Lexical Development
in Cantonese-English Bilingual Children

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Abstract

Abstract of thesis entitled:
Lexical Development in Cantonese-English Bilingual Children

This thesis investigates the lexical development in two Cantonese-English bilingual children, focusing on the developmental patterns of their nouns and verbs. In the literature, a controversial issue centres on whether the noun bias is universal in children's lexical development. Many researchers have found a noun bias in English and other languages, and attributed it to the advantage that the concepts encoded by nouns are easier and more salient for children. However, the noun bias was not observed in children acquiring languages like Mandarin and Cantonese, and some researchers have attributed this to properties of these languages including pro-drop which favour verbs. We conduct a longitudinal corpus-based study of two bilingual children in comparison with their monolingual counterparts, to address the issues of universality and language-specific effects of word category bias and cross-linguistic influence at the lexical level.

The findings show evidence that the noun bias is language-specific but not universal in the lexical development of children. A noun bias was consistently shown in English but not in Cantonese for both monolingual and bilingual children throughout the period of investigation from 1;06 to 3;00. In English, the proportion of nouns to nouns + verbs remained greater than 60% on average and nouns always developed faster than verbs. In contrast, whereas the proportion of nouns to nouns + verbs in Cantonese remained lower than that in English for the entire period of investigation. We argue that language-specific factors such as the licensing of null arguments and the lexicalization patterns of nouns and verbs can account for the

differences in the occurrence of noun bias in children's lexical development in English and Cantonese.

Evidence for cross-linguistic influence is also observed in the lexical development in Cantonese-English bilingual children. Their translation equivalents for nouns and verbs between English and Cantonese narrow the differences in the proportion of nouns and verbs between these two languages. In English, the bilingual children acquired proportionately more verbs than their monolingual counterparts. Having acquired many verbs first in Cantonese, a pro-drop language which favours verbs, facilitated the bilingual children's acquisition of the English equivalents of these verbs, leading to a decrease in the proportion of nouns to nouns + verbs in English. In Cantonese, the bilingual children had a greater proportion of nouns than their monolingual peers. Having acquired many nouns first in English, a non-pro-drop language which favours nouns, facilitated the bilingual children's acquisition of the Cantonese equivalents of these nouns, resulting in the increase in the proportion of nouns to nouns + verbs in Cantonese.

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摘要

本文研究兩位粵英雙語兒童的詞彙發展，當中以研究他們的名詞及動詞發展模式為主。在過往關於兒童詞彙發展的文獻中，很多學者均對於名詞傾向(noun bias)是否屬於普遍存在(universal)的現象，存着不少的討論。大部份學者於英語等語言中發現此名詞傾向，並認為是由於名詞概念對兒童而言較為明顯及容易掌握的緣故。然而，在普通話及粵語等語言中，學者並未能找出此名詞傾向，並認為原因是這些語言的結構特徵都比較強調動詞，例如代名詞省略(pro-drop)等。本文透過語料庫，追蹤性研究兩位粵英雙語兒童的詞彙發展，並把結果與相應的單語兒童作比較，從而討論詞類傾向的跨語言共性(universality)及語言特定(language-specific)的因素，以及在詞彙發展中的跨語言互動(cross-linguistic influence)。

本文的研究結果，顯示了在兒童的詞彙發展中，名詞傾向屬於語言特定(language-specific)的現象，而非所有語言的共性。在整段由1;06至3;00追蹤期之中，單語及雙語兒童的英語詞彙發展均持續地出現了名詞傾向的現象，而這現象並沒有在粵語中出現。英語的名詞比例平均維持在60%以上，英語名詞也發展得比動詞快。相反，在整段追蹤期之中，粵語的名詞比例均比英語的小。語言特定的因素(language-specific factors)，包括零論元是否被認可(licensing of null arguments)，以及名詞及動詞的詞彙化模式(lexicalization patterns of nouns and verbs)，能以解釋為何名詞傾向能在英語中找到，而不能在粵語中找到。

另外，本研究也發現粵英雙語兒童的詞彙發展中的跨語言互動(cross-linguistic influence)，他們粵英之間的名詞及動詞對應詞(translation equivalents)收窄了這兩種語言之間在名詞及動詞比例上的差異。英語方面，比例上，雙語兒童比單語兒童獲得更多動詞。由於粵語的語言結構特徵較強調動詞，因此雙語兒童首先獲得很多粵語動詞，這促使他們獲得這些動詞的英語對應詞

(English equivalents)，從而降低了其英語名詞比例。而粵語方面，比例上，雙語兒童比單語兒童獲得更多名詞。由於英語的語言結構特徵較重視名詞，因此雙語兒童首先獲得很多英語名詞，這促使他們獲得這些名詞的粵語對應詞(Cantonese equivalents)，從而提升了其粵語名詞比例。

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May I therefore end with an acknowledgement drawn from with the Bible: "Thanks be to God for his indescribable gift!" (2 Corinthians 9:15)

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List of Abbreviations

Adj	adjective
ASP	aspect marker
CHI	child
CHILDES	Child Language Data Exchange System
CL	classifier
CLAN	Computerized Language Analysis
de	possessive marker in Mandarin
DEL	delimitative aspect marker
DO	direct object
DUR	durative aspect marker
GEN	genitive marker
gwo3	comparative marker in Cantonese
INV	investigator
IO	indirect object
MCDI	MacArthur Communicative Development Inventory
N	noun
NEG	negation word
NP	Noun Phrase
Num	numeral
PFV	perfective (aspect marker)
PRO	pronoun
PROG	progressive aspect marker
RVC	resultative verb complement
SFP	sentence final particle
SOV	subject-object-verb
SVO	subject-verb-object
V	verb

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Chapter 1: Introduction

This thesis investigates the lexical development in Cantonese-English bilingual children in comparison with their monolingual counterparts, focusing on the developmental patterns of nouns and verbs. This chapter reviews the central issues on the development of nouns and verbs in the early vocabulary of children and the controversy on whether there is a noun bias in monolingual and bilingual children's early lexical composition. The importance of defining the categories of nouns and verbs and the criteria of "noun bias" in the studies of early lexical acquisition is then discussed. This chapter also addresses how cross-linguistic influence and language dominance may affect the bilingual children's early lexical composition in each language. After a brief discussion of these issues, the organization of this thesis will be presented.

1.1 The "noun bias" in early lexical development

It is commonly known that children acquire vocabulary at a remarkable speed, and researchers are particularly interested in the composition of their growing lexicon. Gentner (1982) observed that many more nouns than verbs are acquired by children speaking English, Japanese, Kaluli, German, Turkish, and Mandarin Chinese and proposed that there was a noun bias in the early vocabulary of children. A dominance of nouns was also reported in other studies investigating children's early vocabulary in English (Bates et al., 1994), Italian (Caselli et al., 1995), and Japanese (Ogura, Dale, Yamashita, Murase, & Mahieu, 2006). In light of these findings, Gentner (1982) argued that the noun bias is universal in early lexical acquisition because concepts of objects encoded by nouns are cross-linguistically more similar, easier, and more salient for children when compared to those encoded by verbs.

However, there is counter evidence that does not support the claim of a universal noun bias in children's early vocabulary. Tardif (1996) studied the early lexical development of Mandarin-speaking children, finding that most of the children produced more verbs than nouns. Choi and Gopnik (1995) found that although the proportion of nouns was greater than that of verbs in Korean-speaking children, the difference between these two was not statistically significant and it was much smaller than that in the English-speaking children. In light of these findings, Tardif (1996, 2006a, 2006b) suggested that language-specific factors including frequency of nouns and verbs in adults' input and saliency of verbs, rather than universal conceptual distinctions between nouns and verbs play a more important role in contributing to the (non-)occurrence of noun bias in children's early lexicon.

Conflicting results on the existence of noun bias in children's lexical development have been yielded by different studies investigating different target languages as shown in the previous literature. However, regardless of what the findings are, the interpretations of word category bias in children's early lexicon hinge on the distinction of word categories across languages, the definitions of categories of nouns and verbs in previous studies, and the criteria of "noun/verb bias" among researchers.

1.2 Definition of word categories

1.2.1 Differences in the distinction of word categories across languages

There are differences across languages in the inventory, membership, and definition of grammatical categories, especially for languages that are typologically divergent. One example is that of Korean verbs and their equivalent adjectives, particles and adverbs in English. In English, relational concepts such as location are expressed by particles (e.g. *up*, *down*) and adverbs (e.g. *there*, *here*), and concepts

about states are expressed by adjectives (e.g. *cold*, *hot*, *noisy*). However, these concepts are expressed by verbs in Korean. In this case, Korean contains many more different types of verbs than English. Differences in the membership of verbs in English and Korean have implications for the differences in the nature and extent of word category bias in the lexical composition between the children acquiring these two languages.

Another example is the distinction between verbs and adjectives in English and Cantonese. In English, the categories of verbs and adjectives are clearly distinguished by morphology and syntax, but in Cantonese, there is some overlap in their distribution (Francis & Matthews, 2005, 2006). For example, both can take aspect markers, appear in A-not-A form, take negation with *m4*, and take direct objects. If adjectives are also treated as verbs in Cantonese but they are excluded from the counting of verbs in English, then the proportion of nouns in Cantonese would surely be lowered while the proportion of nouns in English remains high, and the results would be skewed. In order to compare the results between English and Cantonese on an equal basis, the treatment of verbs and adjectives in Cantonese must be addressed and the distinction between these two must be clearly made.

1.2.2 Definitions of nouns and verbs

Apart from the differences in the word categories among languages, researchers have used different criteria in defining the categories of nouns and verbs, which also makes the comparison between studies difficult. As pointed out by Nicoladis (2001), researchers have relied on different definitions for the terms "noun" and "verb" and many have considered these two lexical categories as objects and actions respectively from the perspective of semantic criteria (e.g. Dromi, 1987). In such an approach, all the abstract nouns, action nouns, and non-action verbs are discounted. Moreover,

words like *comb* and *dress* are ambiguous in terms of word categories, as they can refer to either an object or the corresponding action. If only the semantic criteria are used, then the grammatical category of these words cannot be straight-forwardly determined. A better method for classifying words into categories should not only take the semantic meanings of the words into account, but it should also consider their morphological and syntactic characteristics and their distributional contexts. Placing too much reliance on any single characteristic will influence the extent to which a noun bias is found in early child vocabulary.

In addition, the results on the occurrence and extent of word category bias in early child vocabulary can also be affected by whether proper nouns are included in the category of nouns. Gentner (1982) grouped common nouns with proper nouns when investigating the composition of children's early vocabularies in English, Japanese, Kaluli, German, Turkish, and Mandarin Chinese. Results show that the ratio of nouns to all words reached 50% or above in all of these six languages, which led Gentner (1982) to conclude that these languages favoured nouns in children's early lexical development. However, when proper nouns are excluded in the counting of nouns, nouns constitute less than 50% of the total vocabulary in Kaluli and Mandarin Chinese. In other words, the noun bias in Kaluli and Mandarin Chinese claimed by Gentner (1982) is called into question. As pointed out by Erbaugh (1992) and Schieffelin (1990), proper names and kinship terms occur more frequently in the Chinese and Kaluli cultures and input available to children. From this point of view, frequency of occurrence of proper nouns is affected by extra-grammatical factors and inclusion of these words as nouns results in different patterns on the lexical composition of children speaking different languages.

In short, lack of consistent and comprehensive defining criteria of nouns and verbs among researchers makes it difficult to compare the early lexical composition

across languages. Therefore, in this thesis, I will consider the semantic criteria, distribution contexts, and the morphological and syntactic characteristics for determining the category of nouns and verbs in both English and Cantonese. Language-specific differences in the inventory, membership, and definition of nouns and verbs between English and Cantonese will be addressed on methodological grounds and discussed in detail in chapter 3.

1.3 Defining the "noun bias"

1.3.1 Criteria for "noun bias" in the acquisition literature

The definition of "noun bias" needs to be clarified and determined in the first place. However, there is no consensus among researchers regarding the defining criteria of "noun bias" in the literature. Some studies have defined "noun bias" as earlier emergence of nouns than verbs, whereas some have considered "noun bias" as the instantiation of a greater proportion of nouns than verbs and/or other word categories.

Kauschke and Hofmeister (2002) discussed two common views about "noun bias" among researchers. The first view is that if children acquire nouns earlier than verbs, then the noun bias exists in their lexical development. This definition draws attention to the developmental sequence of word categories in children's early vocabulary. For example, Gentner (1982) found the emergence of nouns before verbs in the lexicon of an English-speaking child from age 0;11 to 1;09, which led her to suggest that a noun bias was observed in early English. On the other hand, Choi and Gopnik (1995) compared the occurrence of noun and verb spurt to determine the developmental sequence of word categories in Korean-speaking children from 1;02 to 1;10. Results show that the mean age of the first verb spurt was 1;07.08 whereas that of the first noun spurt was 1;08.02 among the children. Moreover, six out of nine

children had the first verb spurt just before the first noun spurt. Therefore, it was suggested that no strong noun bias can be observed in early Korean.

Another widely-held view on "noun bias" focuses on the ratio of nouns to verbs and/or other word categories. If nouns constitute the majority proportion of children's lexicon, then children are considered to exhibit a noun bias in their lexical development. Regarding the noun quantity issue, researchers adopt different treatments. Some researchers adopt the criterion that if the number of nouns exceeds that of all other word categories in children's early lexicon, then this constitutes evidence for a noun bias in their lexical development. For example, Gentner (1982) reported that at least 50% of first words produced by children were nominals in English, German, Turkish, Kaluli, Japanese, and Mandarin Chinese. As nouns outnumbered all other word categories, Gentner (1982) concluded that children acquiring these languages show a noun bias, which is common across their early lexical development. On the other hand, for some researchers, as long as children produce more nouns than verbs, then they can be considered having a noun bias in their early vocabulary. For example, Liu (2007) compared the ratio of nouns to verbs in the lexicon of monolingual children speaking English, Cantonese and Mandarin in different age groups. Results show that all the children, regardless of their languages, produced more nouns than verbs before 2;00, whereas those speaking Mandarin and Cantonese began to produce more verbs than nouns from 4;00. There seemed to be an early noun bias in these three languages, but the initial noun bias in Mandarin and Cantonese eventually disappeared. Moreover, Dhillon (2010) showed similar results in his study on English-, Spanish- and Mandarin-speaking children. He found that the English- and Spanish-speaking children produced more nouns than verbs consistently throughout the period of his investigation while those acquiring Mandarin started to produce more verbs than nouns from 2;01. A robust noun bias was shown in English

and Spanish for all children, while a noun bias was observed in Mandarin only for children aged below 2;01 in Dhillon's (2010) study.

In short, the notion of "noun bias" means different things to different researchers, as shown in the results of their studies. Divergence in the definition of "noun bias" makes comparison across studies difficult. In order to compare the early lexical composition in different languages and the lexical development between bilingual children and their monolingual counterparts, consistent criteria for determining "noun bias" are needed.

1.3.2 Criteria for "noun bias" in this thesis

To recap, the following two different criteria in determining the "noun bias" among researchers were identified (Kauschke & Hofmeister, 2002, p.738), as discussed in section 1.3.1:

(1) Nouns are acquired earlier than verbs (and other word categories).
(2) There is a greater proportion of nouns than verbs (and other word categories) in children's early lexicon.

The first criterion concerns the developmental sequence of nouns in comparison with verbs and/or other word categories. Typically, the occurrence of a noun bias is identified by the relative order of emergence of nouns and verbs, or that of a noun and verb spurt. The second criterion concerns the proportion of nouns and verbs in children's lexicon. As shown in the studies of Dhillon (2010) and Liu (2007), there were changes in the extent of word category bias in children's lexical development, when the second criterion for "noun bias" was adopted. At the early stage of lexical development, both Mandarin-speaking and Cantonese-speaking children produced

more nouns than verbs; but at the end of the period of investigation, their verbs outnumbered their nouns. They underwent a process from noun bias to verb bias in their early lexical composition. However, such changes in their lexical composition throughout the period of investigation cannot be documented if the criteria defining "noun bias" are determined only by the first criterion for "noun bias". Moreover, studies adopting the first criterion focused only on the lexical development of children under age two, as mentioned in 1.3.1. According to Fenson et al. (1994), children have an average vocabulary size of 300 words by age two. After children have acquired the first 50 to 100 words, their lexical acquisition greatly accelerates as they start to acquire a large number of words every day (Dromi, 1987). From this point of view, it becomes difficult to determine whether nouns have an advantage over verbs for children beyond age two. In other words, the lexical development of these children cannot be further addressed by only sticking to the first criterion for "noun bias". In order to compare the lexical development of children at different ages, the second criterion for "noun bias" should be investigated.

To put it in simple terms, the relative order of emergence of nouns and verbs or that of a noun and verb spurt has to be considered, so that we can understand more about children's lexical development at the earliest stage. In order to investigate the changes in children's lexical composition over time, we also need to take the proportion of nouns and verbs into account. However, the children in this study were not young enough due to the limited availability of data in the corpus and many have already produced more than 10 noun types and 10 verb types in the first recording sessions. Further, due to inconsistency in the length and interval of recording sessions across children and corpora, some children in this study were found to have both noun and verb spurts in each recording session whereas neither noun nor verb spurts were

observed in some other children.[1] Neither the relative order of first emergence of nouns and verbs nor that of a noun and verb spurt can be determined and we, therefore, will not investigate the first criteria for "noun bias" in this thesis.

In this thesis, we will follow Miyata, Oshima-Takane, and Nishisawa (2003) for the second criterion: If the ratio of nouns to nouns + verbs is greater than 0.55, then this is taken as evidence for a noun bias in children's lexical development, whereas a ratio smaller than 0.45 means that there is a verb bias in children's lexical development. If the N/(N+V) ratio is between 0.45 and 0.55, then neither a noun bias nor a verb bias occurs. This criterion will be used in the present longitudinal study of children's lexical development up to age three and the changes in their lexical composition over time.

1.4 Issues in bilingual lexical development

Much of the research on bilingual children's lexical development has focused on whether they have one or two lexicons and how early they are able to produce two words of the same meaning from two different languages. Results of the previous studies show that most of the children could produce translation equivalents from very early on. Deuchar and Quay (2000) reported that an English-Spanish bilingual child already started to produce translation equivalents as early as 0;11. They also found that 44% of the total vocabulary of the English-Spanish bilingual child during the period from 0;10 to 1;10 were words with translation equivalents. Yip and Matthews (2008) found that two Cantonese-English bilingual children already used translation equivalents for nouns and verbs as early as in their first recording at 1;03 and 1;06

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[1] Here, Choi and Gopnik's (1995) definition of "noun/verb spurt" is adopted: When 10 or more new nouns/verbs are found in a recording session, then that session is considered to have a noun/verb spurt. Choi and Gopnik (1995) used this criterion to investigate the early lexical development in Korean-speaking children.

respectively. They also reported that the proportion of English nouns with Cantonese equivalents ranged from 44% to 67% where that of Cantonese nouns with English equivalents ranged from 16% to 30% for one of the bilingual children in the study. All these studies show that bilingual children are able to differentiate two lexical systems from very early on.

The lexical composition of bilingual children in their two languages has also been an issue of great interest among researchers. If the noun bias is universal, it is expected that bilingual children's two languages would start with a noun bias and the lexical composition of their two languages would be similar. But if the noun bias is language-specific, the composition of their two languages is expected to be different. Through studying the lexical composition of simultaneous bilingual children, especially those whose first languages are typologically different and unrelated, we can address the universality of word category bias in lexical development cross-linguistically.

Moreover, for bilingual children who are exposed to two languages simultaneously from birth, their frequency of exposure to each language is expected to be less than that of the monolingual counterparts. Previous studies have shown that cross-linguistic influence occurs in the domain of syntax in the bilingual first language acquisition. For example, Yip and Matthews (2007) found cross-linguistic influence in the domain of omission of objects, *wh*-interrogatives, relative clauses in bilingual children's English and dative constructions with *bei2* 'give' in their Cantonese. Wong (2010) found cross-linguistic influence from English in the development of verb directional complement constructions in Cantonese and cross-linguistic influence from Cantonese in the development of verb particle constructions in English for these bilingual children. Does cross-linguistic influence also occur in the domain of bilingual lexical acquisition? If cross-linguistic influence

does occur at the lexical level, will bilingual children behave differently from their monolingual counterparts in their lexical composition of the two languages? How will the extent of word category bias of bilingual children be different from that of the monolinguals in the early vocabularies?

Further, in most cases, bilingual children are not "balanced bilinguals" in the sense that they show language dominance in their development in one of the languages (Yip & Matthews, 2007), and their dominant language develops faster than their non-dominant one. Would the lexical developmental patterns of bilingual children dominant in one language be different from those with a different dominance pattern?

The issues regarding the lexical composition in the two languages of bilingual children are summarized as follows:

(i)   Do bilingual children start with a noun bias in their lexical development of both languages? Is the extent of their word category bias similar across languages?

(ii)   Does cross-linguistic influence occur in the lexical development between their two languages? In other words, do they perform differently compared to their monolingual peers in the lexical composition of each language?

Through the study of lexical development in Cantonese-English bilingual children, these issues will be addressed systematically.

1.5 Organization of the thesis

This thesis investigates the lexical development in Cantonese-English bilingual children. Specifically, the lexical composition in their English and Cantonese, which are typologically unrelated and structurally different, will be compared so that the

issue of universality can be addressed. The developmental patterns in the bilingual lexicons will be compared with their monolingual counterparts in order to see whether cross-linguistic influence occurs at the lexical level. Moreover, an English-dominant child and a Cantonese-dominant bilingual child will be compared in this study, in order to see whether language dominance affects their lexical development.

The main issues of lexical development in bilingual children are discussed in sections 1.1 to 1.4. The remainder of this thesis is organized as follows.

In Chapter 2, previous studies investigating the lexical development of monolingual and bilingual children are reviewed. In particular, the views put forward by Gentner (1982) and Tardif (1996, 2006a, 2006b) regarding the universality of noun bias and the studies that argue for and against "universal noun bias" are critically examined. The strengths and the weaknesses of these studies in terms of methodology are discussed. To address whether noun bias is universal, we point out the need to conduct longitudinal cross-linguistic studies using naturalistic data in comparing monolingual and bilingual children. The research questions addressed in this thesis are presented at the end of Chapter 2.

In Chapter 3, the hypotheses and methodology that are adopted for this thesis are presented. The research hypotheses are formulated based on the universal distinction between the concepts encoded by nouns and verbs and differences between Cantonese and English in terms of language structures and saliency of word categories. Predictions on the lexical composition of bilingual children in comparison with the monolingual peers in each language are made. Background information of the two bilingual children and their monolingual counterparts are presented. The procedures of data analysis and the criteria for determining nouns and verbs in Cantonese and English in this thesis are also discussed.

In Chapter 4, the findings on the lexical composition of the bilingual children's

English and Cantonese are reported. The frequency of nouns and verbs based on the number of word types and word tokens, their proportion of nouns to nouns + verbs in terms of word types as well as their cumulative development of nouns and verbs are presented. The results for the bilingual children are compared with their monolingual counterparts in each language, and the translation equivalents for nouns and verbs produced by the bilingual children are investigated so that the issue of how cross-linguistic influence affects the bilingual children's lexical development can be addressed. The characteristics of lexical composition in the bilingual children's English and Cantonese are compared and language-specific factors for word category bias in children's lexical development are discussed. Moreover, the morphological and syntactic markings used for nouns and for verbs by each bilingual child in each language are also examined so that we understand whether they can make distinctions between the categories of nouns and verbs in both languages throughout the investigation.

Finally, in Chapter 5, I conclude the thesis by summarizing the main findings and reiterating the significance of these findings. Some suggestions are also made for future research on lexical development in bilingual children.

Chapter 2: Issues in Early Lexical Development

In this chapter, I will discuss the issues regarding the notion of universal noun bias and review the supporting and opposing views. In particular, the views and findings of Gentner (1982) and Tardif (1996) will be carefully examined. I will critically review the previous studies in the lexical acquisition of monolingual children that support the universality of noun bias and those that do not. I will then turn to the cross-linguistic studies comparing the lexical development in monolingual children speaking different languages over a extended period of time. Finally, I will discuss the importance of studying lexical development in bilingual children longitudinally with regard to the issue of universal noun bias, and review some related bilingual studies. The research questions will be formulated and presented at the end.

2.1 Gentner's (1982) claim: The noun bias is universal

A number of studies have investigated whether noun bias is universal or not in children's early vocabulary development. The controversy of "noun bias" arises because a number of studies have reported that children's first words are primarily nouns (e.g. Macnamara, 1972; Nelson, 1973; Gentner, 1978; Bates et al., 1994; etc.) while a number of studies have not (e.g. Choi & Gopnik, 1995; Tardif, 1996; Leung, 1998; etc.). Among the studies in support of noun bias, the most influential one is that of Gentner (1982). Gentner (1982) proposed two hypotheses to explain why children acquire many nouns but few verbs in their early vocabularies: the Natural Partitions Hypothesis and Relational Relativity Hypothesis.

2.1.1 Natural Partitions Hypothesis

Gentner (1982) proposed the Natural Partitions Hypothesis to explain why there

is a noun bias in children's early vocabulary (Gentner, 1982). According to this hypothesis, the clear distinction between nouns and verbs comes from their very different conceptual bases. Nouns encode concrete concepts such as persons and things while verbs encode predicative concepts such as activities, actions, casual relations, and change-of-state. As noun categories are universal, natural, and easy, children only need to find out the mapping between words and concepts in order to acquire nouns. However, verb categories are more language-specific and the mapping between words and concepts is more complex for verbs and other categories. Children must have some language input first before learning verb meanings. Therefore, it usually takes longer for children to acquire verb categories.

In short, concepts of objects are easier than concepts of actions or states in children's minds. The concepts encoded by nouns are also simpler, easier, and more basic than those corresponding to verbs, prepositions and other grammatical categories. Such a distinction between nouns and verbs is universal across languages. Thus, children acquire nouns earlier than verbs and a noun bias is found in children's early vocabularies cross-linguistically.

2.1.2 Relational Relativity Hypothesis

Apart from the Natural Partitions Hypothesis which explains why nouns are acquired early and become dominant in children's vocabulary, Gentner (1982) also proposed the Relational Relativity Hypothesis to explain why the children acquire verbs later than nouns cross-linguistically. According to the Relational Relativity Hypothesis, the meanings of relational terms, including verbs and prepositions, are cross-linguistically more variable than those of nouns because there is more variation in the mapping from concepts to relational terms than from concepts to nouns (Gentner, 1982; Gentner & Boroditsky, 2001). Cross-linguistically, nouns refer to

naturally individuated referents and their meanings are more stable. Gentner (2006) pointed out that such individuated referents can be found to exist only for nouns but not for verbs. On the other hand, different languages select different information to convey the meanings of verbs (Talmy, 1975, 1985). Thus, the verb meanings are more variable. As children need to discover how their language combines different elements of concepts into verb meanings, it takes longer for children to acquire verbs and they therefore acquire verbs later than nouns.

2.1.3 Gentner's study of monolingual children acquiring six languages (1982)

In order to determine whether these two hypotheses can account for early vocabulary acquisition in children, Gentner (1982) investigated the vocabulary development in an American English-speaking child from age 0;11 to 1;09. The words produced by the child were categorized into four types according to the word meaning: nominal terms, predicate terms, expressive terms, and indeterminate terms. Nominal terms are those terms that have the function of object reference, including common and proper nouns, while predicate terms are those that encode actions, change of state, and other predicate notions, including verbs, prepositions, and modifiers.

