Shoe
25	電話	/tin22 wa35/	Telephone
26	糖	/t <sup>h</sup> œŋ35/	Candy
27	腳板	/kœk3 pan35/	Sole
28	杯	/pui55/	Cup
29	洗面	/sœi35 min22/	Wash face
30	粥	/tsok5/	Porridge
31	耳	/ji23/	Ear

**APPENDIX 6** *Items in Goldman Fristoe Test of Articulation-2*  
(Goldman & Fristoe, 2000)

No.	Stimuli	No.	Stimuli
1	house, tree, window	18	fishing
2	telephone	19	chair
3	cup, knife, spoon	20	feather
4	girl, ball	21	pencils, this
5	wagon, shovel	22	bathtub, bath
6	monkey, banana	23	ring, finger, thumb
7	zipper	24	jumping
8	scissors	25	pajamas
9	duck, quack, yellow	26	flowers
10	vacuum	27	brush
11	watch	28	drum
12	plane	29	frog, green
13	swimming	30	clown, balloons
14	watches	31	crying
15	lamp	32	glasses
16	car, blue	33	slide
17	rabbit, carrot, orange	34	stars, five