Gentner (1982) reported that during the period from 0;11 to 1;04, 11 out of the English-speaking child's 13 words were nominal terms such as *dog*, *duck*, and *daddy*. Only one predicate term *yuk* was produced. During the period from 1;06 to 1;07, 19 out of the 31 new words he produced were nominal terms such as *cow*, *truck*, and *kitty*, and 4 were predicate terms such as *hot*, *happy*, and *down*. The child also produced the first expressive terms such as *oops*, *hi*, and *bye* only at 1;07. Across the age span under observation, 41 out of the 60 words he produced were nominal terms, mainly consisting of names for objects, things and individuals, 9 were predicate terms and 5 were expressive terms. Similar results were also reported in monolingual

English-speaking children studied by Greenfield and Smith (1976), Huttenlocher (1974) and Nelson (1973).

Moreover, Gentner (1982) also found similar patterns in monolingual children acquiring other languages such as German, Turkish, Kaluli, Japanese, and Mandarin Chinese. Among the first words they produced, around 50% to 85% were nominal terms, which clearly outweighed the predicate terms and expressive terms. The nominal terms mainly consisted of names for individuals, objects and entities such as *mommy*, *baby*, *dog*, *milk*, and *ball*.

In short, the results of all these studies are consistent with both the Natural Partitions Hypothesis and the Relational Relativity Hypothesis. Nominal terms dominate the first words produced by the children while predicate terms, including verbs, come later. The frequency of nominal terms produced by the children is also much higher than that of predicate terms across the age span. This phenomenon found across children speaking English, Japanese, Kaluli, German, Turkish, and Mandarin Chinese led Gentner (1982) to conclude that the early noun bias is universal and the perceptual-conceptual distinction between objects and predicates explains why children acquire nouns before the other categories and why nouns dominate their first words.

2.1.4 Gentner and Boroditsky's study of Navajo-speaking children (2009)

Navajo is an Athapaskan language. The verbs in Navajo are heavily inflected. The verb affixes always come before the verbs, thus the root of a verb always occurs at the salient word-final position. On the other hand, many nominal affixes are suffixes. The root of nouns occurs at word-initial position, which makes them more difficult to perceive within the surrounding word (Watson, 1976). As Navajo is an SOV language, verbs always occur at salient sentence-final position and as verbs

incorporate all the obligatory pronominal prefixes, verbs can stand alone as sentences in Navajo. So, verbs are considered to be more salient than nouns in this language. Gentner and Boroditsky (2009) invesstigated whether Navajo-speaking children still had an early noun bias in their lexical development. They looked at the lexical composition of five Navajo-speaking children aged between 1;06 and 2;02 who were raised in monolingual environment, using a Navajo vocabulary checklist modified from the MacArthur Communicative Development Inventory for Infants (MCDI) (Fenson et al., 1993, 1994). The children's caregivers were asked to indicate whether the children understood the words on the checklist and whether they spontaneously produced the words or not. Three of the caregivers were also asked to provide any words that the children had produced spontaneously that were not included on the checklist.

Results show that all the Navajo-speaking children produced more nouns than verbs. The mean noun-verb ratio was as high as 3.26:1 overall, even though many descriptive terms and adjectival expressions were counted as verbs. Among these five children, four produced nouns more than word categories other than verbs. On the other hand, the greater the vocabulary size, the greater the proportion of verbs are produced. For the child whose vocabulary size is less than 50 words, the proportion of verbs is 15%. For the child whose vocabulary size exceeds 205 words, the proportion of verbs reaches 30%. But still, the proportion of nouns exceeds 40%, which is higher than that of verbs.

Such results provided strong evidence for an early noun advantage in the lexical development of Navajo, a language in which verbs seem to be more salient than nouns. Early acquisition and dominance of nouns supports the Natural Partitions Hypothesis while increase in the proportion of verbs with growth in vocabulary size supports the Relational Relativity Hypothesis.

2.1.5 Other studies of monolingual children in favour of the noun bias

A number of studies investigating the lexical development of monolingual children speaking different languages also support Gentner's (1982) universal noun bias. Bates et al. (1994) studied the lexical composition of 1,803 English-speaking children aged between 0;08 and 2;06. The caregivers of these children were instructed to fill in the MacArthur Communicative Development Inventories (MCDI) (Fenson et al., 1993, 1994) to indicate the words that children both understand and produce. Common nouns, predicates (verbs and adjectives), and closed-class items were counted. In counting of common nouns, names for people and places were excluded. Results show that the children acquired common nouns earlier than the other word categories. Common nouns developed rapidly at the early stages of language development. The proportion of common nouns increased from 16.4% for children whose vocabulary size was 5 words or below, to 55.2% for those whose vocabulary size reached 200 words. This proportion decreased slightly to 41.9% as the children's lexicon continued to expand. Overall, nouns remained the largest category in their vocabulary.

Such a noun bias is also observed in the early vocabulary of Italian-speaking children. Using the MCDI (Fenson et al., 1993, 1994), Caselli et al. (1995) compared the vocabulary composition of 195 Italian-speaking children with the 659 English-speaking children whose age was between 0;08 and 1;04 in Bates et al.'s (1994) study. Results show that the distribution of word categories in the vocabulary of Italian-speaking children is similar to that in English-speaking children. 82% of words produced by the Italian-speaking children were nominals and most of these were common nouns. Moreover, the larger the children's vocabulary size, the greater the proportion of common nouns. For children whose vocabulary size was below 10

words, the proportion of common nouns in their productive vocabulary was smaller than 30%. But for children whose vocabulary size reached more than 50 words, the proportion of common nouns increased greatly to 46.2%. Again, an early noun bias is found in Italian-speaking children's lexical development.

Au, Dapretto and Song (1994) also reported a noun bias in the early vocabulary of Korean-speaking children. The age of the Korean-speaking children studied was between 1;03 and 2;01. Au et al. (1994) used a vocabulary checklist which contained nouns and verbs frequently found in children to check whether these children produced more nouns than verbs. Three studies, each of which used a different version of the checklist, were carried out. Regardless of which version was used, all the studies showed that Korean-speaking children tended to produce many more nouns than verbs. The median noun-verb ratio among Korean-speaking children was 3.9:1 in the first study, 1.7:1 in the second study and 4:1 in the third study.

An early noun bias is also found in monolingual Japanese children. Miyata, Oshima-Takane, and Nishisawa (2003) studied the lexical development of four Japanese-speaking children longitudinally from 1;02 to 2;00. Their spontaneous speech samples were collected once every two months. Common nouns and verbs were counted, and the N/(N+V) ratio was calculated. Results show that three of the children had a noun bias in their early vocabulary. The N/(N+V) ratio among all children exceeded 0.6, and for one child, such ratio was greater than 0.9. In addition, Ogura et al. (2006) studied the lexical composition of 31 Japanese-speaking children between 1;00 and 2;00. Their natural interactions with their mothers were videotaped. Results show that nouns dominated the lexicon for those children at one-word stage. Their N/(N+V) ratio was as high as 0.85. These researchers concluded that Japanese-speaking children start with a noun bias in their earliest lexical development.

2.2 Tardif's (1996) claim: The noun bias is language-specific

Although many studies have shown the noun bias in the lexicon of children acquiring a number of languages, some studies, contrary to Gentner's (1982) claim, find that children's early lexicons are not dominated by nouns. In other words, the noun bias is language-specific but not universal. Among these studies, two studies by Tardif (1996, 2006b) are the most influential and significant.

2.2.1 Tardif's studies of monolingual children acquiring Chinese languages (1996, 2006b, 2008)

Tardif (1996) studied the lexical composition in ten Mandarin-speaking children aged between 1;08 and 1;10. The natural interactions between these children and their caregivers were audiotaped and transcribed. Common nouns and verbs were counted in terms of word types and word tokens.
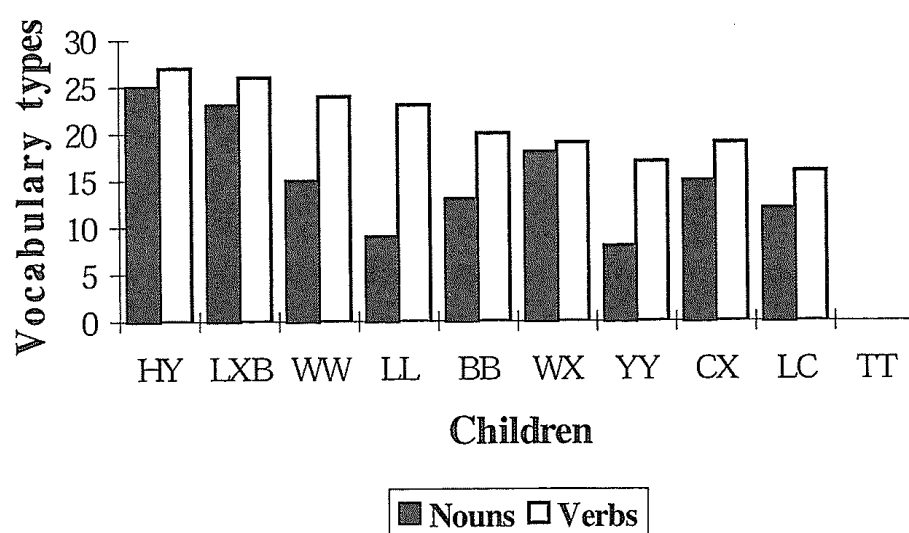
Figure 2.1 Nouns and verbs in Mandarin-speaking children's early vocabularies in Tardif's (1996) study

(adopted from Tardif, 2006a)

As can be from Figure 2.1, nine out of ten children produced more verb types than noun types, regardless of the size of their vocabulary and whether proper names

21

were included in the counting of nouns. Moreover, half of the children produced more verb tokens than noun tokens. In short, verbs were the most dominant category in the early lexicon of the ten Mandarin-speaking children under investigation. This is the first study of Mandarin-speaking children showing that children's early vocabularies are not dominated by nouns.

Moreover, Tardif (2006b) re-examined the data of ten Mandarin-speaking children aged between 1;08 and 1;10 in Tardif's (1996) study, and found that they were able to distinguish verbs from nouns at an early stage. Tardif (2006b) analyzed all the child utterances containing one of the five most frequent action verbs (*na2* 'grab', *zuo4* 'sit', *chi1* 'eat', *da3* 'hit' and *zou3* 'walk/go') or one of the five most frequent object nouns (*che1* 'car/vehicle', *qiu2* 'ball', *mao1* 'cat', *bi3* 'pen' and *deng1* 'light').

Table 2.1 Syntactic markings on target words in child Mandarin (Tardif, 1996)

	Object nouns	Action verbs
Bare form	112 (58.9%)	259 (24%)
Uncodable	41 (21.6%)	52 (4.8%)
(Num) + (CL) + target	28 (14.7%)	0
PRO/Proper name + *de* + target	3 (1.6%)	0
NEG + target	2 (1.0%)	139 (12.9%)
Target + aspect	0	36 (3.3%)
Target + RVC	0	5 (0.05%)
Total tokens	190	1,077

(adopted from Tardif, 2006b)

As shown in Table 2.1, the syntactic markings for nouns and for verbs did not overlap for many children. They all used noun modifiers such as [Numeral-Classifier] phrases and possessive phrases to modify nouns but not verbs. The verbs but not the nouns occur with aspect markers and resultative verb complements. From this point of view, the Mandarin-speaking children were able to make noun-verb distinctions by

using these modifiers discriminately at a very early stage.

In addition to the observational data, Tardif and her colleagues also used the MacArthur Communicative Development Inventories (MCDI) (Fenson et al., 1993, 1994) to investigate early lexical acquisition in Chinese-speaking children (Tardif et al., 2002, as cited in Tardif, 2006a). In this study, the lexical composition in the early vocabularies of approximately 1,600 Mandarin-speaking children and 1,600 Cantonese-speaking children aged between 0;08 and 2;06 was examined, in comparison with approximately 1,600 English-speaking children. As can be seen from Figure 2.2, both Mandarin- and Cantonese-speaking children produced their first verbs as early as the first nouns, and they had proportionately fewer nouns and more verbs than their English-speaking children, regardless of their total vocabulary size.
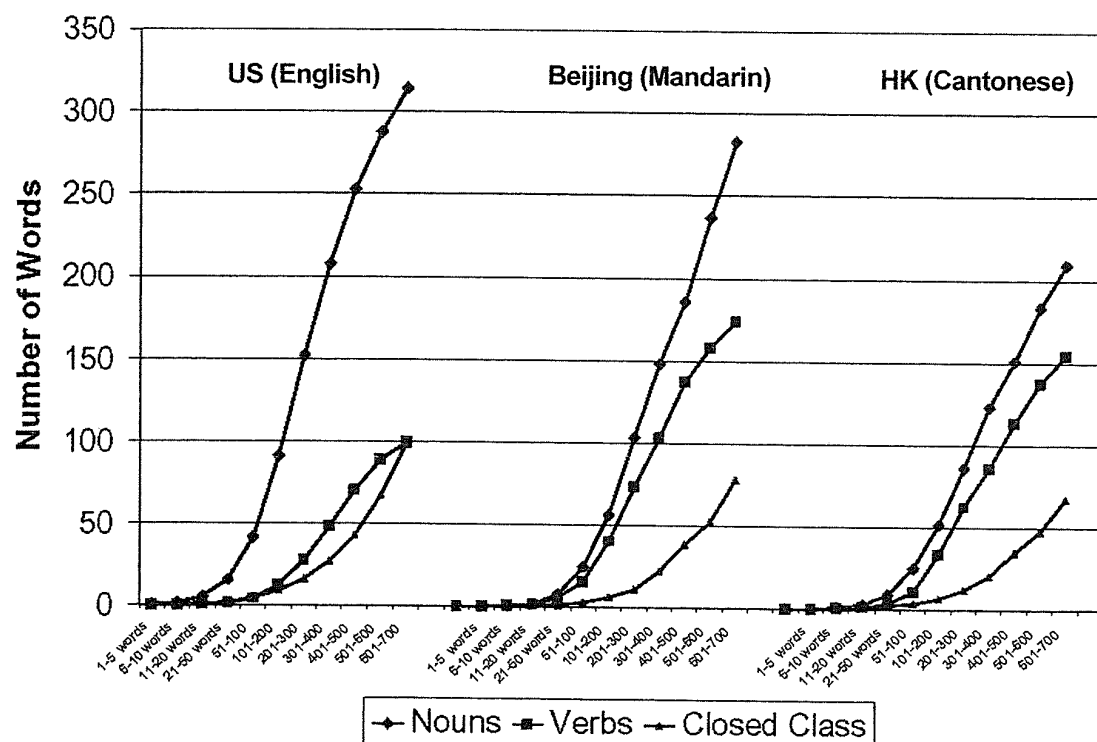
Figure 2.2 Mean number of common nouns, action verbs, and closed class items from infant and toddler samples in norming studies of the English, Mandarin, and Cantonese MacArthur Communicative Development Inventories, by total vocabulary size

(adopted from Tardif, 2006b)
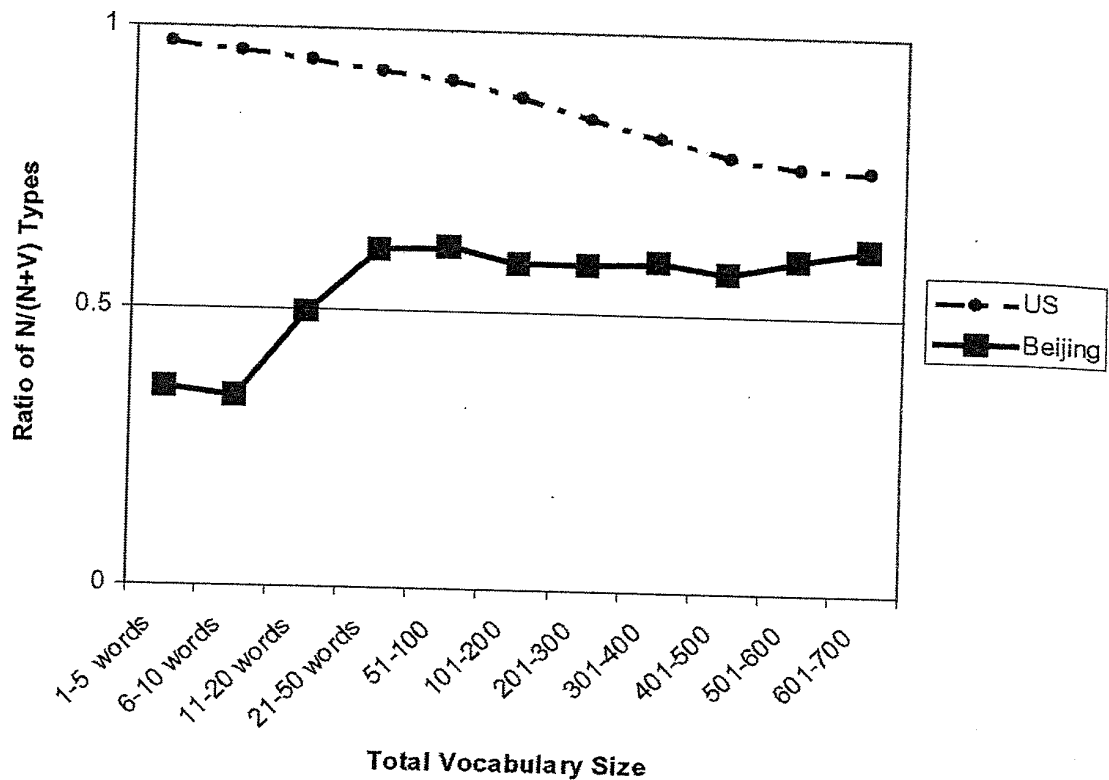
Figure 2.3 Mean ratio of N/(N+V) for English- and Mandarin-speaking children in MCDI norming samples, by total vocabulary size

(adopted from Tardif, 2006b)

As shown in Figure 2.3, for Mandarin-speaking children having more than 50 words, their mean ratio of nouns to nouns + verbs was around 0.6, while the ratio for the English-speaking children was greater than 0.75. The equivalent ratio for the Mandarin-speaking children having less than 20 words was even smaller than 0.5. In addition, by 24 months of age, more than 80% of the Mandarin-speaking children had started to combine words, and about 50% of the children had produced at least one syntactic marker for nouns and verbs, as can be seen in Figure 2.4.
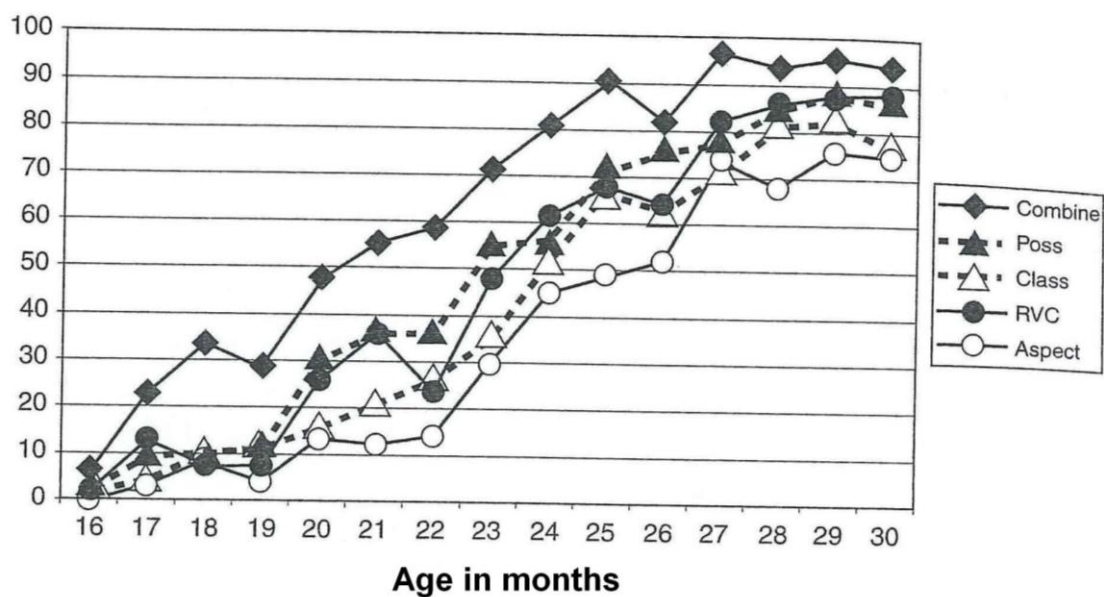
Figure 2.4 Proportion of Mandarin-speaking children reported to "sometimes" or "often" combine words and use syntactic markers for nouns (possessive and classifiers) and verbs (resultative verb complements and perfective aspect marker *le*) from ages 16 to 30 months in Beijing MCDI norming study

(adopted from Tardif, 2006b)

In short, Tardif (2006b) argued that unlike English-speaking children, the vocabulary development of Mandarin-speaking children did not start with an early noun bias. Instead, verbs have primacy in Mandarin-speaking children's lexical development.

Further, Tardif et al. (2008) investigated the first words produced by the children who were reported to have one to ten words in the MCDI norming samples in Tardif's (2006b) study. The first ten words of 265 English-speaking children, 336 Mandarin-speaking children, and 369 Cantonese-speaking children, all of whom aged between 0;08 and 1;04, were examined. Results show that the mean proportion of common nouns was 19.4% and that of verbs was 0.7% for English-speaking children, while such percentages were 3.2% and 7.0% in Mandarin-speaking children and 5.7% and 4.8% in Cantonese-speaking children respectively. Moreover, the children included in Tardif et al.'s (2008) study were divided into three groups according to

their vocabulary size: 1-3 words, 4-6 words, and 7-10 words. Based on these MCDI samples, the probabilities of children producing at least one common object noun or one action verb in each vocabulary size group were computed and compared across languages.
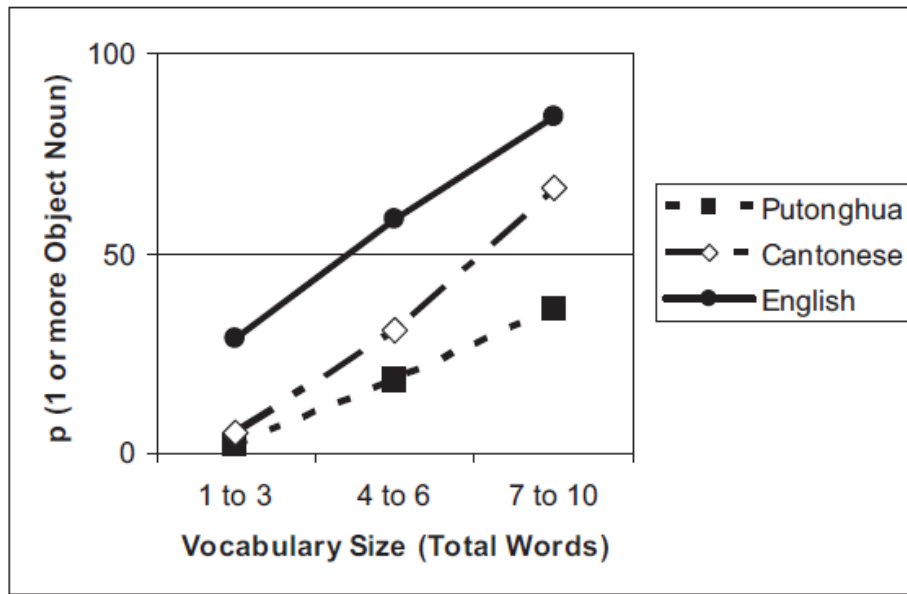
Figure 2.5 Probability of one or more common object nouns in child's total vocabulary, by language and vocabulary size

(adopted from Tardif et al., 2008)
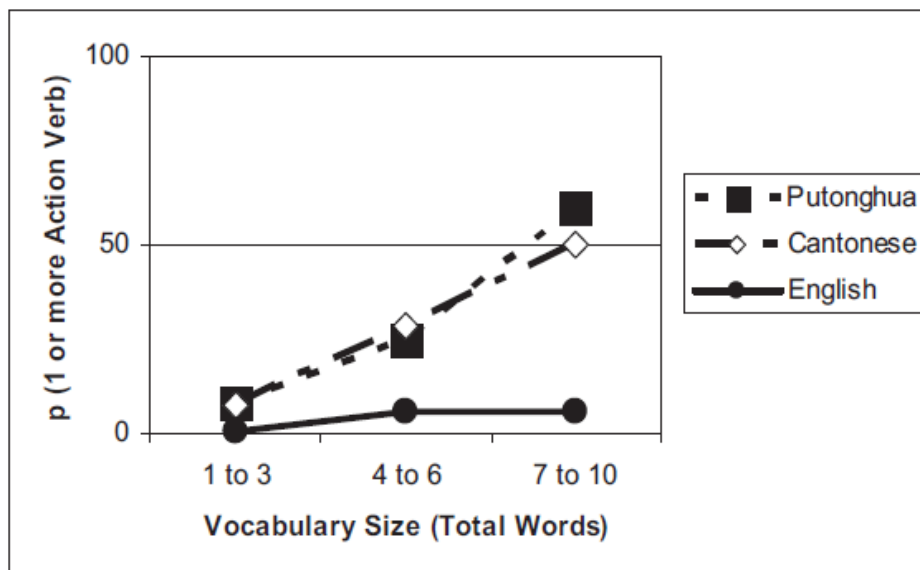
Figure 2.6 Probability of one or more action words in child's total vocabulary, by language and vocabulary size

(adopted from Tardif et al., 2008)

As can be seen in Figure 2.5, English-speaking children were consistently more likely to produce common nouns than Mandarin(Putonghua)- and Cantonese-speaking children, regardless of vocabulary size. On the other hand, both groups of Chinese-speaking children were consistently more likely to produce action verbs than English-speaking children across vocabulary size, as shown in Figure 2.6. From this point of view, English-speaking children had an apparent noun bias at the earliest stage of lexical development whereas Mandarin- and Cantonese-speaking children did not.

2.2.2 Other monolingual studies arguing against the noun bias

Several studies investigating the lexical development of monolingual children also suggest that the noun bias is language-specific rather than universal. Yang (2011) examined the lexical development of children speaking Mandarin in Taiwan, using the corpus data from Taiwan Corpus of Child Mandarin (TCCM; Cheung, Chang, Ke & Tsay, 2011). The corpus data files were categorized into five age groups: 1;07-2;00, 2;01-2;06, 2;07-3;00, 3;01-3;06 and 3;07-4;00, and the mean noun-verb ratio was computed for each group on the basis of the number of noun types and verb types. Results show that the mean noun-verb ratio was 1.2 as a whole across the five age groups. Although the mean noun-verb ratio was 1.54 in the group of 1;07-2;00, such ratio decreased to 1.03 in the group of 2;07-3;00, and it remained lower than 1.2 from 3;00 onwards. Although the Mandarin-speaking children in Yang's (2011) study had generally a greater proportion of nouns than verbs, their mean noun-verb ratio was much lower than that of the English-speaking children of the same age range in Liu's (2007) study, which remained at 2.19 across the age span. From this point of view, no strong noun bias can be found in Mandarin-speaking children and the noun bias is

language-specific rather than universal.

Choi and Gopnik (1995) studied the development of nouns and verbs in nine Korean-speaking children longitudinally from 1;02 to 1;10. They collected naturalistic speech samples of these children once every 3 to 4 weeks, and counted the nouns and verbs that they produced. In this study, only verbs followed by appropriate sentence-ending verbal suffixes which are necessary in Korean verbal morphology were counted. They then counted the number of new nouns and new verbs in each recording session. Following Gopnik and Meltzoff's (1987) criteria, when 10 or more new nouns/verbs are found in a recording session, then that session is considered to instantiate a noun/verb spurt. Results show that six of the Korean-speaking children had the first verb spurt right before the first noun spurt. Among these six children, three had the first verb spurt at the 50-word level, and four produced adult-like verbal suffixes during or before their first verb spurt. Moreover, at the 50-word level of these nine Korean-speaking children, the mean proportion of nouns was 44% while that for verbs was 31%, and the difference between these two proportions was not statistically significant. Although the mean proportion of nouns was slightly higher, verbs were used very early along with nouns. Thus, no strong noun bias is observed in these speech samples of Korean-speaking children because neither nouns nor verbs were more dominant. This contrasts with the findings of Au et al. (1994), in which the mean noun-verb ratio ranged between 1.7:1 and 4:1, using vocabulary checklists.

Leung (1998) studied the lexical composition of 6 Cantonese-speaking children between 1;07 and 2;00. Each of the children's natural interactions with their mother was videotaped for 30 to 40 minutes. Common nouns, proper nouns and main verbs were counted in terms of word types and word tokens. Results show that 4 children produced more verb types than noun types, and 2 children produced equal numbers of noun and verb types. The mean proportion of common nouns was 17% and that of

main verbs was 28.5%. Results show that these Cantonese-speaking children did not exhibit a noun bias in their early vocabulary.

Apart from Asian languages such as Korean, Mandarin and Cantonese, another study in the lexical development of children speaking an African language also show that the noun bias is language-specific rather than universal. Ngas is a Chadic language which allows pro-drop. Childers, Vaughan, and Burquest (2007) studied the composition of early vocabularies in 16 Ngas-speaking children, using a Ngas vocabulary checklist modified from the MCDI (Fenson et al., 1993, 1994). 8 out of 16 children were aged between 1;00 and 1;05, and the others between 1;07 and 2;07. The children's parents were asked to indicate the words that their children understood and produced on the vocabulary checklist at two time points which were six months apart. Results show that the difference between the proportions of nouns and verbs produced by Ngas-speaking children was not statistically significant in both age groups at both time points. At the first time point, the mean noun-verb ratio was 1:1.14 for children aged 1;00-1;05 and such ratio was 1:1.31 for those aged 1;07-2;07. At the second time point, the mean noun-verb ratio was 1.06:1 for those aged 1;00-1;05 and it was 1:1.07 for those aged 1;07-2;07. Thus, no clear noun bias was observed in the early vocabulary of Ngas-speaking children.

2.2.3 Factors leading to the non-existence of a noun bias

As shown in the studies reviewed in 2.2.1 and 2.2.2, the noun bias is not found in a number of languages, such as Mandarin and Cantonese, and although Choi and Gopnik (1995) show that the proportion of nouns is greater than that of verbs in the lexicons of Korean-speaking children, the noun bias remains weaker than that of Au et al.'s (1994) study and the studies of English-speaking children (e.g. Gentner, 1982; Bates et al., 1994). Factors other than perceptual-conceptual predispositions should be

considered. In particular, the role of language input and language-specific properties needs to be examined carefully. Tardif (1996, 2006a, 2006b) proposed the following factors to account for the differences between languages that supported the noun bias and those that did not.

2.2.3.1 Frequency of nouns and verbs in adults' input

Tardif (1996) claimed that the frequency of nouns and verbs in adults' speech affected whether the noun bias would occur in children's early vocabulary. Goldfield (1993) found that English-speaking adults consistently produced more noun types than verb types. However, Tardif (1996) and Tardif, Shatz, and Naigles (1997) found that Mandarin-speaking caregivers consistently produced more verb types than noun types. Choi and Gopnik (1995) and Kim, McGregor, and Thompson (2000) also found that there are more verb types than noun types in the speech of Korean adult speakers addressed to children. The non-occurrence of an early noun bias in Mandarin- and Korean-speaking children may be accounted for by the higher frequency of verbs in adults' input.

2.2.3.2 Sentence positions and perceptual salience

According to Slobin (1973), the initial and final positions of utterances are more salient for children. If a category of words appears frequently in these positions, it tends to be acquired earlier. Tardif (1996) pointed out that Mandarin is different from English in this respect, so that the noun bias is found only in the early vocabulary of English-speaking children but not in Mandarin-speaking children.

Both English and Mandarin are SVO languages, but null arguments are allowed in Mandarin but not in English. There are therefore many more verb-final utterances and verb-only utterances in Mandarin than in English. Goldfield (1993) found that

English-speaking adults produced many more nouns frequently and they seldom produced verbs in this position. On the other hand, Tardif et al. (1997) found that Mandarin utterances ended in verbs more often than nouns, and Mandarin utterances ended in verbs significantly more often than did English utterances.

Korean is an SOV language and null arguments are allowed. Therefore, being similar to Mandarin, verb-final utterances and verb-only utterances are more frequent in Korean. Kim et al. (2000) found that English adult speakers produced mainly nouns in utterance-final position while Korean adult speakers produced mainly verbs in this position. From this point of view, nouns are more salient in English while verbs are more salient in Mandarin and Korean. This may explain why the noun bias was found in English-speaking children but not in Mandarin- and Korean-speaking children.

2.2.3.3 Semantic properties of nouns and verbs

Tardif (2006a, 2006b) claimed that the differences in the semantic properties of nouns and verbs across languages were important in accounting for the prevalence of nouns or verbs in the vocabularies of children and adults.

Many distinct nouns in English shared the same "root" terms in Chinese. One example involves vehicle terms. In English, the vehicle terms are highly distinctive; while in Chinese, they share the common root term *che1* 'car'. For example, there are words like *truck*, *taxi*, and *bus* in English, and their equivalents in Mandarin are *ka3che1*, *chu1zu1che1*, and *gong1gong4qi4che1* in Mandarin. All of these Mandarin words share the same root *che1* 'car'. Moreover, Mandarin-speaking adults can only use the root term to refer to those objects. But it would be ungrammatical to use one word *car* to refer to all kinds of vehicles in English. This factor will lead to a lower count of noun types in Mandarin than English for the semantic domains concerned.

On the other hand, English has both "general purpose" verbs and specific verbs,

while Chinese has only specific verbs to describe "basic" actions (Tardif, 2006b). Many verbs in Chinese are more distinct and specific than those in English. One example is the verb *carry*. In English, *carry* can refer to actions like "carrying a backpack" (on the shoulders/back), "carrying a baby", "carrying a serving dish" and "carrying a purse". But in Chinese, different verbs are used for these actions, like *bei1* 'carry on the back', *bao4* 'hold in one's arms', *duan1* 'flat on two hands' and *ling2* 'dangling in one hand' respectively. Even though there are many distinct verbs for actions of carrying, English speakers tend to use the general-purpose verb, together with a preposition and the object noun. But in Chinese, more than one verb is used to refer to all these actions.

The differences in the semantic properties of verbs between English and Korean may also explain why Korean-speaking children acquire verbs much earlier than English-speaking children. Relational concepts such as non-existence, disappearance, and location are expressed by verbs in Korean, while these concepts are expressed by other grammatical categories such as particles (e.g. *up*, *down*) and adverbs (e.g. *there*) in English. Concepts about states are mostly encoded by adjectives in English (e.g. *cold*, *hot*, *noisy*) while these are mainly encoded by adjectival verbs in Korean (e.g. *chwupta* 'be cold (for animate beings)', *cakawupta* 'be cold (for things)', *tepta* 'be hot (for animate beings)', *ttukepta* 'be hot (for things)', *sikkulepta* 'be noisy'). Compared with English, the conceptual distinctions among verbs are finer in Korean. The findings in Choi and Gopnik's (1995) study are consistent with such a claim. They found that verbs produced by Korean-speaking children are more distinct than those produced by English-speaking children in terms of meaning. For example, they used a variety of verbs related to the action "putting", such as *nehta* 'put in a loose-fitting container', *kkocta* 'put a long stick-like object tightly on/in a base', *kkita* 'put on/in to a tight-fitting base' and *nohta* 'put loosely on a surface'.

The differences in the semantic properties of nouns and verbs across languages may provide an alternative explanation for why Mandarin- and Korean-speaking children acquire many more verbs than English-speaking children do in their early lexical development.

2.2.3.4 Morphological simplicity or regularity

Tardif (1996) suggested that word classes that have fewer inflectional markings are easier for children to acquire. In English, nouns can take the plural suffix *–s* whereas verbs can take the progressive aspect suffix *–ing*, third person singular suffix *–s*, and the past tense or perfective aspect suffix *–ed*. In other words, English verbs have more different kinds of inflections than nouns. The morphology of English nouns is thus comparatively simpler than that of verbs. However, Mandarin nouns and verbs are minimally inflected and the inflections themselves do not change the word stem. Thus, the morphology of nouns and verbs in Mandarin is equally simple. Therefore, English-speaking children tend to acquire nouns but not verbs earlier, but it is not the case for Mandarin-speaking children.

However, morphological simplicity cannot explain why Korean-speaking children acquire verbs so early. Kim et al. (2000) suggested that the regular and obligatory verb inflections in Korean may make the mapping between verbs and their meanings accessible for these children. In Korean, verbs must be followed by appropriate sentence-ending verbal suffixes. Such morphological cues make verbs more salient in Korean because they are obligatory. Thus, Korean-speaking children acquire verbs as early as nouns.

2.2.3.5 Pragmatics

Tardif et al. (1997) pointed out that English-speaking children tend to respond

with nouns and Mandarin-speaking children tended to respond with verbs when they were asked questions. Gopnik, Choi and Baumberger (1996) also pointed out that English-speaking adults focus more on objects while Korean-speaking adults focus more on actions when addressing their children. Such pragmatic differences across languages may contribute to the noun bias in children's early English lexicon but not in early Mandarin or Korean vocabulary.

2.3 Reasons for conflicting results

Although differences in language-specific properties may explain why the early noun bias is found in some languages but not in others, conflicting results have been reported even within the same language. The main reason is the lack of consistent methodology across studies. For example, different ages of the children and different methods of sampling vocabulary data are used by different researchers. It is thus not surprising that different results are reported.

2.3.1 Different methods of sampling children's vocabulary data

Both Choi and Gopnik (1995) and Au et al. (1994) studied children's early vocabulary in Korean, but conflicting results were reported. Choi and Gopnik (1995) used observational data including mothers' diary records of children's vocabularies and regular recordings of children's speech and it was reported that Korean-speaking children did not have a noun bias. However, Au et al. (1994) relied on mothers' reports of children's vocabulary using checklists based on the MCDI (Fenson et al., 1993, 1994), and it was reported that Korean-speaking children showed a noun bias. Results are conflicting even for the same language because different methods of sampling children's vocabulary production were adopted.

In studies reviewed so far, either checklists or observational data are used. Those

using checklists usually reported a noun bias while those using observational data usually reported no noun bias in children's early lexicon (Tardif, 1996). It seems that when only one of the measures is used, the results may be biased in a certain way. The studies using checklists tend to over-report children's production of common nouns while in those studies using naturalistic production data, children tend to produce far less common nouns than they have acquired at a particular time (Pine, 1992; Pine, Lieven & Rowland, 1996).

Tardif (1996) suggested that if one would like to describe children's language use, then naturalistic production data is preferred. She also pointed out that for the MCDI (Fenson et al., 1993, 1994), the norming, reliability and validity testing have been done for the English version only but have not yet been completed for other languages. In this situation, if one would like to study early vocabularies in Korean, Mandarin, etc., observational data is preferred.

2.3.2 Different ages of the children

Au et al. (1994) reported that the Korean-speaking children in all her three studies showed a noun bias. However, there are some problems in their interpretation of the results. One of the problems is that the age spans of the Korean-speaking children in these three studies were different. In the third study, the children's ages ranged from 1;03 to 1;07 and their median noun-verb ratio was 4:1. But in the second study, the children's ages ranged from 1;10 to 2;00 and their median noun-verb ratio was only 1.7:1, which was much lower than that in the third study. Although both groups of children produced more nouns than verbs, their extent of noun bias was substantially different. It is possible that there are some important changes in children's lexical development during the period from 1;03 to 2;00.

Both Tardif (1996) and Tardif, Gelman & Xu (1999) investigated the lexical

composition of Mandarin-speaking children, but different results were reported. Tardif (1996) found that nine of the Mandarin-speaking children whose mean age was 1;09.24 produced more verb types than noun types. However, Tardif et al. (1999) reported that the 24 Mandarin-speaking children whose mean age was 1;08.05, did not show any clear noun or verb biases.

There are several possible reasons for these conflicting results. Firstly, the children in Tardif et al.'s (1999) study were younger than those in Tardif's (1996) study. There may be important changes in lexical composition between 1;08.05 and 1;09.24. Secondly, there were individual differences in lexical development among the children (Tardif et al., 1999). The vocabulary production of different groups of children was investigated in these two studies. It is possible that the children in Tardif's (1996) study showed a verb bias as early as 1;06 while those in Tardif et al.'s (1999) study showed neither noun bias nor verb bias before 2;00.

Even within the same language, there may be variations among children with regard to a word category bias throughout the age span. In order to investigate whether such a bias exists at the earliest stage and whether such a bias changes later, it is necessary to study the lexical development of the same child/children over a period of time longitudinally. In order to address the universality of noun bias, cross-linguistic studies are also needed.

2.4 Previous cross-linguistic longitudinal studies in lexical development

Lack of consistent methodology often renders the results of different studies incomparable with each other. In order to determine whether children had a noun or verb bias in their early vocabularies, longitudinal studies with observational data comparing a number of languages and different ages of children would be preferred. Related previous studies will be reviewed in the following section.

2.4.1 Liu's comparative study of lexical development in English, Mandarin and Cantonese (2007)

Liu (2007) conducted a corpus-based study to investigate the lexical composition of Mandarin-, Cantonese- and English-speaking children from 1;00 to 5;00. Using corpus data from CHILDES, more than 700 English-speaking children, approximately 300 Mandarin-speaking children and approximately 80 Cantonese-speaking children were included in her study. The corpus transcripts were divided into four age groups: 1;00-2;00, 2;00-3;00, 3;00-4;00 and 4;00-5;00. Nouns, verbs and adjectives were counted in terms of both word types and word tokens. Based on the number of word types, the noun/verb ratio for each age group and for each language was computed.

Results show that there are more nouns than verbs and adjectives in children's earliest vocabularies, regardless of their languages and the counting methods. The noun/verb ratio for the group 1;00-2;00 was 1.15, 1.46 and 3.87 in Mandarin, Cantonese and English respectively. In other words, all children started with a noun bias at their earliest stage of lexical development. Moreover, regardless of languages, as the children grew up and their languages developed, the noun bias became weaker, and such a bias eventually disappeared in Mandarin and Cantonese. In English, the noun/verb ratio dropped from 3.87 to 1.68 for children aged 1;00-5;00. In Cantonese and Mandarin, the ratio dropped from 1.46 to 0.96, and from 1.15 to 0.86 respectively.

However, the discrepancy between the number of nouns and verbs was different among languages. The mean noun/verb ratio in English was 2.19, while that in Mandarin and Cantonese was 0.98 and 1.23 respectively. In short, English consistently shows a noun bias throughout the age span while Mandarin and Cantonese show an apparent noun bias only at the earliest stage of lexical development.

2.4.2 Dhillon's comparative study of lexical development in English, Spanish and Mandarin (2010)

Dhillon (2010) conducted a corpus-based study to investigate the lexical composition in the vocabulary in Mandarin-, English- and Spanish-speaking children, in order to determine whether different language structures will have differential noun bias effects in children's vocabularies. These three languages are different in licensing null arguments. In English, null arguments are prohibited. But in Mandarin, null arguments are widely permitted (e.g. Huang, 1984; Li & Thompson, 1981; etc.). In Spanish, null subject pronouns are permitted. Dhillon (2010) analyzed the corpus data from CHILDES which were divided into three age levels: 1;07-2;00, 2;01-2;05 and 2;06-2;11. Nouns and verbs were counted in terms of word types and word tokens and the ratios of nouns to nouns + verbs for each age level and for each language were computed.

Results show that the lexical composition of children is different for different languages and different ages. There was a noun bias in the vocabulary of English- and Spanish-speaking children. Their ratios of nouns to nouns + verbs were between 0.6 and 0.8 for each age group. However, in child Mandarin, a noun bias was shown only in the group of 1;07-2;00. The ratio of nouns to nouns + verbs was 0.55 for this age group but that for the other two age groups was approximately 0.45. According to Dhillon (2010), the noun bias is not universal and it can be explained by structural differences between languages.

On the other hand, in these three languages, the proportion of nouns gradually becomes smaller as the children's age increases. The ratio of nouns to nouns + verbs dropped from 0.77 to 0.64 in English, from 0.7 to 0.6 in Spanish, and from 0.55 to 0.42 in Mandarin. In other words, there were changes in the extent of word category

bias in children's vocabularies across their age span. Many children tended to have a noun bias at their earliest stage of lexical development but the existence and the extent of such bias became different according to the structures of the children's languages.

2.5 Previous studies of lexical development in bilingual children

As shown in Liu's (2007) and Dhillon's (2010) studies, the language-specific properties may determine whether a noun bias exists in early child vocabularies. If the noun bias is language-specific, what will happen in the lexical development of bilingual children who are exposed to two languages simultaneously from birth? If the bilingual children's two languages are typologically different, will the occurrence and extent of the noun bias be different in the two languages? Moreover, in order to address whether the noun bias is universal, studying the lexical composition in each language of bilingual children may provide an ideal testing ground.

Nicoladis (2001) stated the following:

"Using data from bilingual children can be a powerful test of proposed universals in language acquisition because bilingual children can act as a small crosslinguistic experiment of their own. To the extent that a proposed universal is in fact universal, it should appear regardless of the children's level of proficiency in that language and/or should act on the input in the same way regardless of [how] the input characteristics are presented in either language." (p.134)

In other words, investigating the vocabulary development of bilingual children would shed new light on the universality of word category bias. However, very few studies of lexical development in bilingual children address this particular issue. The

methodology and results of these studies will be carefully reviewed in the next section.

2.5.1 Bilingual studies involving two European languages

Researchers who have studied the lexical composition in the early vocabularies of bilingual children speaking two European languages found a noun bias in both languages. For example, Conboy and Thal (2006) used the MCDI (Fenson et al., 1993, 1994) to study the lexical composition of 64 English-Spanish bilingual children between 1;08 and 2;06. The proportions of different word classes over vocabulary size were computed. It was found that the lexical composition and development in English and Spanish was similar. Common nouns constituted approximately 45% of their total vocabulary whereas verbs constituted approximately 14% in both languages. The proportion of nouns increased rapidly with the children's growing lexicon and remained at more than 40% for children whose vocabulary size exceeded 100 words. However, the proportion of verbs and adjectives did not increase until the children reached the 200-word-level. It reached 25% for children whose vocabulary size exceeded 400 words, but it was still lower than the proportion of nouns. It can be seen, therefore, that nouns dominated the early lexicon of these bilingual children in both languages and that their lexical developmental patterns were similar to those of their monolingual counterparts (e.g. Caselli et al, 1995).

David & Li (2005) studied the lexical composition of 13 French-English bilingual children from 1;04 to 2;06 longitudinally. Their parents were asked to report their production of words on the MCDI (Fenson et al., 1993, 1994) at monthly intervals. The patterns of lexical composition in English and French were similar in these bilingual children. In both languages, common nouns were the most dominant category for children who produced more than 50 words. The proportion of common

40

nouns in the total vocabulary increased with the growing vocabulary size. It reached more than 50% for children whose vocabulary size was 200 words, and it remained at around 50% for those who had more than 500 words. The proportion of verbs and adjectives in the total vocabulary increased gradually from approximately 5% for children with the smallest lexicon, up to approximately 25% for the children who had more than 500 words, clearly demonstrating a noun bias for both languages of the French-English bilingual children.

Nicoladis (2001) studied the early vocabulary development of an English-Portuguese bilingual boy from 1;00.14 to 1;06.06. His early words were collected from both weekly videotaped sessions and weekly parental reports. At 1;06.06, he had a vocabulary size of 100 words, with words from both English and Portuguese counted together. Results show that the composition of the child's cumulative vocabulary in both languages was very different from that in the adults' input. Considering the ratio of nouns to verbs, adult English had a greater proportion of nouns than verbs (3.6:1 for type; 3.5:1 for token), while adult Portuguese had an approximately equal proportion of nouns and verbs (1.1 for both type and token). However, the child produced 90% of nouns and 10% of verbs in English, and 87.5% of nouns and 12.5% of verbs in Portuguese. The early lexicons of both his English and Portuguese were strongly noun-biased, regardless of the different noun-verb proportions in the dual input. Thus, Nicoladis (2001) suggested that there is an innate noun bias in children's early word use.

2.5.2 Bilingual studies involving an European language and an Asian language

Although many lexical development studies involving two European languages showed the noun bias in both languages of the bilingual children, different results were reported in studies involving one European language and one Asian language.

Levey and Cruz (2003) studied the early words produced by 17 bilingual Mandarin-English children aged between 1;10 and 4;00. Their parents were interviewed to provide the data for the first 100 words produced by their children. Results show that 70% of the 100 earliest words were nouns and only 13% were verbs. The noun bias was observed in both Mandarin and English. However, the noun bias in English was much stronger than that in Mandarin. In Mandarin, both nouns and verbs were acquired early with nouns outnumbering verbs. But in English, only nouns but no verbs were found. The results of Levey and Cruz's (2003) study show that children tend to acquire more nouns than verbs at the earliest stage of development, but the extent of the noun bias varies from language to language.

Itani-Adams (2007) studied the lexical composition of a Japanese-English bilingual girl from 1;11 to 4;10 longitudinally. Her spontaneous speech samples were collected monthly. Common nouns, proper nouns, and kinship terms were included in the counting of nominals, while both lexical verbs and auxiliary verbs were included in the verb category. Results show that there was a noun bias in both of her two languages at the beginning of the study but as the age of the child increased, the extent of the noun bias changed. In English, the proportion of nominals over all words was 42% and that of verbs 13% at 1;11. The proportion of verbs among all words in English gradually increased, but there were still more nominals than verbs throughout the study period. At 4;07, although the proportion of verbs increased to 24%, the proportion of nominals remained at approximately 40%. However, in Japanese, the proportion of nominals among all words continued to decrease while that of verbs continued to increase throughout the study period. At the start of the study, the proportion of nominals over all words was 40% and that of verbs was 12%. But at 4;00, the proportion of nominals decreased to 32% while that of verbs increased to 24%. At 4;07, verbs constituted 32% of the bilingual girl's Japanese lexicon, while

nominals constituted only 25%. The initial noun bias in the child's Japanese eventually disappeared. This bilingual girl bootstrapped into both English and Japanese through nominals first while she acquired verbs in a language-specific manner.

Both Lee (2009) and Yip and Matthews (2008) conducted corpus-based studies on the lexical development of Cantonese-English bilingual children. Lee (2009) studied the lexical composition of two Cantonese-English bilingual children from 1;03 to 1;07 from the Hong Kong Bilingual Child Language Corpus (Yip & Matthews, 2007). The number of nouns and verbs each child used was counted in terms of word types and tokens, and the proportion of verbs to verbs + nouns was calculated on the basis of word types and tokens. The number of nouns in both bilingual children was similar to that of verbs in Cantonese while there were many more nouns than verbs in their English. In Cantonese, the proportions of verbs to verbs + nouns were 51.57% and 42.60% for word tokens and types respectively, while in English, the ratios were just 13.78% and 14.31%. The figures reported by Lee (2009) suggest that the noun bias is language-specific rather than universal across languages, as the proportion of verbs is much greater in the lexicon of the bilingual children's Cantonese than in their English.

Yip and Matthews (2008) investigated the development of nouns and verbs produced by two Cantonese-English bilingual children from the Hong Kong Bilingual Child Language Corpus (Yip & Matthews, 2007), one from 1;03 to 3;00, and the other from 1;06 to 3;00. In Cantonese, among the nouns and verbs they produced, 59% were nouns and 41% were verbs. In English, the percentages of nouns and verbs were 78% and 22% respectively. Results show that both bilingual children produced more nouns than verbs in both languages. But such a tendency is different in Cantonese and English. The noun bias in bilingual children's Cantonese is much weaker than the

noun bias in their English.

These bilingual studies suggest that the occurrence and extent of the "noun bias" can be affected by the structure of the languages acquired by the children and their ages. Thus, more longitudinal studies investigating the developmental changes in the lexical composition of bilingual children would help us to understand the nature of the "noun bias".

2.6 Research Questions

There is a lack of consensus to whether a "universal" noun bias can be applied to children acquiring any language. The issue becomes more complex in bilingual children who have exposure to two languages simultaneously from birth, as their exposure to each language is expected to be less than that of the corresponding monolingual children and there may be interactions between the lexicons of their two languages. Further, most bilingual children are not "balanced bilinguals" in the sense that they show language dominance in one of the languages (Yip & Matthews, 2007); their dominant language develops faster than their non-dominant one. All these factors can affect whether the noun bias occurs and how it occurs in the early vocabularies of the two languages of the bilingual children.

The questions that are addressed in this thesis include the following:

(i) Is the "noun bias" universal or language-specific at the earliest stage of bilingual development? Does a "noun bias" exist in both languages acquired by the bilingual children? That is, are their first words in both languages dominated by nouns? To what extent is the noun-verb ratio of their first words in both languages similar or different?

(ii) If the "noun bias" is universal, is the extent of the bias similar in both languages of the bilingual children? If the "noun bias" is language-specific, how would the

word category bias be different in their two languages?

(iii) How does the lexical composition change in both languages of the bilingual children over the course of their development? That is, how do the proportions of nouns and verbs in the two languages change from the earliest to the later stages of lexical development?

(iv) How does language dominance in the bilingual children affect the developmental patterns of nouns and verbs?

(v) How is the lexical development of the bilingual children similar to and different from that of their monolingual counterparts?

Through a corpus-based study of two bilingual Cantonese-English children in comparison with a monolingual Cantonese-speaking child and a monolingual English-speaking child, these issues are addressed systematically in the remaining chapters of this thesis.

Chapter 3: Hypotheses and Methodology

In this chapter, I will discuss the hypotheses investigated in the thesis. I will focus on how the universality of the early noun advantage and differences in language structures affect the nature and extent of lexical category bias. According to Gentner (1982, 2006), the early lexicon of children is dominated by nouns because the concepts of nouns are easier and simpler for children. Such a noun bias should be found in all languages, regardless of how different they are. However, Tardif (1996, 2006a, 2006b) claimed that the noun bias is language-specific rather than universal. The lexical category bias should then be different across languages, depending on the structures of these languages. In light of these opposing views by Gentner (1982, 2006) and Tardif (1996, 2006a, 2006b), I will formulate hypotheses with predictions on whether the noun bias can be found in the lexicons of Cantonese-English bilingual children. In addition, with regard to bilingual lexical development, cross-linguistic influence and language dominance are important issues. I will also discuss and investigate how these two factors affect the word category bias in the lexical development of Cantonese-English bilingual children. Finally, the methodology used in this study will be presented at the end of this chapter.

3.1 Universality of early noun advantage

As discussed in section 2.1, Gentner (1982) proposed the Natural Partitions Hypothesis and Relational Relativity Hypothesis to explain why there is a noun bias in children's early lexicon across languages including English (e.g. Gentner, 1982; Bates et al., 1994), German (e.g. Gentner, 1982), Turkish (e.g. Gentner, 1982), Italian (e.g. Caselli et al., 1995), Japanese (e.g. Miyata et al., 2003), and Navajo (Gentner & Boroditsky, 2009). According to the Natural Partitions Hypothesis, nouns are acquired

early and are dominant because the concepts encoded by nouns such as persons and things are cross-linguistically similar, simple, and salient for children. In addition, according to the Relational Relativity hypothesis, verbs are acquired late because the concepts encoded by verbs such as actions and relationships are more variable across languages. Therefore, concepts of nouns are easier and more accessible than those of verbs for children, because they do not need to rely much on language input to acquire nouns. This is the opposite case for verbs.

Based on these two hypotheses, the noun bias should be universal, no matter how the structures of languages are different. Nouns should be acquired earlier than verbs and nouns should cross-linguistically outnumber verbs in the early lexicon of children. Under these circumstances, it is hypothesized that if the noun bias is universal, nouns should constitute a greater proportion than verbs in the lexicons of both languages of Cantonese-English bilingual children. In this case, there will be more noun types than verb types, and the N/(N+V) ratio will be greater than 50% in both their Cantonese and English. Nouns will also develop faster than verbs in both of their first languages throughout their course of language development.

3.2 Language-specific properties in relation to lexical category bias

Contrary to Gentner's (1982) findings, Tardif (1996) found that there was no noun bias in the early vocabulary of Mandarin-speaking children and they acquired verbs as early as nouns. Similar results were also reported in Korean- and Cantonese-speaking children (e.g. Choi & Gopnik, 1995; Leung, 1998; Tardif, 2006b). As discussed in chapter 2, regarding the conflicting results across studies and languages, Tardif (1996, 2006a, 2006b) claimed that differences in language structures played an important role in determining whether the noun bias was found. In particular, Dhillon's (2010) corpus-based study on the lexical composition of

English-, Spanish- and Mandarin-speaking children showed that differences found in the lexical category bias across languages were possibly related to their allowance of null arguments. As pointed out in chapter 2, English favours nouns due to its language structures and properties emphasize nouns. For example, null arguments are prohibited and objects often appear at sentence-initial and sentence-final positions. On the other hand, Cantonese, which is typologically similar to Mandarin, is a verb-friendly language because its language structures and properties favour verbs rather than nouns. For example, null arguments are allowed and occur quite frequently, so verbs can easily occur in sentence-initial and sentence-final positions.

In this study, it is predicted that if the noun bias is language-specific, the differences in language properties should be reflected in the nature and extent of lexical category bias in the child's early lexicon. Under these circumstances, a noun bias should be found in the bilingual children's English while a verb bias should occur in the bilingual children's Cantonese. In this case, there will be more noun types than verb types in their English, but more verb types than noun types in their Cantonese. The $N/(N+V)$ ratio in the bilingual children's English will be higher than that in their Cantonese. Adopting the criterion for "noun/verb bias" in Miyata, Oshima-Takane, and Nishisawa's (2003) study, the $N/(N+V)$ ratio will be greater than 55% in their English while it will be smaller than 45% in their Cantonese. Nouns will develop faster in English but verbs will develop faster in Cantonese. In addition, the differences in the developmental patterns of nouns and verbs between Cantonese and English in the bilingual children will also be similar to the monolingual Cantonese- and English-speaking children respectively.

3.3 Cross-linguistic influence

3.3.1 Cross-linguistic influence in the domain of syntax

One of the main issues in bilingual first language acquisition is cross-linguistic influence. Various forms of interactions between two target languages of bilingual children have been reported in many previous studies (e.g. Döpke, 1998; Hulk & Müller, 2000; Yip & Matthews, 2007).

Cross-linguistic influence can take place in the form of non-target structures, which are observed in bilingual children but not found in their monolingual counterparts. Usually, these non-target structures are forms of grammatical properties that transfer from one of their languages to the other (Paradis & Genesee 1996; Yip & Matthews, 2007). For example, a stage was found where *wh*-in-situ questions were produced in the English of Cantonese-English bilingual children but not in their monolingual counterparts (Yip & Matthews, 2007)[2]. It is taken as evidence that this non-target structure in bilingual children's English was transferred from Cantonese.

Cross-linguistic influence can also occur in the form of quantitative differences. For example, Yip and Matthews (2007) reported that the frequency of null objects found in the English of five bilingual Cantonese-English children ranged from 19% to 34%, whereas that in their monolingual counterparts ranged from 2.8% to 9% only. The higher frequency of null objects in the bilingual children can be accounted for by the cross-linguistic influence from Cantonese, as null arguments are allowed in Cantonese but prohibited in English.

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[2] Yip and Matthews (2007) pointed out that *wh*-in-situ questions were found in monolingual English-speaking children, but in general they were just cases of imitation based on adults' input. Contrary to the Cantonese-English bilingual children, the monolingual English-speaking children did not produce *wh*-in-situ questions spontaneously.

3.3.2 Cross-linguistic influence in the domain of lexicon

Cross-linguistic influence can be easily observed in the domain of syntax in bilingual children due to the interactions between the grammars of their two languages. So, would these interactions also affect their lexical composition in each language? Are there any quantitative differences in the lexical development between the bilingual children and their monolingual counterparts? For example, are bilinguals and monolinguals different in terms of proportions of nouns and verbs in their early vocabulary? As pointed out in section 3.2, if the noun bias is language-specific, it is predicted that a noun bias should be observed in English while a verb bias should be found in Cantonese, given the findings in previous studies. If there is cross-linguistic influence between the languages of bilingual children, it is expected that the nouns acquired in English may be "transferred" to Cantonese, while the verbs acquired in Cantonese may be "transferred" to English, because knowing a term (for a given thing or action) in the dominant language favours knowing it in the non-dominant language. In other words, many nouns in the bilingual children's Cantonese have English equivalents which have been acquired earlier whereas many verbs in their English have Cantonese equivalents which have been acquired earlier. As a result, the bilingual children would acquire more verbs in English and more nouns in Cantonese than their monolingual counterparts. Thus, the noun bias in the bilingual children's English may not be as strong as their monolingual counterparts and the verb bias in the bilingual children's Cantonese may also be weaker than the monolinguals.

Therefore, if the noun bias is language-specific and cross-linguistic influence plays a role in the lexical development of bilingual children, there should be more verbs produced with Cantonese equivalents than nouns in English whereas there should be more nouns produced with English equivalents than verbs in Cantonese. Thus, if the noun bias is language-specific and cross-linguistic influence affects the

nature and extent of word category bias in bilingual children, it is hypothesized that the N/(N+V) ratio in the bilingual children's English will be smaller than that in the monolingual English-speaking children, and the N/(N+V) ratio in the bilingual children's Cantonese will be greater than that in the monolingual Cantonese-speaking children. However, if there is no cross-linguistic influence or if the noun bias is universal, the N/(N+V) ratio in both languages of the Cantonese-English bilingual children will be similar to that in their monolingual counterparts.

3.3.3 Language dominance

Language dominance is an important issue in bilingual first language acquisition and it is widely considered as one of the factors for determining cross-linguistic influence. Language dominance is usually defined in terms of proficiency (e.g. Deuchar & Muntz, 2003; Genesee, Nicoladis & Paradis, 1995), where the dominant language of a bilingual child is consistently more proficient than the other. According to Yip and Matthews (2007), in a bilingual child, a language is dominant if it is "more advanced or developing faster than the other" (p.35). Baker and Prys Jones (1998) pointed out that "in the majority of bilinguals one language is more dominant than the other" (p.12). In other words, most bilingual children are unbalanced in their language development. If language dominance plays an important role in cross-linguistic influence, we expect that the development patterns of languages are different between children dominant in one language and those dominant in another language. In other words, the patterns of bilingual children's language dominance may have an effect on how their two languages develop over time.

In this study, each bilingual child shows a different language dominance pattern in their development. One child is Cantonese-dominant (Sophie) and the other is English-dominant (Charlotte). And generally speaking, cross-linguistic influence from

the dominant language to the non-dominant language is expected to occur. Therefore, if cross-linguistic influence plays a role in the lexical development of bilingual children and if language dominance plays a role in cross-linguistic influence, Sophie's English is expected to behave differently from that of English monolinguals, whereas her Cantonese is expected to develop similarly to that of Cantonese monolinguals. As for Charlotte, her Cantonese is expected to perform differently from that of Cantonese monolinguals while her English is expected to develop similarly to that of English monolinguals.

As pointed out in section 3.2, if the noun bias is language-specific, it is predicted that a noun bias will be found in the early vocabulary of English whereas a verb bias will be found in the early vocabulary of Cantonese. If language dominance plays a role in cross-linguistic influence at the lexical level, it is expected that the N/(N+V) ratio in Sophie's English will be lower than that in the English monolinguals, whereas the N/(N+V) ratio in her Cantonese will be similar to the Cantonese monolinguals. On the other hand, the N/(N+V) ratio in Charlotte's Cantonese will be greater than that in the Cantonese monolinguals while the N/(N+V) ratio in her English will be similar to the English monolinguals. From another point of view, the N/(N+V) ratio in Sophie's English is expected to be smaller than that in Charlotte's English, whereas the N/(N+V) ratio in Charlotte's Cantonese may be greater than that in Sophie's Cantonese.

3.4 Methodology

This thesis investigates the longitudinal development of nouns and verbs in two Cantonese-English bilingual children from the Hong Kong Bilingual Child Language Corpus (Yip & Matthews, 2007), in comparison with one monolingual Cantonese-speaking child from the Hong Kong Cantonese Child Language Corpus

(CANCORP) (Lee et al.,1996) and one monolingual English-speaking child from the Bloom (1970) corpus (Bloom, Hood & Lightbrown, 1974). Background information of these four children is provided below.

3.4.1 Subjects

3.4.1.1 Cantonese-English bilingual children

The lexical development of two Cantonese-English bilingual children, Sophie and Charlotte, from the Hong Kong Bilingual Child Language Corpus (Yip & Matthews, 2007) is studied longitudinally from 1;06 to 3;00. Their language dominance is defined in terms of the differential of Mean Length of Utterance (MLU) values (Yip & Matthews, 2007). Table 3.1 reports their mean MLU values in each language and the MLU differentials between their two languages.

Table 3.1 Mean MLU and MLU differentials in two Cantonese-English bilingual children

Child	Sophie	Charlotte
Age range	1;06.00-3;00.09	1;08.28-3;00.03
Cantonese MLU	2.58	1.74
English MLU	1.73	2.33
MLU differential (Cantonese MLU – English MLU)	0.85	-0.59
MLU differential (Proportion of Cantonese MLU to English MLU)	149%	75%

(adopted from Yip & Matthews, 2007)

As shown in Table 3.3, Sophie has a mean MLU differential of 0.85 and her Cantonese MLU value represents 149% of her English MLU value, while Charlotte has a mean MLU differential of -0.59 and her Cantonese MLU value represents 75% of her English MLU value. These figures suggest that Sophie is Cantonese-dominant

whereas Charlotte is English-dominant. In this study, two children, each with a different dominant language, are chosen so that the role of language dominance in the development of nouns and verbs in bilingual children can be investigated.

The data of these two children in both Cantonese and English are available in the CHILDES database in the form of video-linked or audio-linked transcripts (MacWhinney, 2000). Both children grew up in a bilingual environment in which their parents adopted a one parent-one language principle when addressing the children. Each session consists of approximately 30 minutes of recording in Cantonese and approximately 30 minutes of recording in English. Each two consecutive recording sessions are roughly two to four weeks apart.

Table 3.2 summarizes the age span and the number of recording sessions of the bilingual subjects in this study.

Table 3.2 Age span and the number of recordings in two Cantonese-English bilingual children

Child	Sophie	Charlotte
Age	1;06.00-3;00.09	1;08.28-3;00.03
Dominant language	Cantonese	English
Number of Cantonese files	40	19
Number of Cantonese utterances	12,574	4,012
Number of English files	40	19
Number of English utterances	6,717	4,621

(adopted from Yip & Matthews, 2007)

3.4.1.2 Monolingual children

In order to investigate whether and how the cross-linguistic influence occurs in the lexical development of bilingual children, the developmental patterns of nouns and verbs in these two bilingual children's Cantonese and English are compared with those of their monolingual counterparts. In this thesis, the lexical development of one

monolingual Cantonese-speaking child and one monolingual English-speaking child is studied longitudinally.

The data of the monolingual Cantonese-speaking child, CCC, comes from the Hong Kong Cantonese Child Language Corpus (CANCORP) (Lee et al., 1996). All the eight children in the CANCORP were recorded on an approximately bi-weekly basis during the period of data collection. Among the children in the CANCORP, CCC is chosen for comparison in this study because he was brought up in an entirely monolingual Cantonese-speaking environment and he had no exposure to other languages during the period of data collection. All of his family members spoke Cantonese to him and there were no foreign domestic helpers at his home. He had not started attending any nursery schools before the end of the period of investigation. In addition, CCC's recordings covered the age range from 1;10 to 2;10. His first recording session started before age two and the last recording session ended at nearly age three. Therefore, the lexical developmental patterns in bilingual children's Cantonese before 2;00 and after 2;06 can be compared to those of CCC, the monolingual Cantonese-speaking child.

The data of the monolingual English-speaking child, Peter, comes from the Bloom (1970) corpus (Bloom et al., 1974). Peter was born to an English-speaking family in USA, with his parents speaking English to him. During the period of data collection, he was recorded approximately once in two to three weeks. His recordings covered the age range from 1;09 to 2;10.

Table 3.3 summarizes the age span and the number of recording sessions of the monolingual subjects in this study.

Table 3.3 Age span and the number of recordings in two monolingual children

Child	CCC	Peter
Age	1;10;08-2;10;27	1;09.08-2;10.19
First language	Cantonese	English
Number of files	21	19
Number of utterances	12023	23013

3.4.2 The monolingual and bilingual data

3.4.2.1 Developmental stages

In order to determine how the lexical category bias changes throughout the age span, the language data of each child are divided into three stages according to age intervals. The first stage covers the recording sessions up to age 2;00. The second stage covers the sessions from 2;01 to 2;06, and the third stage covers the sessions at or after 2;07. In such a way, the development of nouns and verbs in the earlier and later stages are compared for each child.

Table 3.4 summarizes the details of the language data of each child at each stage.

Table 3.4 Age span and the number of recordings at each stage for all children

Subjects		Sophie	Charlotte	CCC	Peter
First Language(s)		Cantonese & English	Cantonese & English	Cantonese	English
Stage 1	Age span	1;06.00–2;00.18	1;08.28–2;00.25	1;10.08–1;11.21	1;09.08–2;00.10
	No. of recording sessions	14	5	3	6
Stage 2	Age span	2;01.06–2;06.12	2;01.22–2;06.16	2;01.10–2;06.24	2;01.00–2;06.16
	No. of recording sessions	13	7	10	9
Stage 3	Age span	2;07.01–3;00.09	2;07.23–3;00.03	2;07.06–2;10.27	2;07.13–2;10.19
	No. of recording sessions	13	7	8	4

3.4.2.2 Data inclusion/exclusion

For each recording session, the number of words produced by the children in each language is counted. Using the CLAN software, the number of words of each category produced by the child is computed based on the transcript. Then, the words and the categories of these words are manually checked against the utterances in the transcript. Two categories of word types are identified in this study: nouns and verbs. Their defining criteria will be discussed in detail in section 3.4.3. The categories for class-ambiguous words will be determined according to the context of the transcript. Any single-word utterances in which the category of the word cannot be determined through the context of the transcript are excluded from analysis. Onomatopoeic words and utterances that are clearly imitated or cannot be interpreted are excluded from counting and analysis. Colour terms are also excluded from counting and analysis because they can fall into either the noun or adjective categories.

3.4.3 Classification of nouns and verbs in Cantonese and English

Nicoladis (2001) pointed out that different researchers have used different definitions of "noun" and "verb" in their studies. In previous studies related to lexical acquisition, most researchers considered "noun" and "verb" in notional terms as words denoting objects and actions respectively (e.g. Dromi, 1987), while some researchers considered these terms as syntactic categories (e.g. Maratsos, 1988; Ninio, 1988). Although many nouns are labels for persons, places and things, there are also nouns denoting abstract concepts, for example, *name*. Moreover, some words can fall into more than one syntactic category, depending on the syntactic context, for example, *comb* and *dress*. But Bloom, Tinker and Margulis (1993) pointed out that children's early words start with one or two word combinations only. As the syntactic context is lacking in children's early language, it is more difficult to determine the

syntactic categories of their words, especially those that are class-ambiguous. Relying solely on either semantic or syntactic criteria may have caused biased results in the previous studies.

Moreover, grammatical categories like nouns, verbs, and adjectives can be defined differently in different languages. For example, Cantonese and English are genetically and typologically unrelated. They are different in their inventory of grammatical categories and membership of each category. In English, nouns, verbs, and adjectives are clearly distinguished by syntax, morphology, and word order, while in Cantonese, the differences among these categories are not so clear-cut (Francis & Matthews, 2005). Therefore, setting clear criteria for nouns and verbs in Cantonese and English is important in studying lexical development in Cantonese-English bilingual children.

3.4.3.1 Criteria for identifying nouns in Cantonese and English

Grammatically, nouns in noun phrases (NPs) appear as the subject or object of a verb in any language. They can appear in subject or object position, or as the object of a preposition. In Cantonese, nouns can be preceded by sortal or mensural classifiers and can form [classifier + noun] phrases with classifiers (e.g. Cheng & Sybesma, 1999, 2005; Cheung, 2007; Matthews & Yip, 2011). In English, nouns can be preceded by determiners *a*, *an* or *the* and can form [determiner + noun] phrases with determiners. Most English nouns can take a plural marker *–s*.

Semantically, in both languages, object labels such as *ball*, *hand*, *rabbit* and *bo1bo1* 'ball', *sau2* 'hand', *tou3zai2* 'rabbit' are considered as nouns because each of them refers to an individual entity. Words which label persons and places such as *soldier*, *policeman*, *park* and *si6bing1* 'soldier', *ging2caat3* 'policeman', *gung1jyun2* 'park' are classified as nouns, and those denoting abstract concepts such as *name*,

story, *birthday* and *meng2* 'name', *gu2zai2* 'story', *saang1jat6* 'birthday', are also included in the counting of nouns.

In this study, proper names and kinship terms are excluded from the counting of nouns in both languages because their frequency of occurrence is affected by different cultures. In some cultures like Chinese and Kaluli, proper names and kinship terms are very important and they occur more frequently in sociolinguistic contexts (Erbaugh, 1992; Schieffelin, 1990); but in other cultures, they are not as important and occur less frequently. Moreover, proper names do not generalize beyond one individual and they do not take determiners or plural forms in most cases (Nelson, Hampson & Kessler Shaw, 1993), so excluding proper nouns and kinship terms from counting will facilitate the comparison between Cantonese and English.

3.4.3.2 Criteria for identifying verbs in Cantonese and English

Grammatically, verbs serve as the predicate or the head of a predicative expression in any language. In English, verbs are distinguished according to morphology and syntax. Morphologically, verbs can take inflections such as past tense or perfective aspect suffix *–ed*, progressive aspect suffix *–ing*, and the third person singular morpheme *–s*. Syntactically, verbs in English follow the subject and precede the object in sentences. In this study, auxiliary verbs in English such as *will*, *may*, *can*, *should*, and *do* are excluded from counting because their functions and usage are different from main verbs. For example, they must occur with a main verb and cannot stand alone as verb phrases except in cases of ellipsis and question tags.

In Cantonese, verbs are distinguished according to the following criteria. First, they can be preceded by the negation words *m4*, *mei6*, or *m4hou2* (e.g. Cheung, 2007; Matthews & Yip, 2011). Second, they can take aspect markers such as the progressive *gan2*, the perfective *zo2*, and the experiential *gwo3* (e.g. Cheung, 2007; Matthews &

Yip, 2011). Third, they can appear in A-not-A form of a question (e.g. Cheung, 2007; Matthews & Yip, 2011; Li & Thompson, 1981). In this study, auxiliary verbs in Cantonese such as *ho2ji5* 'can', *wui5* 'will', and *jing1goi1* 'should' are excluded from the counting of verbs because they behave differently from most verbs. For example, they cannot take aspect markers and must be followed by a verb (Li & Thompson, 1981).

Semantically, in both languages, words which label actions or activities such as *eat*, *sleep*, *buy* and *sik6* 'eat', *fan3gaau3* 'sleep, *maai5* 'buy' are considered as verbs. Words denoting states such as *like*, *understand*, *want* and *zung1ji3* 'like', *ming4baak6* 'understand', *soeng2* 'want' are also classified as verbs. Further, existential verbs including *have*, *has* and *jau5* 'have' and copula verbs including *is*, *am*, *are* and *hai6* 'be' which function as main verbs are included in the counting of verbs in this study.

3.4.3.3 Distinction between verbs and adjectives in Cantonese

According to syntactic and morphological criteria, the boundary between verbs and adjectives is not so clear-cut in Cantonese. Cantonese adjectives behave similarly to verbs in many ways. For example, both can appear in A-not-A form of a question, both can be preceded by the negation word *m4*, and both can take aspect markers. In light of this, some researchers (e.g. Li & Thompson, 1981; Francis & Matthews, 2005) argue that Cantonese adjectives do not form a separate syntactic category but should be treated as a sub-category of verbs, known as "stative verbs". In addition, many "adjectives" in Cantonese exhibit the structural properties of stative verbs. For example, both can be modified by an intensifier or other adverbs of degree. Consider the following examples:

(1) a. 佢好靚

   keoi5   hou2   leng3

   s/he   very   pretty

   's/he is pretty'

 b. 佢好明白

   keoi5   hou2   ming4baak6

   s/he   very   understand

   's/he understands well'

In this example, the gradable predicate *leng3* 'pretty' in (1a) and the verb *ming4baak6* 'understand' in (1b) can both be modified by the intensifier *hou2* 'very'.

　　Stative verbs and adjectives are also similar in the sense that both can occur in the comparison construction [NP V/Adj *gwo3* NP]. Consider the following examples:

(2) a. 佢仲靚過我

   keoi5   zung6   leng3   gwo3   ngo5

   s/he   still/even pretty   than   me

   's/he is even prettier than me'

 b. 佢仲明過我

   keoi5   zung6   ming4   gwo3   ngo5

   s/he   still   understand   than   me

   's/he understands more than I am'

In this example, both *leng3* 'pretty' in (2a) and *ming4* 'understand' in (2b) can be followed by the comparative marker *gwo3*. Some researchers then consider both of them as verbs, with *leng3* as an adjectival verb and *ming4* as a stative verb. In light of

the similarities shared by these two words, some researchers classify both of them as belong to the category of verbs, with *leng3* as an adjectival verb and *ming4baak6* as a stative verb.

Regardless of what is the best analysis for the treatment of Cantonese stative verbs and adjectives on theoretical grounds, I would like to make distinctions between these two types of words on the basis of methodological grounds in this thesis.

First, transitive verbs take objects while adjectives normally do not (Lau, 1999). Stative verbs such as *ming4baak6* 'understand', *zi1dou3* 'know', and *zung1ji3* 'like' can take objects, so they are treated as verbs in this study. On the other hand, adjectives such as *leng3* 'pretty', *gou1* 'tall', and *daai6* 'big' cannot take objects. So if they do not take aspect markers or show other verbal properties, they are not counted as verbs. If adjectives are also included as verbs in this study, the N/(N+V) ratio will be lowered almost automatically. It would then become difficult to separate this factor from the other hypotheses that are to be tested. Therefore, for the purpose of comparison between English and Cantonese, adjectives are separated from the category of verbs and excluded from the counting of verbs, while stative verbs are considered as a sub-category of transitive verbs.

Second, stative predicates such as *nau1* '(be) angry', *geng1* '(be) afraid', and *daam1sam1* 'worry/worried' can be either transitive or intransitive. Consider the following examples:

(3) a. 佢好嬲

     keoi5   hou2   nau1

     s/he   very   angry

     's/he is angry'

b. 佢好嬲我

keoi5　hou2　nau1　ngo5

s/he　very　angry　me

's/he is angry with me'

(4) a. 我好驚

ngo5　hou2　geng1

I　very　afraid

'I am afraid'

b. 我好驚巫婆

ngo5　hou2　geng1　mou4po4

I　very　fear　witch(es)

'I fear witches'

In these examples, *nau1* 'angry' in (3a) and *geng1* 'afraid/fear' in (4a) are intransitive, while *nau1* 'angry' in (3b) and *geng1* 'afraid/fear' in (4b) are transitive. Some researchers treat all these stative predicates as stative verbs while others treat them as adjectives. In this study, for the purpose of comparison between English and Cantonese, only those stative predicates taking a transitive object are analyzed as verbs, falling into the sub-category of stative verbs, as adjectives do not normally take objects (Lau, 1999). In this case, *nau1* 'angry' in (3b) and *geng1* 'afraid/fear' in (4b) are counted as verbs whereas *nau1* 'angry' in (3a) and *geng1* 'afraid/fear' in (4a) are excluded from the counting of verbs.

Third, some stative predicates can occur in the comparative construction [NP V/Adj *gwo3* NP] and they can take the intensifier *hou2* 'very' or other adverbs of degree as well as aspect markers. Consider the following examples:

(5) a. 個蘋果爛咗

   go3   ping4gwo2   laan6   zo2

   CL   apple   rotten   ASP

   'The apple is rotten'

   b. 個蘋果好爛

   go3   ping4gwo2   hou2   laan6

   CL   apple   very   rotten

   'The apple is very rotten'

   c. 呢個蘋果爛過嗰個蘋果

   li1   go3   ping4gwo2   laan6   gwo3   go2   go3   ping4gwo2

   this CL   apple   rotten   than   that CL   apple

   'This apple is more rotten than that apple'

As shown in these examples, *laan6* 'rotten' can be followed by the perfective aspect marker *zo2* in (5a) whereas it takes the intensifier *hou2* 'very' in (5b) and is followed by the comparative marker *gwo3* in (5c). In this study, only those stative predicates taking aspect markers are analyzed as verbs, falling into the sub-category of stative verbs. In this case, *laan6* 'rotten' in (5a) is counted as a verb whereas *laan6* in (5b) and (5c) are excluded from the counting of verbs.

3.4.3.4 Distinction between verb-object compounds and verb-object phrases in Cantonese

Verb-object constructions are very common in Cantonese. Some of them are verb-object phrases in which the object is counted as an independent noun, whereas others are considered as verb-object compounds in which the object is the part of the

verb because the relationship between the verb and object is very close (Matthews & Yip, 2011) and the meaning of the whole verb is incomplete if the object is dropped. In other words, each verb-object phrase consists of a verb and a noun, while each verb-object compound is treated as a verb. It is important to make clear distinctions between verb-object compounds and verb-object phrases, as it will affect whether a noun bias is observed in the early lexicon of Cantonese-speaking children.

In this study, I follow Chao (1968)'s criteria in distinguishing verb-object compounds from verb-object phrases. Any verb-object constructions fulfilling at least one of the following criteria are considered as verb-object compounds and they are counted as verbs in this study. First, among the two constituents in the verb-object constructions, at least one of them should be a bound morpheme. Second, the meaning of the entire verb-object construction is idiomatic. Third, the whole verb-object construction is inseparable, or only separable to a limited extent.

Consider the verb-object constructions *cung1-loeng4* 'take a shower/bath' and *fan3-gaau3* 'sleep'. The object *loeng4* and *gaau3* are bound morphemes. So these two verb-object constructions are treated as verb-object compounds and they are counted as verbs in this study. Also consider the verb-object construction *tau2-hei3* 'breathe'. The verb *tau2* means "take a rest" and the object *hei3* means "air". However, when these two constituents are combined, the whole verb-object construction carries the meaning of "breathe". The object cannot be dropped or replaced by other nouns; otherwise the meaning of "breathe" is lost. So the whole *tau2-hei3* 'breathe' is treated as a verb-object compound and it is counted as a verb in this study.

On the other hand, consider the verb-object construction *waak6-waa2* 'draw (picture)'. The verb *waak6* means "draw" and the object *waa2* means "picture". When these two constituents are combined, their original meaning remains. In addition, both constituents are free morphemes and they can be separated. See the following

examples:

(6) a. 畫一幅畫

     waak6   jat1   fuk1   waa2

     draw   one   CL   picture

     'draw a picture'

  b. 畫，我唔想再畫嘿

     waa2,   ngo5   m4   soeng2   zoi3   waak6   laa3

     picture(s)   I   NEG   want   again   draw   SFP

     'As for pictures, I don't want to draw anymore'

Example (6a) shows that the verb *waak6* 'draw' and the object *waa2* 'picture' can be separated by a [Numeral-Classifier] phrase. Example (6b) shows that the object *waa2* 'picture' can be topicalized and it can precede the subject in a sentence. As the verb-object construction *waak6-waa2* 'draw (picture)' is separable and the two constituents *waak6* 'draw' and *waa2* 'picture' are free morphemes, it is treated as a verb-object phrase in this study. The verb *waak6* 'draw' is counted as a verb while the object *waa2* 'picture' is counted as a noun.

3.4.3.5 Resultative-verb constructions in Cantonese

Apart from verb-object constructions, resultative-verb constructions are also very common in Cantonese. In a resultative-verb construction, two verbs are combined to form a predicate, and the second verb denotes the result of the first verb (Li & Thompson, 1981; Matthews & Yip, 2011). In this study, resultative-verb constructions are considered as compounds and each of them is counted as one verb because the whole resultative-verb compound cannot be separated in a sentence. A

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resultative-verb compound can take an object and it can take an aspect marker. Consider the following examples:

(7) a. 我搣爛張紙

ngo5   mit1-laan6   zoeng1   zi2

I   tear-broken   CL   paper

'I tore the piece of paper'

b. *我搣張紙爛

ngo5   mit1   zoeng1   zi2   laan6

I   tear   CL   paper   broken

'I tore the piece of paper'

(8) a. 我搣爛咗張紙

ngo5   mit1-laan6   zo2   zoeng1   zi2

I   tear-broken   PFV   CL   paper

'I have torn the piece of paper'

b. *我搣咗爛張紙

ngo5   mit1   zo2   laan6   zoeng1   zi2

I   tear   PFV   broken   CL   paper

'I have torn the piece of paper'

In example (7a), the resultative-verb compound *mit1laan6* 'tear' takes an object *zoeng1-zi2* 'the piece of paper'. In example (8a), this compound can be followed by the perfective aspect marker *zo2*. Examples (7b) and (8b) show that the second verb *laan6* 'broken' cannot be separated from the first verb *mit1* 'tear' in sentences. Therefore, *mit1laan6* is counted as one verb in this study.

3.4.4 Data analysis

3.4.4.1 Counting word types and tokens for nouns and verbs

Based on the categorization of grammatical categories, word types and word tokens are counted for each child in both languages. Word types refer to the number of different words produced, and word tokens refer to the total number of all the words produced. In this thesis, noun types, noun tokens (number of each noun type), verb types and verb tokens (number of each verb type) in each recording session and at each stage are counted in Cantonese and English separately. By counting word types, we can establish how many different nouns and verbs children have acquired. By counting word tokens, we can find out how frequently each noun and verb is produced by them. Children's production of words is counted in these two ways so that their lexical composition, in particular, the proportion of nouns and verbs, can be easily seen from different perspectives throughout their age span.

In this thesis, different regular forms (i.e. taking different inflections) of the same word, such as *ask*, *asking* and *asked*, *ce1* 'car' and *ce1ce1* 'car car', are treated as the same word type. But irregular forms, such as *break* and *broke*, *child* and *children*, are considered as different word types. This was a common method employed in previous studies (e.g. Sandhofer et al., 2000; Liu, 2007; Dhillon, 2010; etc.)

3.4.4.2 Calculating the proportion of nouns

For each child, on the basis of word types, the proportion of nouns to nouns + verbs is computed for each language. An N/(N+V) ratio higher than 0.55 means there is a noun bias whereas an N/(N+V) ratio lower than 0.45 means there is no noun but a verb bias, while an N/(N+V) ratio between 0.45 and 0.55 means neither noun bias nor verb bias can be found. By computing this ratio, we can know whether there is a noun

bias or verb bias in the lexical development of monolingual and bilingual children in both languages. In order to see how their lexical composition changes across the age span, the N/(N+V) ratio will be calculated in each recording session and at each stage. In order to see whether the overall lexical composition is different between monolingual and bilingual children in different languages, an N/(N+V) ratio is computed for each child for the period of investigation in Cantonese and English accordingly.

3.4.4.3 Calculating cumulative nouns and verbs throughout the age span

On the basis of word types, cumulative nouns and verbs are calculated for each recording session by counting the number of new noun types and verb types through comparison with the previous recording sessions for each child in each language. These cumulative figures in each recording session can help us understand the developmental rate and pattern of nouns and verbs in each language across the age span. Moreover, based on the cumulative figures for nouns and verbs on the basis of word types, an N/(N+V) ratio is computed for each recording session for each child in each language. Such ratios are calculated so that we can compare how the lexical composition changes cumulatively in each child across different stages in Cantonese and English.

3.4.4.4 Counting translation equivalents of nouns and verbs

Translation equivalents refer to words in one language that have a counterpart in another language referring to the same object, event, or process (Deuchar & Quay, 2000). In order to address the issue on cross-linguistic influence in bilingual lexical development, I count and analyze the translation equivalents between English and Cantonese produced by the bilingual children, based on the nouns and verbs extracted

from each recording session. In this study, I follow Deuchar and Quay (2000)'s method in analyzing the equivalent words in English and Cantonese.

For each bilingual child, I compare the nouns and verbs in Cantonese and English extracted from every recording session and identify the translation equivalents on the basis of the word meanings. If a word from Cantonese and a word from English refer to the same object, event or process (Deuchar & Quay, 2000) and they are used for the same purpose (Leopold, 1970), then these two words are considered as a pair of translation equivalents. For example, the nouns *dog* in English and *gau2* 'dog' in Cantonese are a pair of translation equivalents because their meaning is the same and they are used by the child to refer to a dog or dogs, and the verbs *eat* in English and *sik6* 'eat' in Cantonese are a pair of translation equivalents because they share the same meaning and they are used by the child to refer to the action "eating".

Some words in a language share the same equivalent word in another language in terms of word meanings. For example, the nouns *foot* and *leg* in English share the same equivalent word *goek3* 'foot/leg' in Cantonese. In this case, *foot* in English and *goek3* 'foot/leg' in Cantonese are treated as a pair of translation equivalents whereas *leg* in English and *goek3* 'foot/leg' in Cantonese are treated as another pair of translation equivalents. If the child produces the nouns *leg* in English and *goek3* in Cantonese, s/he is considered having produced one pair of translation equivalents. But if s/he produces both *leg* and *foot* for the Cantonese noun *goek3*, s/he is then considered as having produced two pairs of translation equivalents. Another example is the English verb *put* and its equivalent words *fong3*, *baai2* and *zai1* in Cantonese. All of them refer to the action "putting". If the child produces all these three Cantonese verbs for *put* in English, s/he is considered having produced three pairs of translation equivalents. But if s/he produces only one of these Cantonese verbs for *put*

in English, s/he is then considered having produced only one pair of translation equivalents.

When all the pairs of translation equivalents of nouns and verbs are found, the age at which each pair of translation equivalents is produced by the child is determined. Some translation equivalents may appear at the same age. Then this age is considered as the age producing these pairs. But for some translation equivalents, one member in the pair may be produced later than the other one. In this case, the age at which one member in the pair is produced later is considered as the age producing the equivalent pair.

After that, for each recording session, the number of translation equivalents is counted. The proportion of nouns/verbs with equivalents to the cumulative number of nouns/verbs in each recording session is calculated for each child in each language, so that the direction and extent of cross-linguistic influence in bilingual lexical development can be compared between English and Cantonese and between English-dominant and Cantonese-dominant bilingual children across stages.

3.4.4.5 Analyzing morphological and syntactic markings on nouns and verbs produced by the bilingual children

Unlike English, nouns and verbs in Cantonese are not distinguished by inflectional morphemes. However, these two categories of words can still be identified by syntactic markings. As discussed in section 3.4.3, nouns in Cantonese can be preceded by classifiers while verbs in Cantonese cannot. On the other hand, verbs in Cantonese can be preceded by negation words such as *m4*, can be followed by aspect markers, and can appear in A-not-A form of a question, whereas nouns in Cantonese cannot.

In order to test whether the bilingual children are making distinctions between

nouns and verbs in each language, the morphological and/or syntactic markings used by the children on nouns and verbs need to be investigated. In this study, I follow Tardif's (2006b) method for the analysis of nouns and verbs. For each child, the five most frequent nouns and the five most frequent verbs in each language are chosen, based on the number of word tokens. The children's utterances containing one of the five most frequent nouns and one of the five most frequent verbs in each language are extracted. Then, a frequency analysis of morphological and syntactic markings used on these target nouns and verbs in each language is conducted. Table 3.5 lists all the morphological and syntactic markings on nouns and verbs that will be included for analysis in English and Cantonese. In each language, the target nouns and verbs which carry the morphological and/or syntactic markings listed in Table 3.5 are counted. In addition, the age of first occurrence of each morphological and syntactic marking on nouns and verbs listed in Table 3.5 is also determined.

Table 3.5 Morphological and syntactic markings on nouns and verbs in English and Cantonese included in this study

	Nouns	Verbs
English	● preceded by determiners *a*, *an*, or *the* ● followed by the plural marker –*s*	● followed by the third person singular morpheme –*s* ● followed by the progressive aspect suffix –*ing* ● followed by the past tense or perfective aspect suffix –*ed*
Cantonese	● preceded by classifiers such as *go3*, *zek3*, and *di1*	● preceded by negation words *m4*, *mei6*, or *m4hou2* ● followed by aspect markers *zo2*, *gan2*, *gwo3*, *haa5*, or *zyu6* ● used in A-not-A form of a question

3.5 Summary

The hypotheses tested in this study are formulated and presented in sections 3.1-3.3. I discussed the predictions on how the universality of "noun bias" and language-specific properties will affect the lexical category bias in the two languages of Cantonese-English bilingual children. I also discussed the role of cross-linguistic influence and language dominance in affecting the nature and extent of their lexical category bias in Cantonese and English. Moreover, the background of both monolingual and bilingual subjects, the criteria of nouns and verbs in Cantonese and English, and the procedures of data analysis have also been presented. In the next chapter, we are going to look at the results in detail.

Chapter 4: Results and Discussion

Many researchers are interested in whether children's early vocabularies are dominated by nouns. In particular, they are concerned about whether such a phenomenon can be found in different languages and in both monolingual and bilingual children, and why the early vocabularies of so many children are dominated by nouns. In this chapter, I will present the results of this study in detail.

First, I will report the number of noun types and verb types and the N/(N+V) ratios at each stage for each child, in order to see whether the noun bias can be found across stages. Then, I will report the number of noun tokens and verb tokens at each stage for each child, so that we can understand how frequently nouns and verbs are produced in the bilingual children's two languages. The children's cumulative development of nouns and verbs in each language will also be presented. The results for the bilingual children will be compared with those for their monolingual peers, in order to see whether there are similarities or differences in the nature and extent of word category bias in these two groups of children. The frequency of translation equivalents of nouns and verbs in English and Cantonese of the bilingual children will be reported, and cross-linguistic influence observed in the lexical composition of their two languages will be discussed. In particular, how their language dominance affects their lexical developmental patterns and the cross-linguistic influence at the lexical level will be addressed. In addition, the findings in the bilingual children's English will be compared with those in their Cantonese, in order to see whether they have the same word category bias in the lexical development of both languages. Language-specific factors affecting the occurrence, nature, and extent of word category bias such as allowance or prohibition of null arguments and lexicalization patterns of nouns and verbs will be discussed. Finally, results on the analysis of

morphological and syntactic markings used for nouns and verbs in the bilingual children's English and Cantonese will be presented, in order to understand whether they can make noun-verb distinctions in both languages from very early on.

4.1 Lexical composition in early English

4.1.1 Number of noun types and verb types and N/(N+V) ratios in English

Tables 4.1, 4.2, and 4.3 report the number of noun types and verb types produced respectively by Sophie, Charlotte and Peter in English. Their proportion of nouns in relation to verbs in their early vocabularies is also computed in these tables.

Table 4.1 Number of noun and verb types and N/(N+V) ratio in Sophie's English

Age	No. of noun types	No. of verb types	N/(N+V) ratio
1;06-2;00	73	22	0.77
2;01-2;06	155	79	0.66
2;07-3;00	157	101	0.61
Overall	252	122	0.67

Table 4.2 Number of noun and verb types and N/(N+V) ratio in Charlotte's English

Age	No. of noun types	No. of verb types	N/(N+V) ratio
1;08-2;00	83	48	0.63
2;01-2;06	131	81	0.62
2;07-3;00	170	117	0.59
Overall	238	140	0.63

Table 4.3 Number of noun and verb types and N/(N+V) ratio in Peter's English

Age	No. of noun types	No. of verb types	N/(N+V) ratio
1;09-2;00	186	86	0.68
2;01-2;06	437	198	0.69
2;07-2;10	402	216	0.65
Overall	615	265	0.7

As can be seen from Tables 4.1, 4.2, and 4.3, all the children produced more

nouns than verbs in terms of word types across the three stages. A N/(N+V) ratio higher than 0.55 was yielded at each stage for each child. Moreover, the total number of word types in each child also shows the same tendency of nouns dominating over verbs in their early English lexicon. The overall N/(N+V) ratios for Sophie, Charlotte and Peter were 0.67, 0.63 and 0.7 respectively. All these ratios were higher than 0.6. Therefore, based on the number of word types and the N/(N+V) ratios, there is a noun bias in early English for both monolingual and bilingual children across the stages.

On the other hand, the N/(N+V) ratio in English has a tendency to decrease across stages for both monolingual and bilingual children. As can be seen from Tables 4.1, 4.2, and 4.3, Sophie's N/(N+V) ratio in English drops from 0.77 to 0.61 and Charlotte's N/(N+V) ratio drops from 0.63 to 0.59 across the three stages. Peter, the monolingual English-speaking child's N/(N+V) ratio also decreases from 0.68 to 0.65. From this point of view, the noun bias in early English weakens along with a gradual increase in verbs, even though the noun bias exists across the three stages in English.

4.1.2 Number of noun tokens and verb tokens in English

Nouns surpass verbs in terms of word types in early English. However, in terms of word tokens, nouns generally do not outnumber verbs in English. Table 4.4 shows the number of English noun tokens and verb tokens produced by Sophie, Charlotte, and Peter at different stages.

Table 4.4 Number of noun and verb tokens in English in the three children

Age	Sophie		Age	Charlotte		Age	Peter	
	Nouns	Verbs		Nouns	Verbs		Nouns	Verbs
1;06-2;00	207	66	1;08-2;00	301	301	1;09-2;00	2401	1460
2;01-2;06	682	695	2;01-2;06	631	1048	2;01-2;06	5566	6508
2;07-3;00	753	1166	2;07-3;00	1023	1983	2;07-2;10	3864	5522
Overall	1642	1927	Overall	1955	3332	Overall	11831	13490

According to Table 4.4, Charlotte, the English-dominant bilingual child produced an equal number of noun and verb tokens during the period from 1;08 to 2;00. Starting from 2;01, she produced more verb tokens than noun tokens. Sophie, the Cantonese-dominant bilingual child, and Peter, the monolingual English-speaking child, produced noun tokens more frequently than verb tokens during the period before age two. Starting from 2;01, their verb tokens were produced more frequently than noun tokens. For all these three children, their total verb tokens outnumbered their total noun tokens. The discrepancies between the number of word types and tokens for nouns and verbs show that the children produced many more different nouns than verbs, but they frequently produced a small number of verbs in their early English.

4.1.3 Cumulative nouns and verbs in English

Figures 4.1, 4.2 and 4.3 show the cumulative developmental pattern of English nouns and verbs on the basis of word types in Sophie, Charlotte, and Peter, respectively.
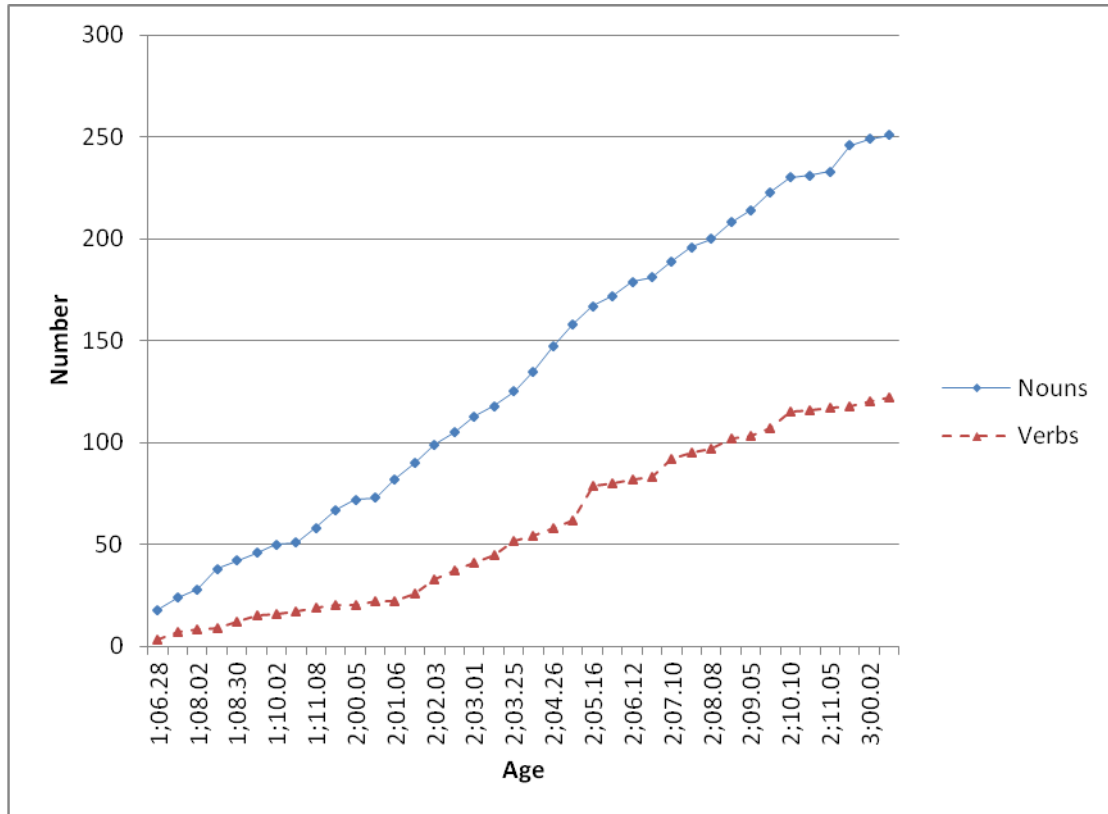
Figure 4.1 Sophie's cumulative noun types and verb types in English
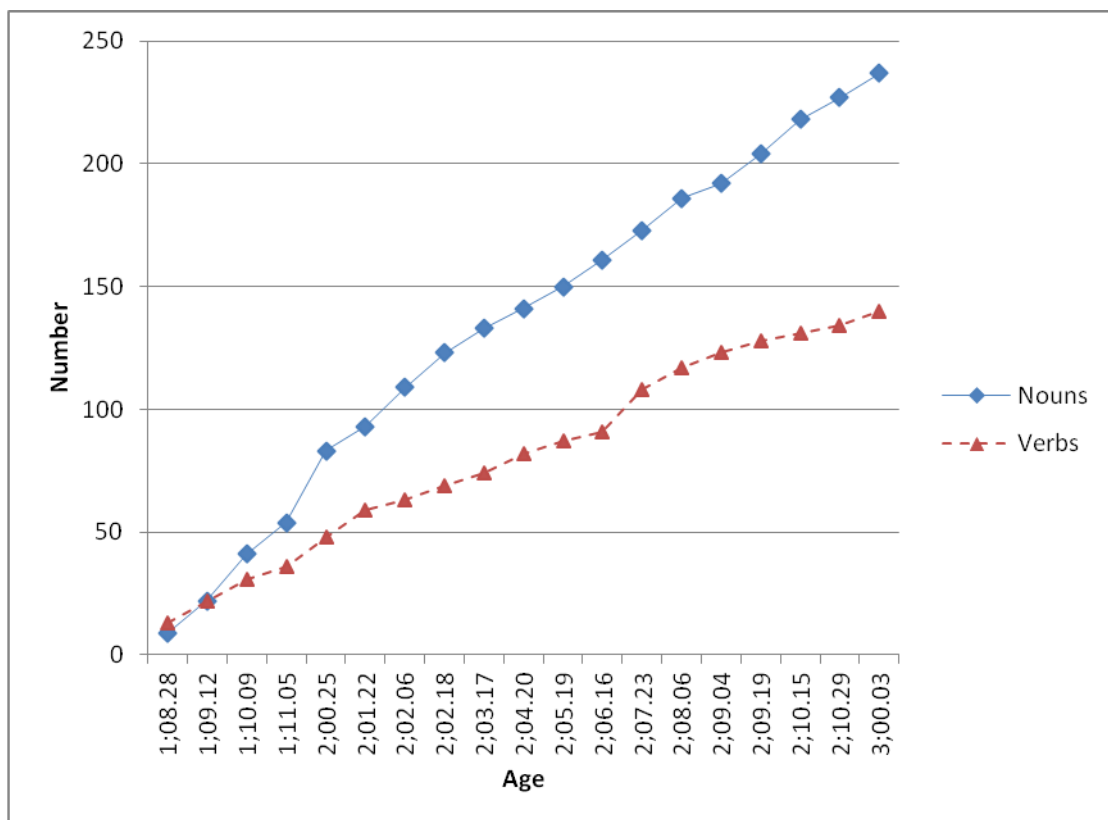
Figure 4.2 Charlotte's cumulative noun types and verb types in English
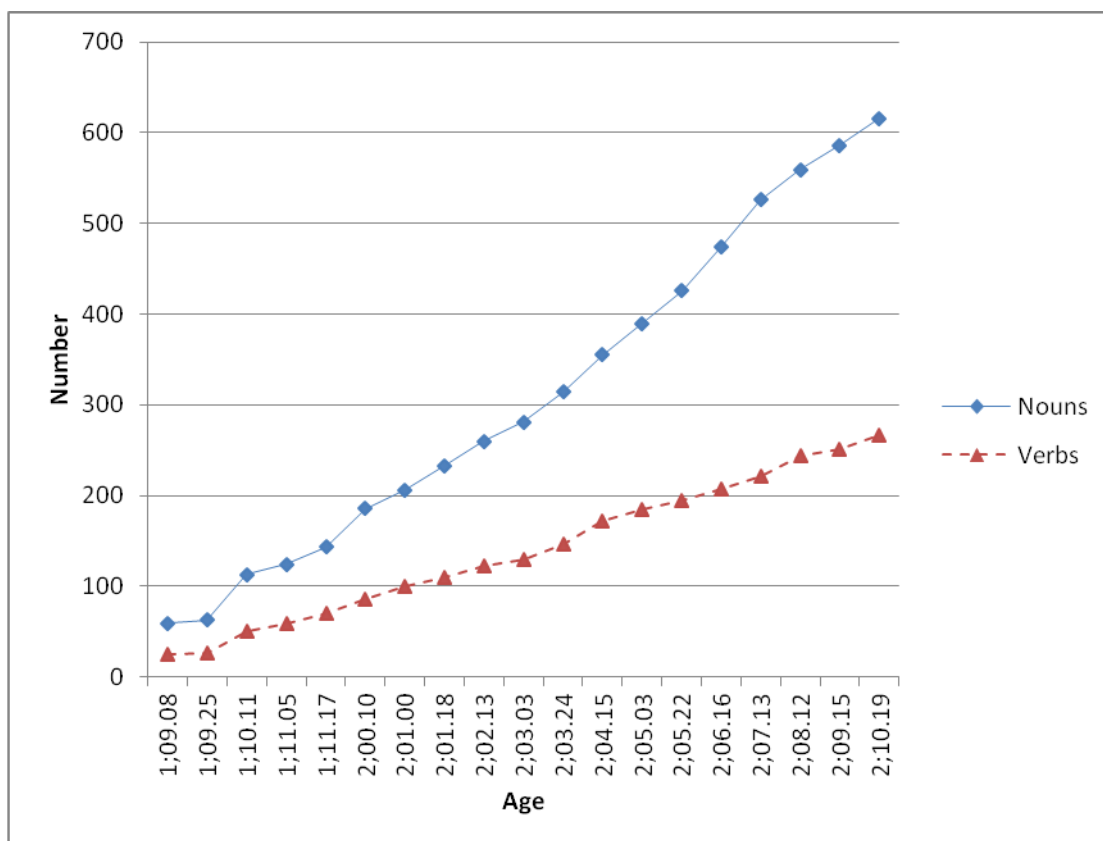
Figure 4.3 Peter's cumulative noun types and verb types in English

As seen from Figures 4.1, 4.2, and 4.3, English nouns develop faster than verbs in all children throughout their age span in this study. In particular, the increase in the number of nouns in Sophie and Peter is greater than the increase in verbs in every recording session. In Charlotte's English, though there are slightly more verbs than nouns at the beginning of this study, nouns start to develop faster than verbs afterwards. In general, all these three children have a noun bias throughout their course of lexical development in English.

4.1.4 Differences between Cantonese-English bilingual children and the monolingual English-speaking child

Although all children show the noun bias in their early English vocabulary across all stages, their extent of noun bias is different. Table 4.5 lists the English N/(N+V) ratios at each stage for each child.

Table 4.5 English N/(N+V) ratios in Sophie, Charlotte, and Peter (type measure)

Age	Sophie	Age	Charlotte	Age	Peter
1;06-2;00	0.77	1;08-2;00	0.63	1;09-2;00	0.68
2;01-2;06	0.66	2;01-2;06	0.62	2;01-2;06	0.69
2;07-3;00	0.61	2;07-3;00	0.59	2;07-2;10	0.65
Overall	0.67	Overall	0.63	Overall	0.7

In general, the noun bias found in Peter was stronger than that in the bilingual children, except for the period before 2;00. On the basis of word types, the overall N/(N+V) ratio of Peter was 0.7, while it was 0.67 and 0.63 for Sophie and Charlotte respectively. The mean N/(N+V) ratio of the bilingual children was 0.65 overall, which was lower than that of Peter, the monolingual child. Thus, there was generally a greater proportion of nouns in the monolingual child's lexicon than in the English lexicon of the other two bilingual children.

In particular, across the three stages, the N/(N+V) ratio ranged between 0.65 and 0.7 for Peter, while it ranged between 0.59 and 0.63 for Charlotte. Charlotte had a smaller proportion of nouns than Peter did throughout the age span. On the other hand, Sophie's N/(N+V) ratio in English was greater than Peter's at the beginning of the study. Starting from Stage 2 (2;01-2;06), her N/(N+V) ratio became lower than Peter's. Her initial noun bias in English was strong, but then it became weaker than the monolingual child.

Figure 4.4 shows the cumulative English N/(N+V) ratios of the three children throughout the age span.
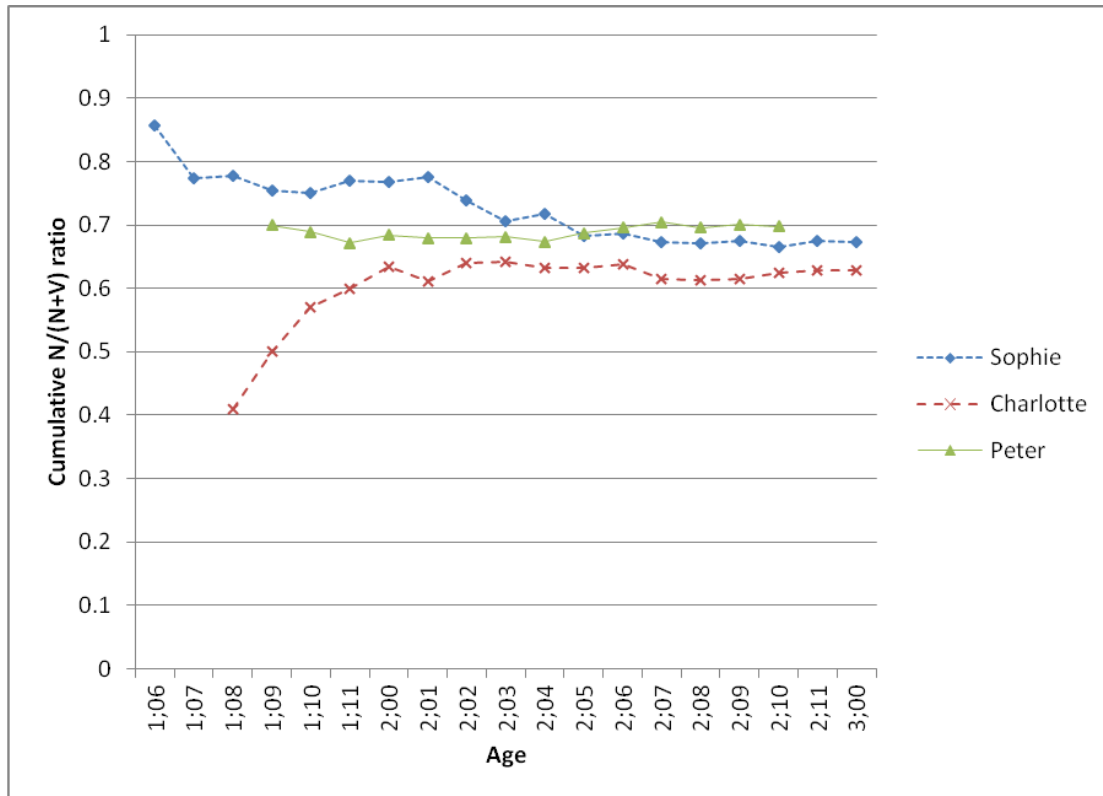
Figure 4.4 Cumulative English N/(N+V) ratios in Sophie, Charlotte, and Peter throughout the age span (type measure)

As seen from Figure 4.4, the cumulative N/(N+V) ratio of Peter remained at around 0.7 when his English nouns and verbs continued to develop throughout the age span. Charlotte did not start with a noun bias in English at the beginning of the study, as the cumulative N/(N+V) ratios were 0.41 at 1;08 and 0.5 at 1;09. However, a noun bias later developed in her English. Her cumulative N/(N+V) ratio increased to 0.63 at age two and it remained around 0.63 to 0.64. Moreover, Charlotte's cumulative N/(N+V) ratio in English ranged between 0.41 and 0.64 across the three stages, while that of Peter remained around 0.68 to 0.7. The English noun bias in Charlotte was not as strong as that in Peter throughout the age span.

Similar to the monolingual child, Sophie started with a noun bias in English in the first place. Her noun bias remained after age two, but it gradually weakened. Her cumulative N/(N+V) ratio in English decreased to 0.71 at 2;03 and it further dropped

to 0.67 from 2;07 onwards. Sophie had developed a smaller cumulative proportion of nouns than Peter did at 2;10. Compared with Charlotte's, however, Sophie's noun bias seemed to be more similar to that of Peter.

The discrepancies in the results of early lexical composition in English between the bilingual and monolingual children may be attributed to cross-linguistic influence from Cantonese. Figures 4.5 and 4.6 show the frequency of English verbs with Cantonese equivalents for Sophie and Charlotte, respectively.
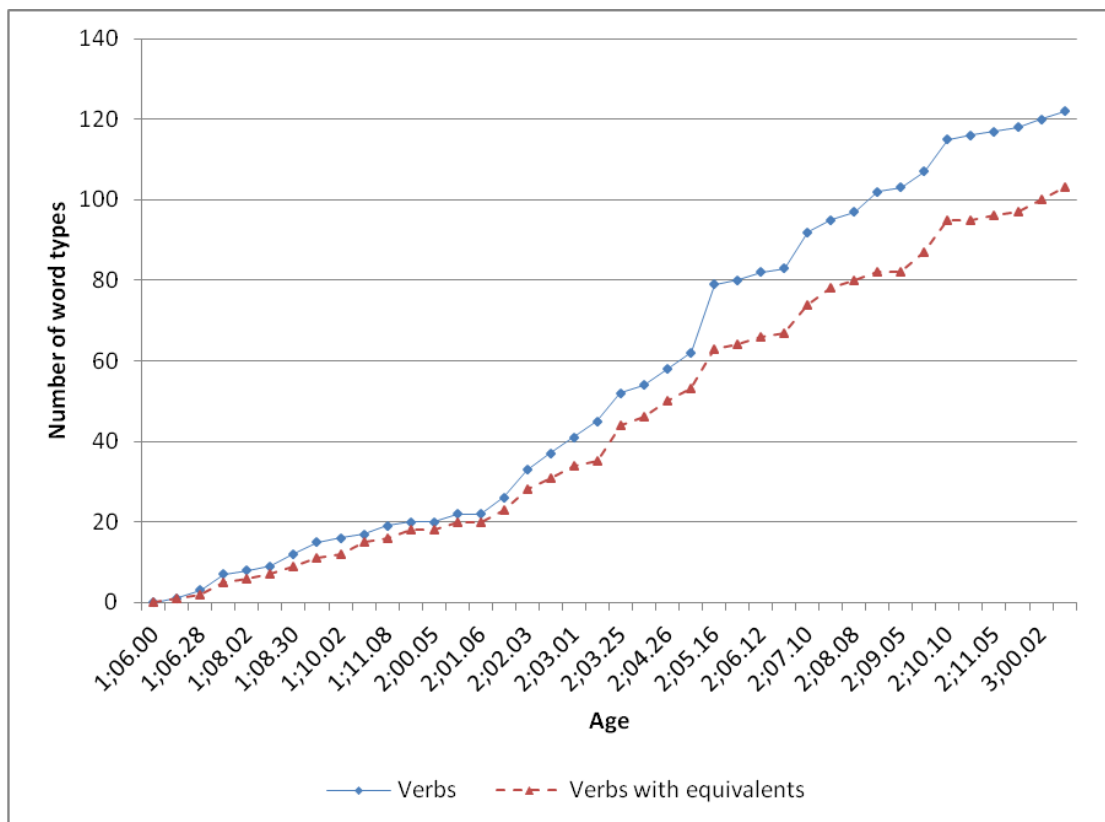
Figure 4.5 Frequency of Sophie's English verbs with Cantonese equivalents (1;06.00-3;00.09)
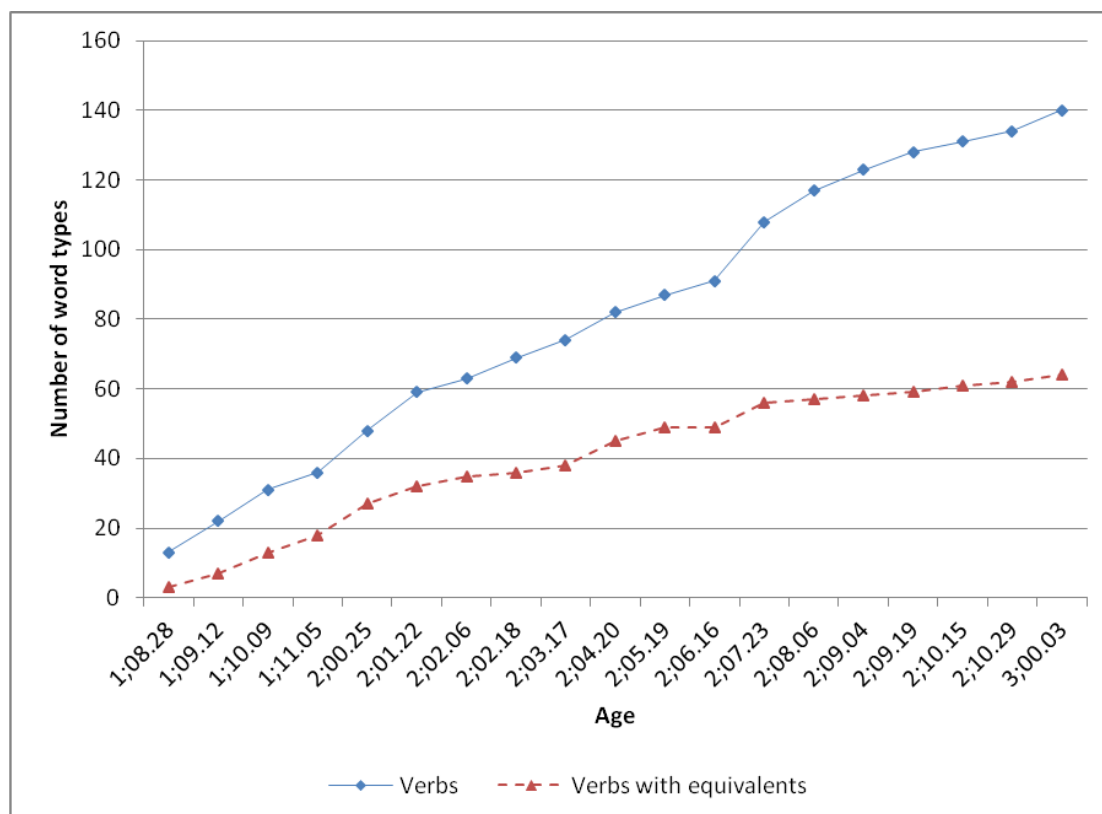
Figure 4.6 Frequency of Charlotte's English verbs with Cantonese equivalents (1;08.28-3;00.03)

As shown in Figure 4.5, more than 80% of Sophie's English verbs had Cantonese equivalents across the age span. Such proportion ranged from 40% to 60% for Charlotte from 1;10.09 onwards, as can be seen from Figure 4.6. In other words, the Cantonese equivalents of a number of English verbs were already acquired before the bilingual children produced the verbs in English. As discussed in section 3.2, verbs are salient in Cantonese in terms of structural properties, and children speaking Cantonese tend to produce more verbs. In the lexical development of Cantonese-English bilingual children, having knowledge of a verb in Cantonese favours its acquisition in English. As a result, bilingual children acquire more verbs than their monolingual peers do in English, which raises the proportion of verbs and lowers the N/(N+V) ratio in English for the bilingual children. Therefore, the N/(N+V) ratio and cumulative N/(N+V) ratio in English tend to be lower in the bilingual

children than in the monolingual English-speaking child.

4.1.5 Comparison between Cantonese-dominant and English-dominant bilingual children

As discussed in section 3.3.3, it is expected that the proportion of nouns to verbs will be different between English-dominant and Cantonese-dominant bilingual children. It is hypothesized that the N/(N+V) ratio in English for Charlotte, the English-dominant child, would be similar to that for Peter, the monolingual child, whereas such ratio for Sophie, the Cantonese-dominant child, would be smaller than both children due to cross-linguistic influence from her dominant language. However, as shown in Table 4.5, the N/(N+V) ratio of Charlotte not only fell below that of Peter, but it also remained lower than that of Sophie across stages. As can be seen from Figure 4.4, Charlotte's cumulative N/(N+V) ratio in English remained smaller than that of Sophie and Peter throughout the investigation. Even though Charlotte is dominant in English, she did not perform similarly to the monolingual child in her lexical composition but she developed a smaller proportion of nouns than Sophie in English. From this point of view, language dominance does not play a significant role as expected in cross-linguistic influence in the lexical composition (i.e. proportion of nouns to verbs) of the bilingual children's English.

4.1.6 Summary

The vocabularies of all the three children in English under investigation are dominated by nouns throughout the investigation. Their proportion of nouns to nouns + verbs on the basis of word types remained greater than 55% across stages, showing that there is a consistent noun bias in their lexical development in English. On the other hand, the extent of the noun dominance in English is different between the

bilingual children and the monolingual child. The English noun bias in the bilingual children is generally not as strong as that in the monolingual child. Moreover, although nouns develop faster than verbs in all the three children's English, the developmental pattern of nouns and verbs is different between the bilingual children and the monolingual child. Charlotte developed a smaller cumulative proportion of nouns than the monolingual child throughout the early years. For Sophie, the noun bias in her English gradually weakened and her cumulative proportion of nouns eventually fell below that of the monolingual child. The cross-linguistic influence from Cantonese, which is considered as a "verb-friendly" language (Gentner, 1982), provides a possible reason for Sophie's developmental pattern.

4.2 Lexical composition in early Cantonese

4.2.1 Number of noun types and verb types and N/(N+V) ratios in Cantonese

Tables 4.6, 4.7, and 4.8 show the number of noun types and verb types produced by Sophie, Charlotte, and CCC in Cantonese respectively. Their proportion of nouns in relation to verbs in their early vocabularies is also computed in these tables.

Table 4.6 Number of noun and verb types and N/(N+V) ratio in Sophie's Cantonese

	No. of noun types	No. of verb types	N/(N+V) ratio
1;06-2;00	154	116	0.57
2;01-2;06	192	154	0.55
2;07-3;00	183	204	0.47
Overall	312	270	0.54

Table 4.7 Number of noun and verb types and N/(N+V) ratio in Charlotte's Cantonese

	No. of noun types	No. of verb types	N/(N+V) ratio
1;08-2;00	26	41	0.39
2;01-2;06	44	45	0.49
2;07-3;00	35	36	0.49
Overall	82	70	0.54

Table 4.8 Number of noun and verb types and N/(N+V) ratio in CCC's Cantonese

	No. of noun types	No. of verb types	N/(N+V) ratio
1;10-2;00	33	25	0.57
2;01-2;06	138	178	0.44
2;07-2;10	182	195	0.48
Overall	249	250	0.5

As seen from Table 4.6, Sophie produced more noun types than verb types in Cantonese during the period from 1;06 to 2;06. Her N/(N+V) ratio was 0.57 at Stage 1 (1;06-2;00), which shows that her vocabulary in Cantonese started off with a slight noun bias. However, her N/(N+V) ratio decreased to 0.55 at Stage 2 (2;01-2;06). Although she still produced more noun types than verb types, the N/(N+V) ratio shows neither a noun bias nor a verb bias in Cantonese at this stage. At Stage 3 (2;07-3;00), she produced more verb types than noun types, and her N/(N+V) ratio further decreased to 0.47. This indicates that that her initial noun bias in Cantonese gradually weakened across the age span and disappeared at the final stage.

The lexical composition of Charlotte's Cantonese was different from Sophie's, however. According to Table 4.7, she produced more verb types than noun types across all stages. Her N/(N+V) ratio at Stage 1 (1;08-2;00) was 0.39, which was lower than 0.5, demonstrating that her vocabulary in Cantonese did not start with a noun bias but rather a verb bias. However, her N/(N+V) ratio increased to 0.49 during the period from 2;01 to 3;00 when she produced only one more verb type than noun types.

Starting from 2;01, her initial verb bias disappeared.

The monolingual Cantonese-speaking child, CCC, produced more noun types than verb types at Stage 1 (1;10-2;00). His Cantonese lexicon started to develop with a slight noun bias, with a N/(N+V) ratio of 0.57, which was higher than 0.55. Starting from 2;01, he produced more verb types than noun types, and his N/(N+V) ratios at Stage 2 (2;01-2;06) and Stage 3 (2;07-2;10) were 0.44 and 0.48 respectively. The initial noun bias in his Cantonese disappeared from 2;01 onwards.

On the other hand, the total number of word types did not show the verb bias in the Cantonese lexicon of all the children. Their overall N/(N+V) ratios throughout the investigation remained at 0.5 or above. However, the N/(N+V) ratios in Cantonese were lower than those in English. This point will be discussed in detail in section 4.3.

Thus, unlike English, all the children tended to have no noun bias in Cantonese throughout the investigation. Although Sophie, the Cantonese-dominant bilingual child, and CCC, the monolingual Cantonese-speaking child, showed a slight noun bias before 2;00, such a noun bias gradually weakened and disappeared in their Cantonese towards the end of the period of study. On the other hand, Charlotte, the English-dominant bilingual child, showed a verb bias in her Cantonese before 2;00, but the verb bias disappeared from 2;01 onwards with an increase in the proportion of nouns to nouns + verbs.

4.2.2 Number of noun tokens and verb tokens in Cantonese

According to the number of word tokens, verbs generally outnumber nouns in Cantonese. Table 4.9 shows the number of Cantonese noun tokens and verb tokens produced by Sophie, Charlotte, and Peter at different stages.

Table 4.9 Number of noun and verb tokens in Cantonese in the three children

Age	Sophie		Age	Charlotte		Age	CCC	
	Nouns	Verbs		Nouns	Verbs		Nouns	Verbs
1;06-2;00	993	1460	1;08-2;00	66	148	1;10-2;00	211	160
2;01-2;06	816	2052	2;01-2;06	163	346	2;01-2;06	882	2984
2;07-3;00	741	2909	2;07-3;00	120	367	2;07-2;10	1145	3354
Overall	2550	6419	Overall	349	861	Overall	2238	6498

As seen from Table 4.9, there were more verb tokens than noun tokens in Sophie's and Charlotte's Cantonese across all stages. Their total number of verb tokens also surpassed that of noun tokens twice. CCC's Cantonese verb tokens outnumbered his noun tokens during the period from 2;01 to 2;10, although there were more noun tokens than verb tokens during the period before 2;00. His total verb tokens were more than twice as his total noun tokens. Thus, not only did all three children produce many different verb types, but they also produced many verb tokens frequently in Cantonese.

4.2.3 Cumulative nouns and verbs in Cantonese

Figures 4.7, 4.8, and 4.9 show the cumulative developmental patterns of Cantonese nouns and verbs on the basis of word types in Sophie, Charlotte, and CCC, respectively.
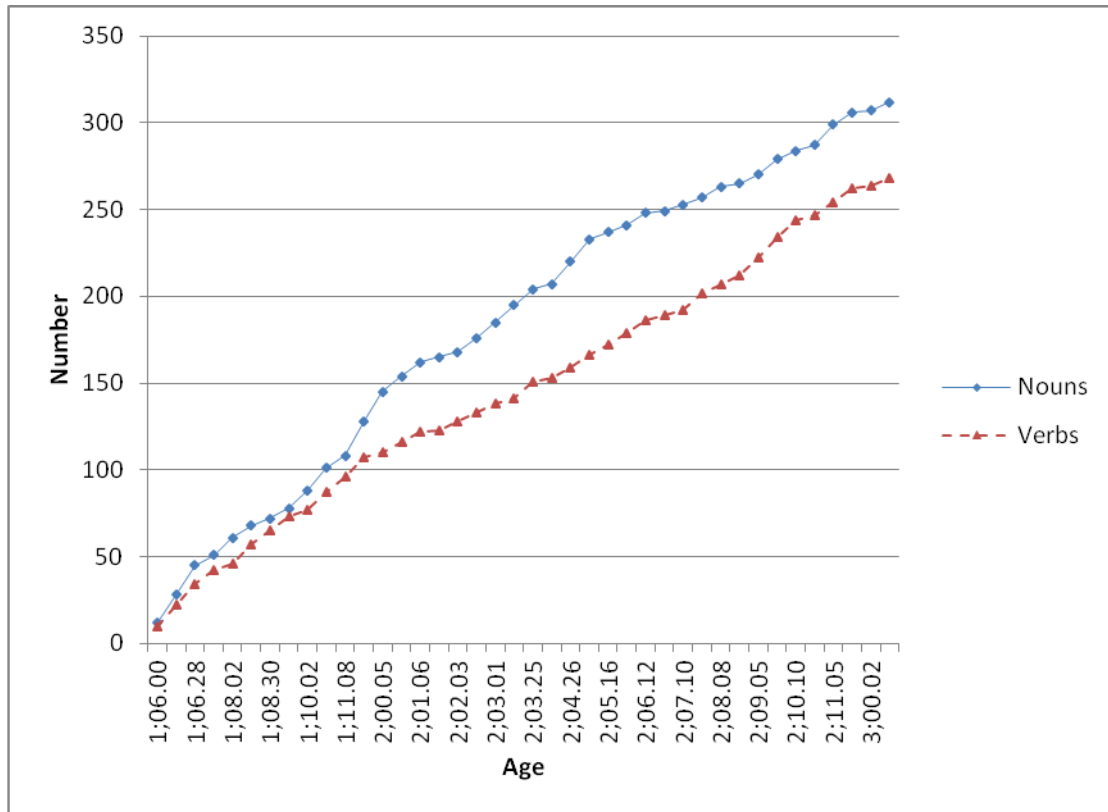
Figure 4.7 Sophie's cumulative noun types and verb types in Cantonese
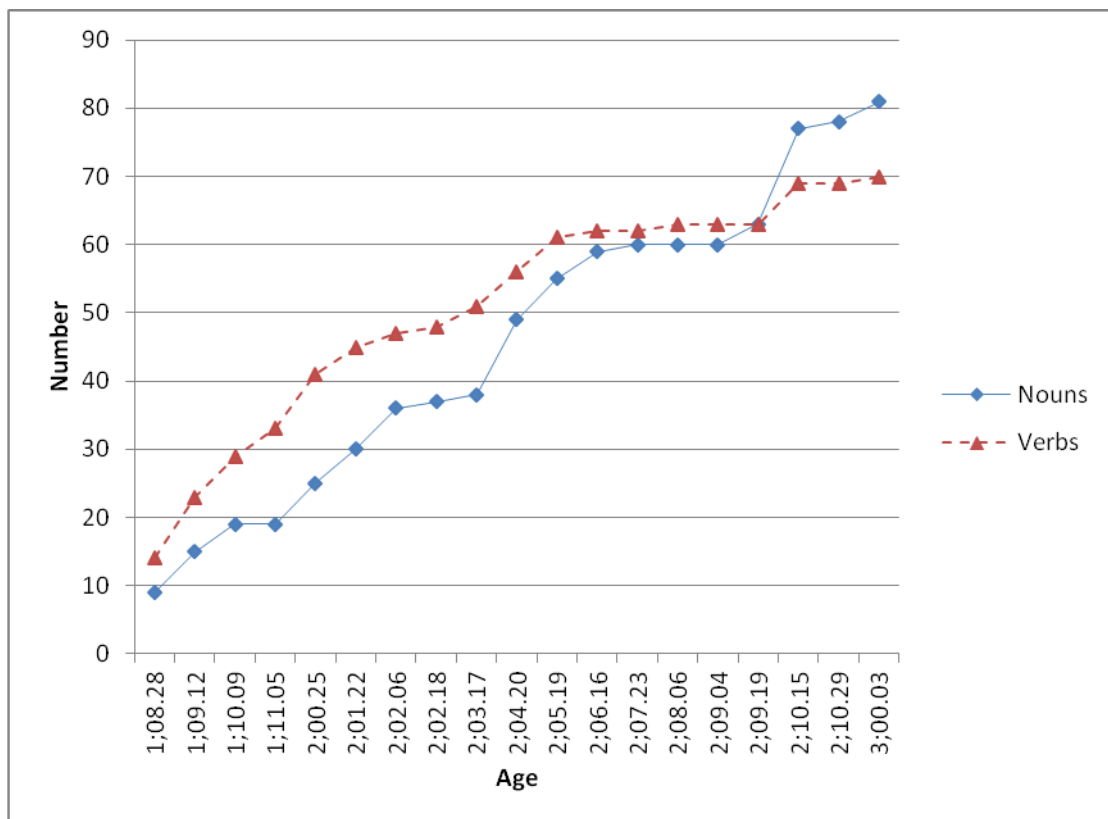
Figure 4.8 Charlotte's cumulative noun types and verb types in Cantonese
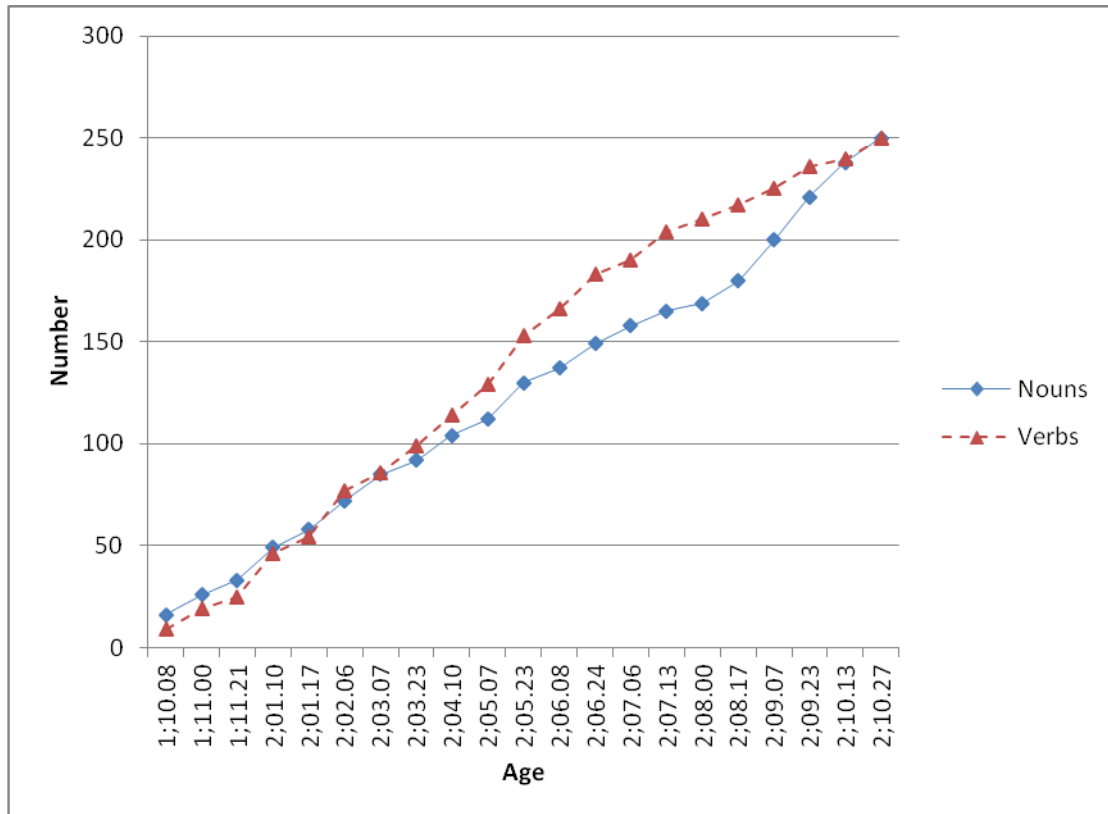
Figure 4.9 CCC's cumulative noun types and verb types in Cantonese

As can be seen from Figures 4.7 and 4.8, nouns developed faster than verbs in Sophie's Cantonese throughout the investigation but the same pattern was not observed for Charlotte. Verbs continued to develop faster than nouns in Charlotte's Cantonese until 2;09.19. Only after 2;09.19 did her total number of noun types start to surpass that of verb types. CCC, the monolingual Cantonese-speaking child, developed nouns slightly faster than verbs at the beginning of the study, but, starting from 2;02.06, his cumulative verb types outnumbered his noun types. As shown in Figure 4.9, the phenomenon of verbs developing faster than nouns continued until 2;10 in CCC. Only at the end of the period of investigation did the total number of his noun types become equal to that of his verb types.

To summarize, the cumulative developmental patterns of nouns and verbs in Cantonese are different among the three children. The differences of these three children in terms of cumulative N/(N+V) ratios in Cantonese will be discussed in

detail in the following section.

4.2.4 Differences between Cantonese-English bilingual children and the monolingual Cantonese-speaking child

There are some differences in the lexical composition of Cantonese between the two Cantonese-English bilingual children and the monolingual Cantonese-speaking child. Table 4.10 lists their Cantonese N/(N+V) ratios at each stage.

Table 4.10 Cantonese N/(N+V) ratios in Sophie, Charlotte, and CCC (type measure)

Age	Sophie	Age	Charlotte	Age	CCC
1;06-2;00	0.57	1;08-2;00	0.39	1;10-2;00	0.57
2;01-2;06	0.55	2;01-2;06	0.49	2;01-2;06	0.44
2;07-3;00	0.47	2;07-3;00	0.49	2;07-2;10	0.48
Overall	0.54	Overall	0.54	Overall	0.5

As seen from Table 4.10, the overall N/(N+V) ratios of Sophie and Charlotte were 0.54. For CCC, the ratio was 0.5. The proportion of nouns in the Cantonese lexicon of Sophie and Charlotte was slightly greater than that of CCC, although all three children showed no noun bias in their overall lexical composition in Cantonese, according to the criterion for "noun/verb bias" discussed in section 3.4.4.2.

In addition, the changes of the N/(N+V) ratio were different among these three children across the three stages. This will be discussed in section 4.2.5, which focuses on the differences between English-dominant and Cantonese-dominant bilingual children.

Figure 4.10 shows the cumulative Cantonese N/(N+V) ratios of Sophie, Charlotte and CCC throughout the age span.
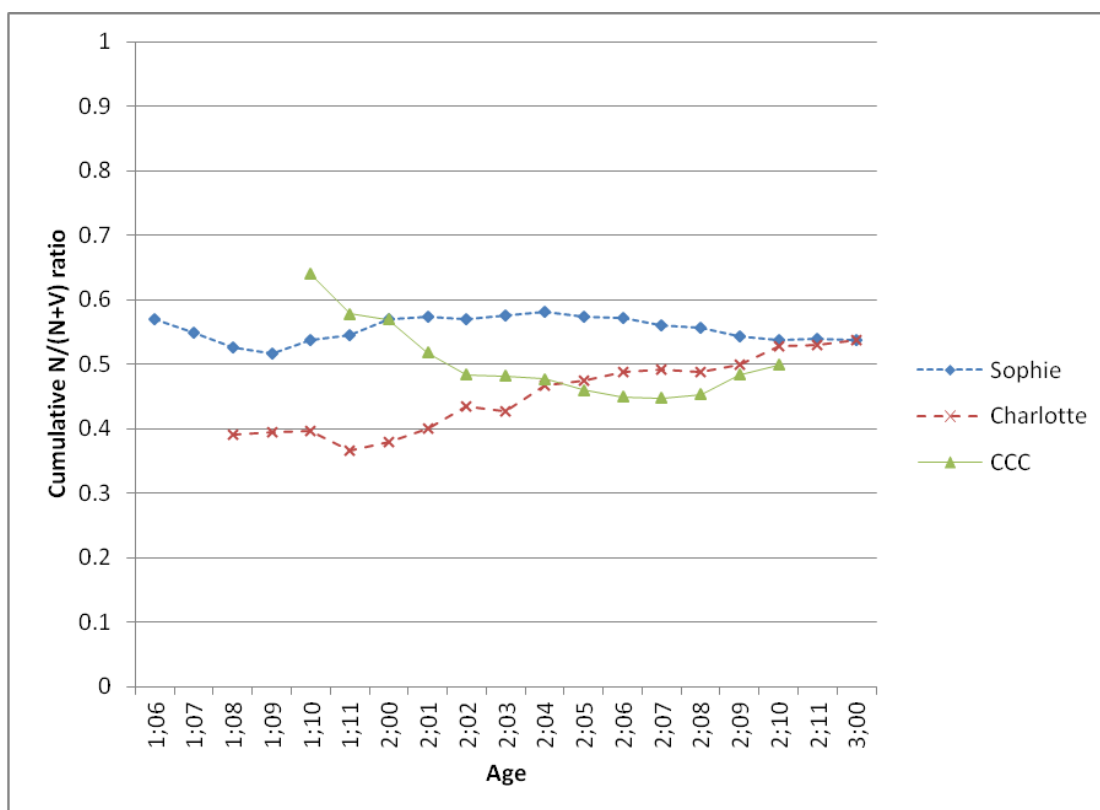
Figure 4.10 Cumulative Cantonese N/(N+V) ratios in Sophie, Charlotte, and CCC throughout the age span (type measure)

As Figure 4.10 shows, the cumulative figures for nouns and verbs show similar patterns to the number of noun and verb types in the lexical development of these three children in Cantonese. The cumulative N/(N+V) ratio of Sophie remained greater than that of CCC from 2;00 onwards and that of Charlotte remained greater than that of the monolingual child beginning from 2;05. At the end of the period of investigation, both bilingual children had a cumulative N/(N+V) ratio greater than 0.5 but lower than 0.55, whereas that of the monolingual child remained at 0.5. The bilingual children developed a greater cumulative proportion of nouns than the monolingual child did towards the end of the study period, although neither noun bias nor verb bias can be found in all three children's Cantonese at the end of the period of investigation, according to the criterion for "noun bias" discussed in section 3.4.4.2.

On the other hand, clear differences were shown in terms of the changes in

cumulative proportion of nouns to verbs among these three children across the age span. This will be discussed in section 4.2.5, which focuses on the differences between English-dominant and Cantonese-dominant children.

Thus, the discrepancies in the results for the lexical composition in the Cantonese between the bilingual and monolingual children are clearly shown in their overall N/(N+V) ratio and their cumulative proportion of nouns to nouns + verbs at the end of the study period. One possible explanation of their Cantonese patterns of development is the cross-linguistic influence from English. Figures 4.11 and 4.12 show the frequency of Cantonese nouns with English equivalents for Sophie and Charlotte, respectively.
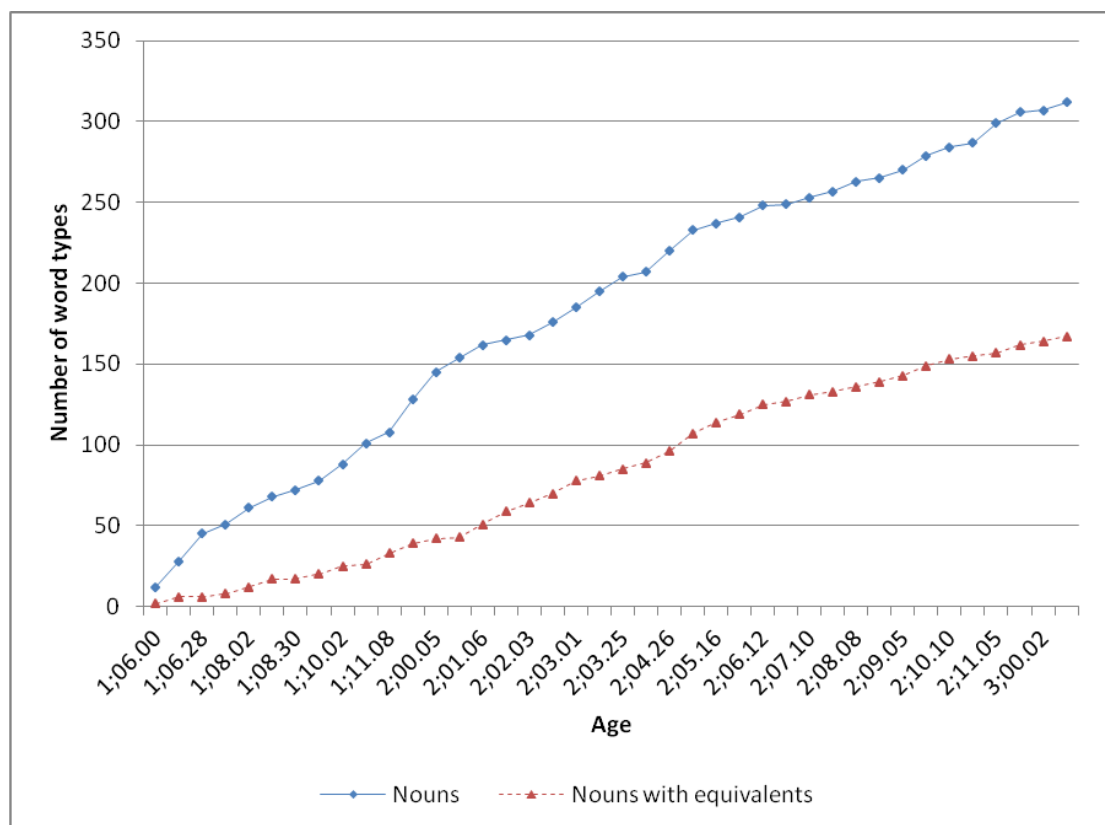
Figure 4.11 Frequency of Sophie's Cantonese nouns with English equivalents (1;06.00-3;00.09)
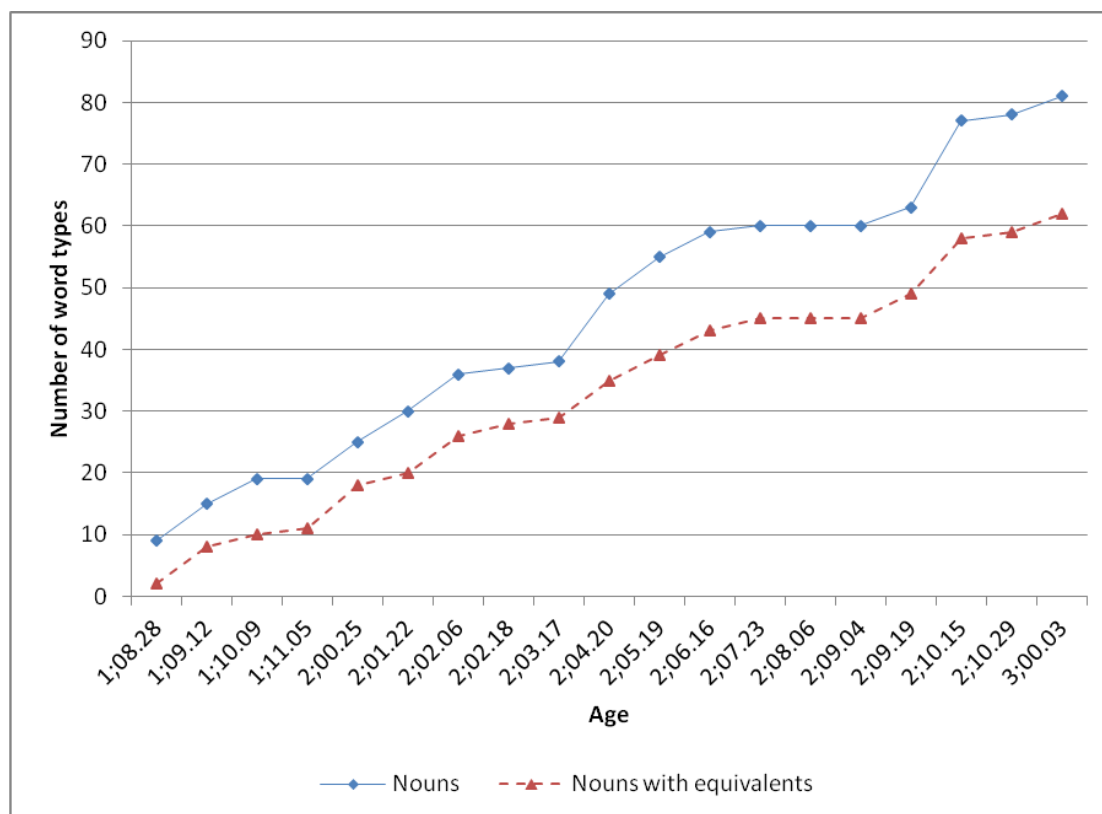
Figure 4.12 Frequency of Charlotte's Cantonese nouns with English equivalents (1;08.28-3;00.03)

As shown in Figure 4.11, the proportion of Sophie's Cantonese nouns with English equivalents increased steadily throughout the investigation, reaching to 30.6% at 1;11.08, 39.8% at 2;02.06, and 49.4% at 2;05.30. From 2;06.12 onwards, such a proportion remained greater than 50%. As for Charlotte, more than 60% of her Cantonese nouns had English equivalents from 2;00.25 onwards, as can be seen from Figure 4.12. In other words, the English equivalents of a number of Cantonese nouns were already acquired before the bilingual children produced the nouns in Cantonese. As discussed in section 3.2, English favours nouns while Cantonese does not according to the language structures. Children speaking English tend to acquire a lot of nouns in the first place. Then, when cross-linguistic influence occurs in the lexical development of Cantonese-English bilingual children, having knowledge of a noun in English favours its acquisition in Cantonese. As a result, bilingual children acquire more nouns than monolingual Cantonese-speaking children do. Therefore, the

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proportion of nouns in the bilingual children's Cantonese increases and the overall N/(N+V) ratio and final cumulative N/(N+V) ratio of the bilingual children become higher than that in their monolingual peers in Cantonese. Thus, the extent of noun bias in Cantonese is generally stronger in the bilingual children than in their monolingual peers if they have any noun bias at all.

4.2.5 Comparison between Cantonese-dominant and English-dominant bilingual children

As discussed in section 3.3.3, it is expected that the proportion of nouns to verbs would be different between English-dominant and Cantonese-dominant bilingual children. It is hypothesized that the N/(N+V) ratio in Cantonese for Sophie, the Cantonese-dominant child, would be similar to that for CCC, the monolingual child, whereas such ratio for Charlotte, the English-dominant child, would be smaller due to cross-linguistic influence from English, her dominant language. Although it is shown that both Sophie and Charlotte had a similar overall N/(N+V) ratio and cumulative proportion of nouns to nouns + verbs at the final stage, the changes in the nature and extent of word category bias in Cantonese across stages are still different between these two children.

Let us compare the N/(N+V) ratio between Sophie and CCC first. At the beginning of the study, Sophie, the Cantonese-dominant bilingual child, behaved more like CCC, the monolingual child. As can be seen from Table 4.10, the N/(N+V) ratios of both children during the period before 2;00 were 0.57, which were higher than 0.5. Both started with a slight noun bias. But subsequently, the lexical composition in their Cantonese began to undergo change. The N/(N+V) ratio of CCC dropped to 0.44 while that of Sophie dropped to 0.55 at Stage 2 (2;01-2;06). Starting from this stage, the initial noun bias of CCC disappeared in her Cantonese lexicon

while that of Sophie did not. During the period after 2;07, the N/(N+V) ratio of CCC increased to 0.48 while that of Sophie decreased to 0.47. Only after 2;07 did the initial noun bias of Sophie disappeared. At the same time, there was still no noun bias in CCC's Cantonese lexicon at the final stage. Sophie's vocabulary composition resembled that of the monolingual child in Cantonese towards the end of the period of the study, according to the number of word types.

On the other hand, Charlotte, the English-dominant bilingual child, performed differently from CCC and Sophie in terms of changes in the word category bias throughout the investigation. With a different language-dominance pattern, Charlotte started without a noun bias in her lexical development in Cantonese, but her nouns increased towards the end of the study period. As can be seen from Table 4.10, her N/(N+V) ratio at Stage 1 (1;08-2;00) was 0.39, which was lower than the ratio of CCC and Sophie before 2;00. Starting from 2;01, her N/(N+V) ratio increased to 0.49, which was higher than that of CCC during the period from 2;01 to 2;10. In short, unlike Sophie and CCC, the proportion of nouns to nouns + verbs tended to increase in Charlotte's Cantonese towards the end of the study period, although neither noun bias nor verb bias was observed in Charlotte's Cantonese throughout the investigation, according to the criterion for "noun bias" discussed in section 3.4.4.2.

The cumulative figures for nouns and verbs also show these differences in the lexical development of Cantonese among these three children. As shown in Figure 4.8, Sophie and CCC started with a noun bias in Cantonese at the beginning of the study. The initial N/(N+V) ratio of Sophie was 0.57 and that of CCC was 0.64, both of which were higher than 0.55. When their nouns and verbs continued to develop, their cumulative proportion of nouns to nouns + verbs had different trajectories. As seen from Figure 4.8, the cumulative N/(N+V) ratio of Sophie remained at 0.52 to 0.58 till the end of the period of investigation. On the other hand, the cumulative N/(N+V)

ratio of CCC decreased to 0.48 at 2;02 first, and subsequently dropped to 0.45 at 2;06, which indicates an increase in verbs in his cumulative vocabulary. Finally, his cumulative N/(N+V) ratio increased to 0.5, but it was still lower than that of Sophie at the same age. The cumulative proportion of nouns to nouns + verbs remained quite stable in Sophie's Cantonese throughout all stages while such a proportion tended to decrease in CCC's Cantonese. As Sophie developed a greater cumulative proportion of nouns than CCC did, we may conclude that the extent of noun bias in Sophie's Cantonese was stronger than that in the monolingual child at the final stage if they had any noun bias at all.

On the other hand, the cumulative developmental pattern of Cantonese nouns and verbs was different between Charlotte and CCC throughout the investigation. Being different from the monolingual child, Charlotte started with no noun bias in the beginning of lexical development in her Cantonese. As seen from Figure 4.8, her initial N/(N+V) ratio at 1;08 was 0.39 and her cumulative N/(N+V) ratio at 1;11 further decreased to 0.37. Her cumulative N/(N+V) ratio before age two remained lower than 0.4, meaning that no noun bias but rather a verb bias was observed in the lexical development of her Cantonese at the beginning of the study. Starting from age two, nouns began to outnumber verbs in Charlotte's Cantonese gradually. According to Figure 4.8, her cumulative N/(N+V) ratio increased to 0.47 at 2;04 and it then increased up to 0.5 at 2;09. Finally, her cumulative N/(N+V) ratio further increased up to 0.53 at 2;10, which indicates that the cumulative number of noun types in her Cantonese exceeded that of verb types towards the end of the period of investigation. Based on the cumulative figures, the proportion of nouns in Charlotte's Cantonese surpassed that of verbs finally, which was completely different from the lexical composition of CCC at the end of the period of investigation.

Comparing the Cantonese-dominant bilingual child with the English-dominant

one, the data show different patterns in the lexical composition in their Cantonese. In particular, Sophie performed more similarly to CCC at the beginning of the study, as both children had a N/(N+V) ratio of 0.57, which indicates a slight noun bias in their Cantonese. Starting from age two, their proportion of nouns and verbs became different. Although the initial noun bias in Cantonese of both children eventually disappeared, the proportion of nouns to nouns + verbs in Sophie's Cantonese remained greater than that in CCC's Cantonese till the end of investigation. On the other hand, Charlotte behaved differently from both Sophie and CCC in the lexical composition of her Cantonese throughout the investigation. Charlotte did not start with a noun bias at the beginning of the study but the proportion of nouns to nouns + verbs in her Cantonese showed a tendency to increase towards the end of the study period, while such a proportion in Cantonese of Sophie and CCC tended to decrease across the age span.

As shown in the trend in the proportion of nouns to nouns + verbs of these three children across the age span, language dominance plays a role in shaping cross-linguistic influence in bilingual lexical development in Cantonese. Firstly, the impact of language dominance on cross-linguistic influence at the lexical level is clearly shown in Charlotte's Cantonese after age two. At the beginning of the study, Charlotte produced more verbs than nouns in Cantonese, and the proportion of her verbs to nouns was greater than the monolingual peers. Starting from age two, she began to acquire more nouns in Cantonese due to cross-linguistic influence from English, a language which favours nouns, thereby increasing her N/(N+V) ratio. Furthermore, her language dominance enhanced the cross-linguistic influence from English, so she produced many more nouns in Cantonese. As a result, the proportion of nouns to nouns + verbs in her Cantonese continued to increase till the end of the period of investigation and it eventually became even greater than that at the

beginning of the study. On the other hand, the extent of Sophie's noun bias in Cantonese was similar to that of CCC's at the beginning of the study. At age two, while the proportion of nouns to nouns + verbs in CCC's Cantonese started to decrease, Sophie still acquired more noun types than verb types in Cantonese, presumably due to cross-linguistic influence from English, a "noun-friendly" language. As a result, her proportion of nouns to nouns + verbs became greater than that of CCC. However, such a proportion did not change much in Sophie's Cantonese throughout the investigation. From this viewpoint, the influence from English, though evident, was not strong on the lexical composition in Sophie's Cantonese, as English was not her dominant language.

4.2.6 Summary

The overall development of lexical composition in Cantonese is different between bilingual and monolingual children. Sophie and Charlotte, the two Cantonese-English bilingual children, had a greater proportion of nouns to nouns + verbs in Cantonese than CCC, the monolingual Cantonese-speaking child. The developmental trend of Cantonese nouns and verbs is also different among these three children across stages. Both Sophie, the Cantonese-dominant bilingual child, and CCC, the monolingual child, started with a slight noun bias in the earliest stage of lexical development but then the proportion of nouns to verbs in their Cantonese tended to decrease, with Sophie retaining a greater proportion of nouns than CCC throughout the investigation. On the contrary, for Charlotte, the English-dominant bilingual child, verbs dominated her Cantonese lexicon at the early stage, but her nouns gradually overtook her verbs, leading to the unceasing increase in the proportion of nouns to verbs in her Cantonese from 2;00 onwards. The differences in the lexical composition in Cantonese between the bilingual and monolingual children

can be explained by cross-linguistic influence from English, and the differences between Cantonese-dominant and English-dominant bilingual children in the lexical development in Cantonese show the impact of language dominance on cross-linguistic influence.

4.3 Translation equivalents of nouns and verbs in Cantonese-English bilingual children

In order to examine how cross-linguistic influence occurs in the lexical composition of the bilingual children between English and Cantonese and how language dominance affects their lexical development, I compared their translation equivalents of nouns and verbs in each language. The translation equivalents produced by each child are listed in Appendix 1, and this section reports the findings on the frequency of translation equivalents produced in each language.

4.3.1 English nouns and verbs with Cantonese equivalents

Figures 4.13 and 4.14 show the cumulative proportion of English nouns and verbs with Cantonese equivalents for Sophie and Charlotte, respectively.

Figure 4.13 Sophie's cumulative proportion of English nouns and verbs with Cantonese equivalents (type measure)

Figure 4.14 Charlotte's cumulative proportion of English nouns and verbs with Cantonese equivalents (type measure)

As shown in Figure 4.13, Sophie's proportion of English verbs with Cantonese

equivalents remained greater than 70%, reaching 80% to 100% in some recording sessions, whereas that of her nouns remained lower than 70% most of the time. Her English verbs had a greater proportion of Cantonese equivalents than her English nouns did throughout the investigation. For Charlotte, her proportion of English verbs with Cantonese equivalents ranged from 20% to 60%, as can be seen from Figure 4.14. Although the proportion of English nouns with translation equivalents produced by Charlotte was slightly greater than that of her verbs at the beginning of the study, her proportion of English verbs with translation equivalents remained greater than 40% while that of her nouns remained lower than 30% since 1;10.09. In both bilingual children, the English verbs had a greater proportion of Cantonese equivalents than their English nouns did throughout the investigation.

The results reflect cross-linguistic influence from Cantonese at the lexical level. As discussed in section 3.2, verbs in Cantonese, the pro-drop language, are more salient than those in English, the non-pro-drop language, in terms of language properties and structures. Thus, children speaking Cantonese are expected to acquire comparatively more verbs to start with. When the cross-linguistic influence occurs in the lexical development of Cantonese-English bilingual children, having acquired a verb in Cantonese would favour them acquiring it in English also. This might account for a higher rate of translation equivalents found for verbs than nouns in English in both bilingual children. As the knowledge of many verbs is transferred from Cantonese to English, it results in the reduction of their proportion of nouns to nouns + verbs in English, as discussed in section 4.1.4. From this point of view, cross-linguistic influence from Cantonese at the lexical level can account for why the bilingual children have an overall N/(N+V) ratio lower than the monolingual child in English (0.67 for Sophie, 0.63 for Charlotte, but 0.7 for Peter), why their N/(N+V) ratios in English since Stage 2 fall below that of the monolingual child (0.61-0.66 for

Sophie, 0.59-0.62 for Charlotte, but 0.65-0.69 for Peter), and why their cumulative proportion of nouns to nouns + verbs in English remained lower than that of the monolingual child since 2;06 (0.67-0.69 for Sophie, 0.63-0.64 for Charlotte, but 0.7 for Peter).

Figure 4.15 compares the cumulative proportion of English nouns with Cantonese equivalents between Sophie and Charlotte, and Figure 4.16 compares that of English verbs with Cantonese equivalents between the bilingual children throughout the investigation.
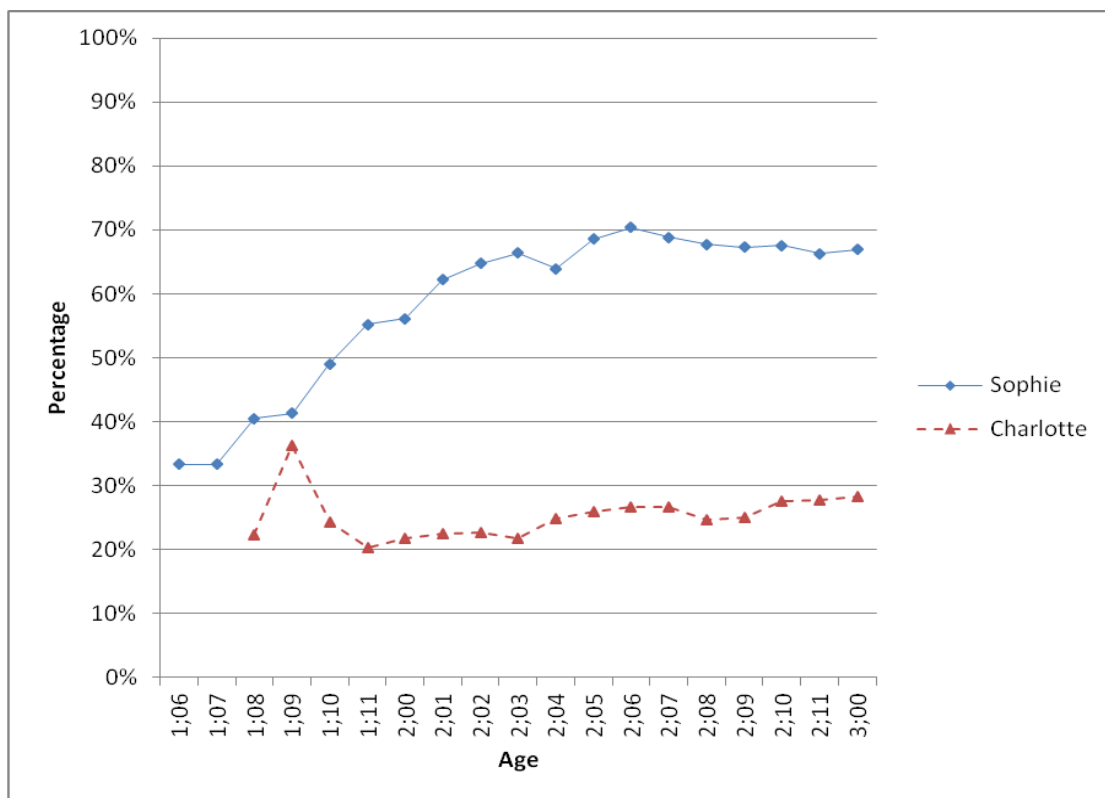
Figure 4.15 Cumulative proportion of English nouns with Cantonese equivalents in bilingual children (type measure)
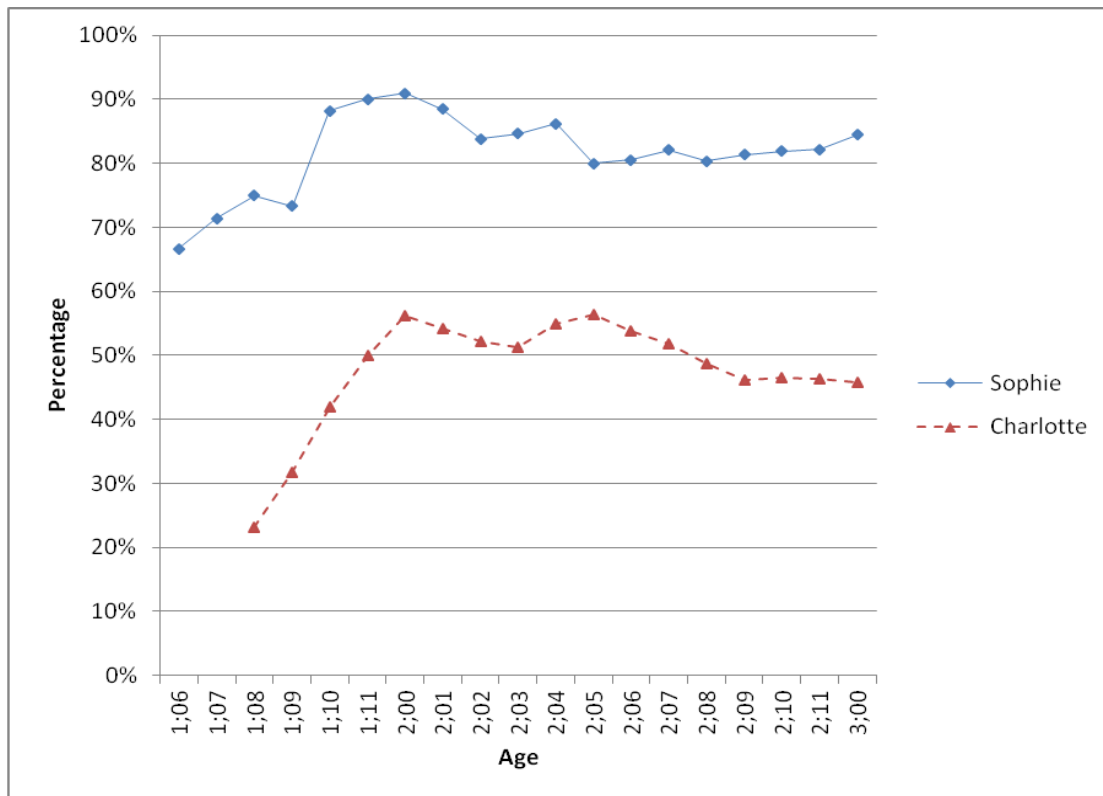
Figure 4.16 Cumulative proportion of English verbs with Cantonese equivalents in bilingual children (type measure)

As shown in Figure 4.15, less than 30% of Charlotte's English nouns had Cantonese equivalents for the entire period of investigation except for 1;09, while the proportion of Sophie's English nouns produced with Cantonese equivalents increased from 33.3% at 1;06 to 66.9% at 3;00. Also, as shown in Figure 4.16, less than 60% of Charlotte's English verbs had Cantonese equivalents across the age span while more than 70% of Sophie's English verbs were produced with Cantonese equivalents since 1;07. Sophie, the Cantonese-dominant bilingual child, produced a greater proportion of English words with Cantonese equivalents than Charlotte did in the categories of both nouns and verbs throughout the investigation.

4.3.2 Cantonese nouns and verbs with English equivalents

Figures 4.17 and 4.18 show the cumulative proportion of Cantonese nouns and verbs with English equivalents for Sophie and Charlotte respectively.
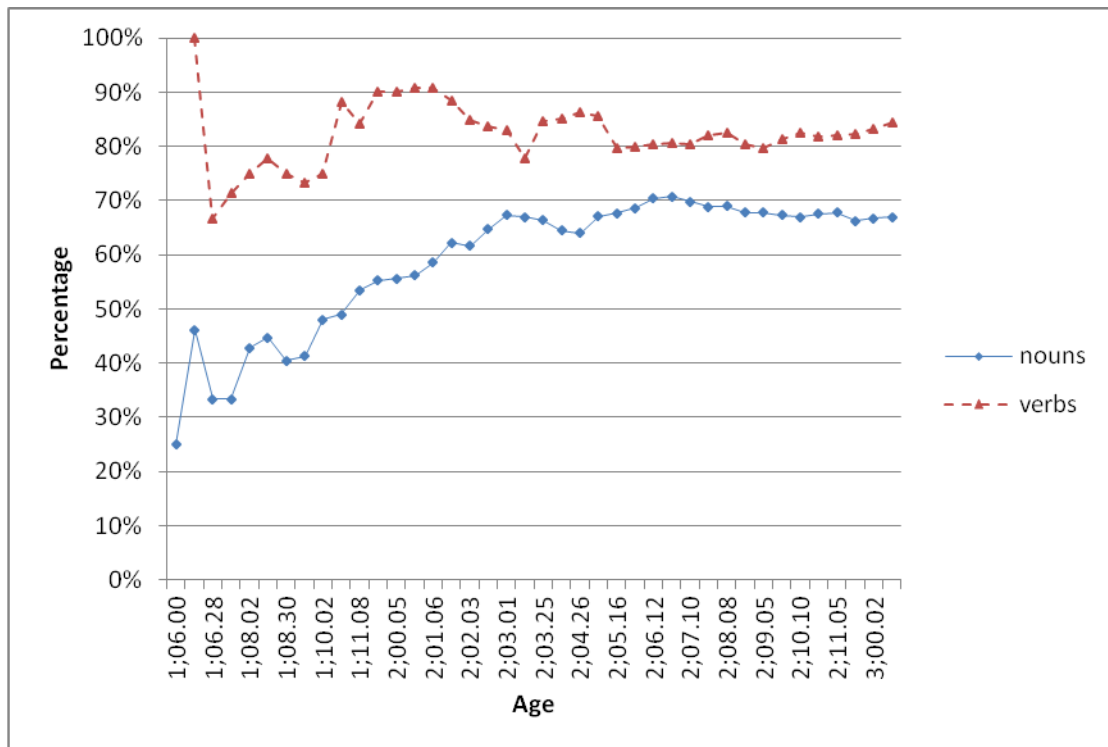
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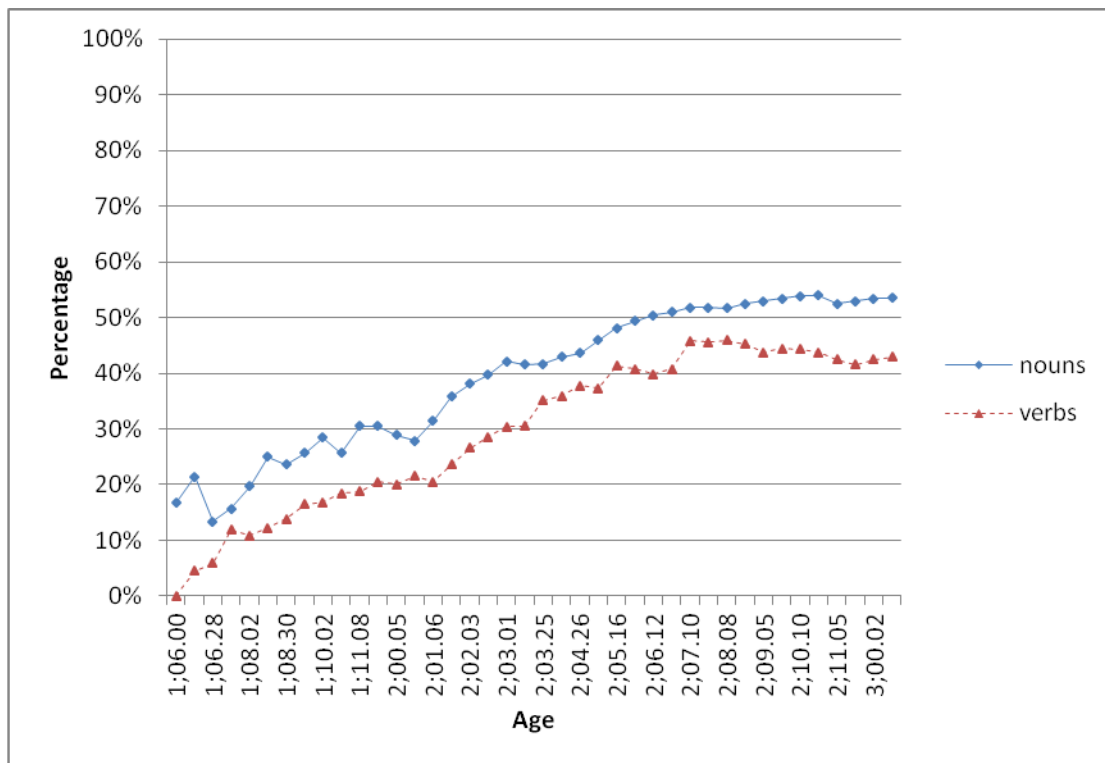
Figure 4.17 Sophie's cumulative proportion of Cantonese nouns and verbs with English equivalents (type measure)
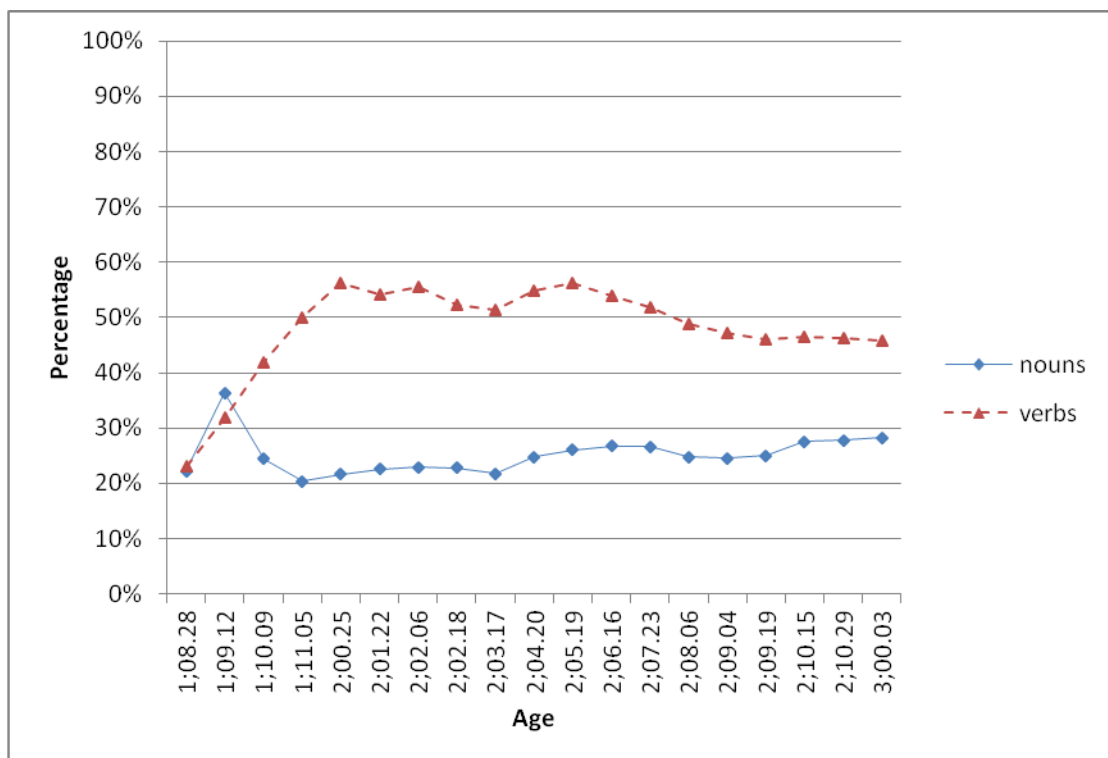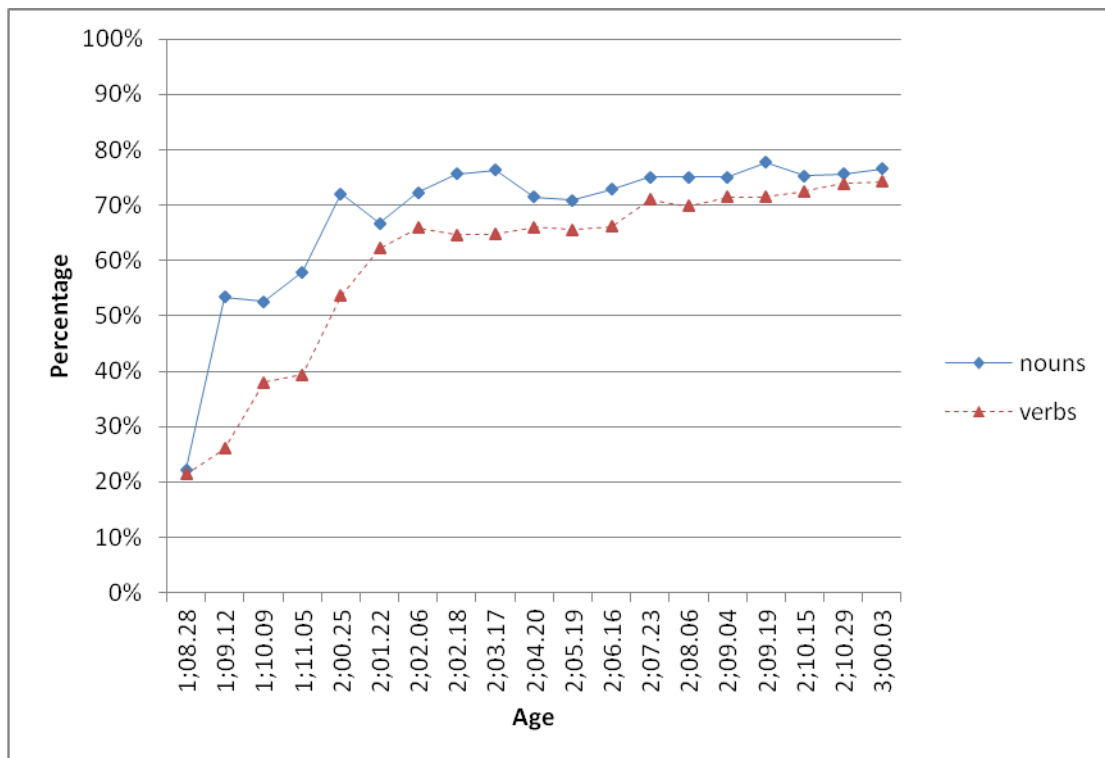

Figure 4.18 Charlotte's cumulative proportion of Cantonese nouns and verbs with English equivalents (type measure)

As shown in Figure 4.17, Sophie's cumulative proportion of Cantonese nouns with English equivalents was greater than 50% while that in her Cantonese verbs was below 45% at the end of the period of investigation. As Figure 4.18 shows, Charlotte's cumulative proportion of Cantonese nouns with English equivalents was slightly greater than 75% while that in her Cantonese verbs was slightly below 75% at the end of the period of investigation. Results show that the Cantonese nouns of both bilingual children constituted a greater proportion of English equivalents than their Cantonese verbs did across the age span.

The results reflect cross-linguistic influence from English at the lexical level. As discussed in section 3.2, English, the non-pro-drop language, favours nouns but Cantonese, the pro-drop language, does not in terms of language properties and structures. Children speaking English are expected to acquire more nouns to start with. When cross-linguistic influence occurs in the lexical development of Cantonese-English bilingual children, having acquired nouns first in English will facilitate their acquisition of nouns in Cantonese. As expected, a higher rate of translation equivalents is found for nouns than verbs in Cantonese in both bilingual children. As the knowledge of many nouns is transferred from English to Cantonese, this results in the increase in their proportion of nouns to nouns + verbs in Cantonese, as discussed in section 4.2.4. From this point of view, cross-linguistic influence from English at the lexical level can explain why the bilingual children have an overall N/(N+V) ratio higher than the monolingual child in Cantonese (0.53 for Sophie, 0.54 for Charlotte, but 0.5 for CCC), why their cumulative proportion of nouns to nouns + verbs in Cantonese became greater than that of the monolingual child since 2;06 (0.54-0.57 for Sophie, 0.49-0.54 for Charlotte, but 0.45-0.5 for CCC), and in particular, why the proportion of nouns to nouns + verbs showed a tendency to increase in Charlotte's Cantonese throughout the investigation (increase in both

N/(N+V) ratio and cumulative N/(N+V) ratio from 0.39 to 0.54).

Figure 4.19 compares the cumulative proportion of Cantonese nouns with English equivalents between Sophie and Charlotte, and Figure 4.20 compares that of Cantonese verbs with English equivalents between the bilingual children throughout the investigation.
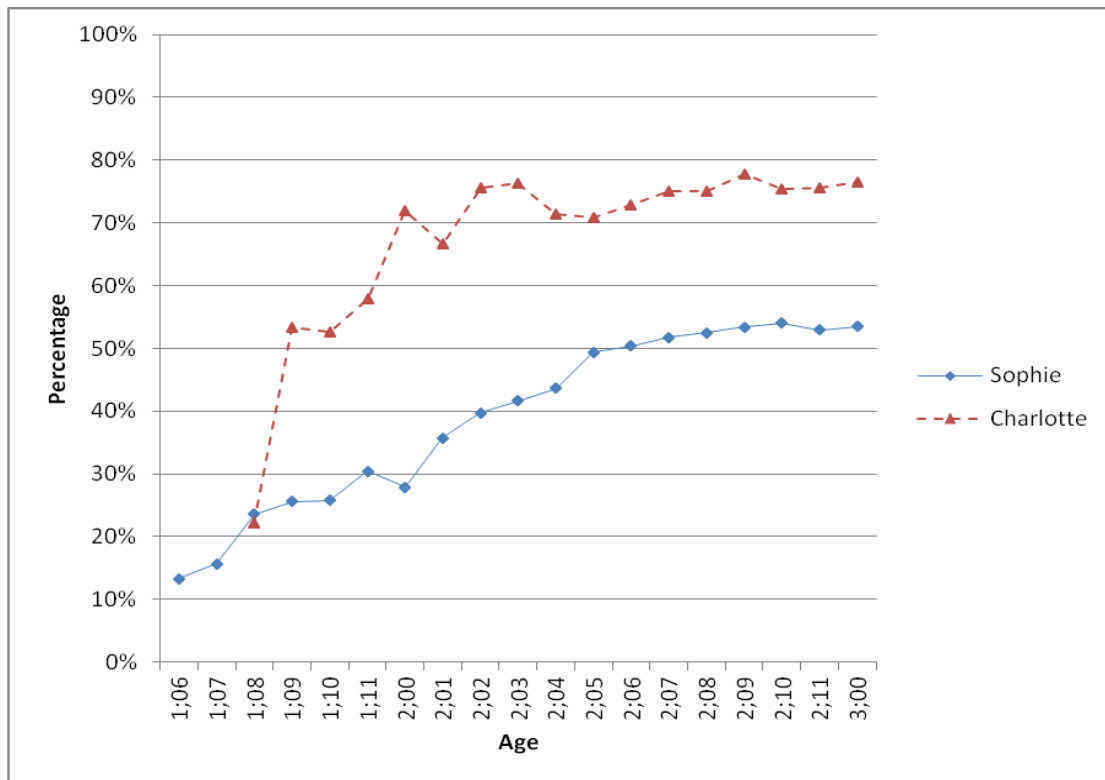
Figure 4.19 Cumulative proportion of Cantonese nouns with English equivalents in bilingual children (type measure)
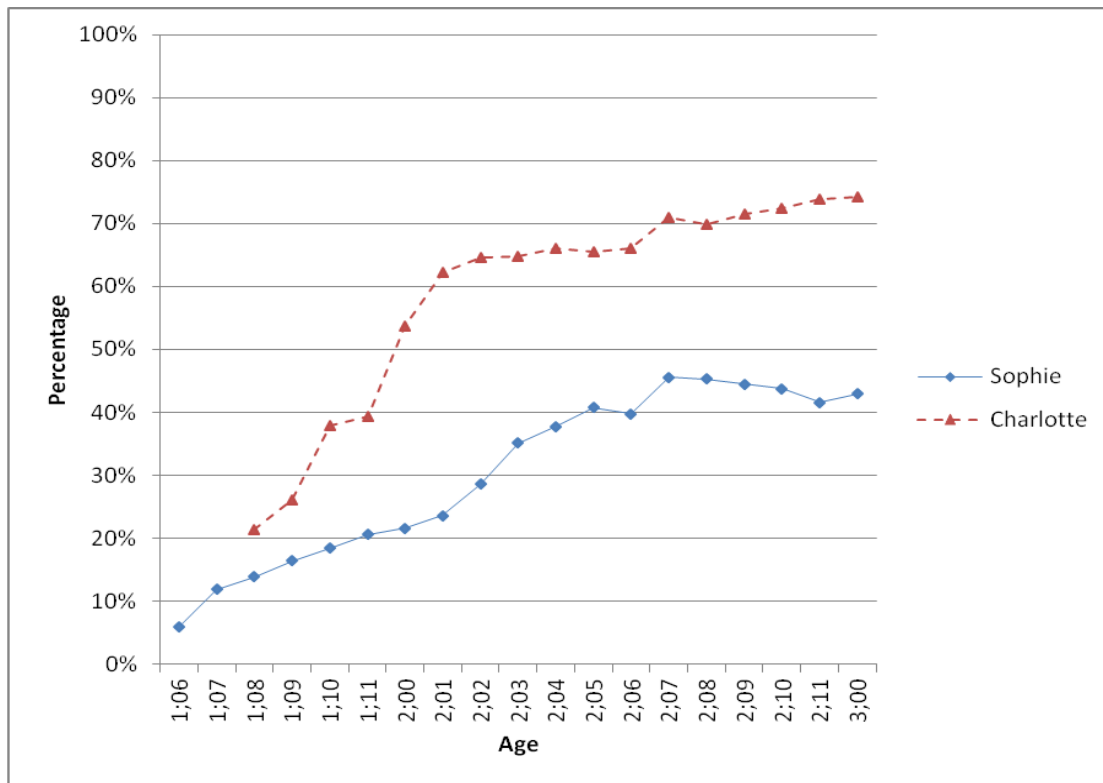
Figure 4.20 Cumulative proportion of Cantonese verbs with English equivalents in bilingual children (type measure)

As shown in Figure 4.19, 22.2% of Charlotte's Cantonese nouns were produced with English equivalents at 1;08, and such proportion increased to 53.3% at 1;09. Starting from 2;02, more than 70% of her Cantonese nouns had English equivalents. As for Sophie, the proportion of her Cantonese nouns with English equivalents increased gradually from 13.3% at 1;06 to 53.3% at 3;00. But still, such proportion remained lower than 60% throughout the investigation and it remained lower than that of Charlotte since 1;09. As Figure 4.20 shows, the proportion of Charlotte's Cantonese verbs with English equivalents increased from 21.4% at 1;08 to 53.7% at 2;00. Starting from 2;01, more than 60% of her Cantonese verbs had English equivalents. The proportion of Sophie's Cantonese verbs with English equivalents increased gradually from 5.9% at 1;06 to 42.9% at 3;00. But still, such proportion remained lower than 50% throughout the investigation and it remained lower than that of Charlotte since 1;08. In short, Charlotte, the English-dominant bilingual child,

produced a greater proportion of Cantonese words with English equivalents than Sophie did in the categories of both nouns and verbs throughout the investigation.

4.3.3 Summary

The data show that in both bilingual children, the Cantonese nouns have a greater proportion of English equivalents than their Cantonese verbs do, whereas their English verbs contain a greater proportion of Cantonese equivalents than their English nouns do. The results on translation equivalents show how language-specific factors and cross-linguistic influence affect the lexical composition in each language. English favours nouns and Cantonese favours verbs in terms of structures, so children tend to acquire more nouns in English but more verbs in Cantonese over time in developing their early lexicon. As having acquired a noun/verb in a language facilitates its acquisition of their counterparts in another language, this logically leads to the bilingual children acquiring more nouns in Cantonese than their monolingual peers do due to cross-linguistic influence from English, whereas they acquire more verbs in English than their monolingual counterparts do due to cross-linguistic influence from Cantonese. Moreover, the non-dominant language of both bilingual children contains a greater proportion of translation equivalents in both categories of nouns and verbs. This reflects cross-linguistic influence from their dominant language at the lexical level.

4.4 Comparison of lexical composition between Cantonese and English of the bilingual children

In this section, we compare the lexical composition between English and Cantonese in the bilingual children in terms of word types and cumulative developmental patterns.

4.4.1 Proportion of nouns to verbs on the basis of word types and cumulative development

Figure 4.21 compares the N/(N+V) ratios of Sophie in English and Cantonese at different stages, and Figure 4.22 compares those of Charlotte in these two languages, based on the number of word types.
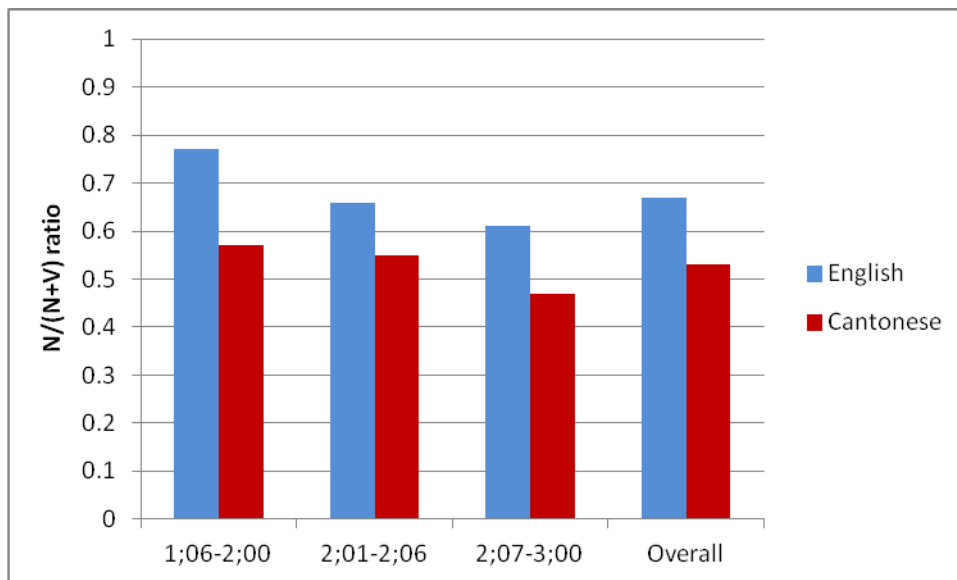
Figure 4.21 Sophie's N/(N+V) ratios in English and Cantonese (type measure)
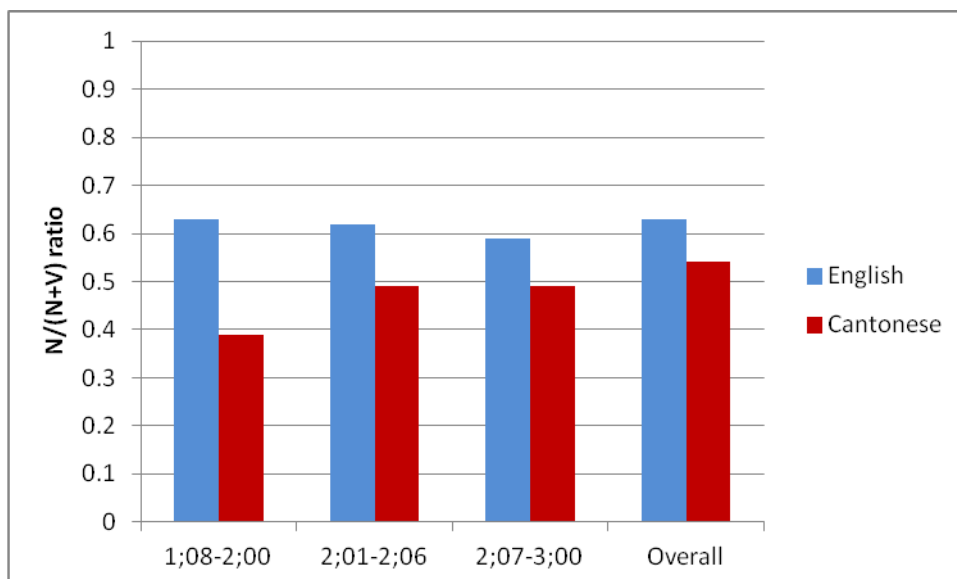
Figure 4.22 Charlotte's N/(N+V) ratios in English and Cantonese (type measure)

As shown in Figure 4.21, the N/(N+V) ratio remained higher than 0.6 in Sophie's English at every stage whereas it remained lower than 0.6 in her Cantonese. The overall N/(N+V) ratio in her English was higher than 0.65, while that in her Cantonese fell below 0.55. As Figure 4.22 shows, the N/(N+V) ratio in Charlotte's English ranged between 0.59 and 0.63 while that in her Cantonese ranged between 0.39 and 0.49 across the three stages. The overall N/(N+V) ratio in her English was higher than 0.6 where that in her Cantonese fell below 0.55. In short, both bilingual children retained a greater proportion of nouns to verbs in English than in Cantonese throughout the investigation.

Figures 4.23 shows the changes in cumulative N/(N+V) ratios in Sophie's English and Cantonese on the basis of word types throughout the whole period of investigation.
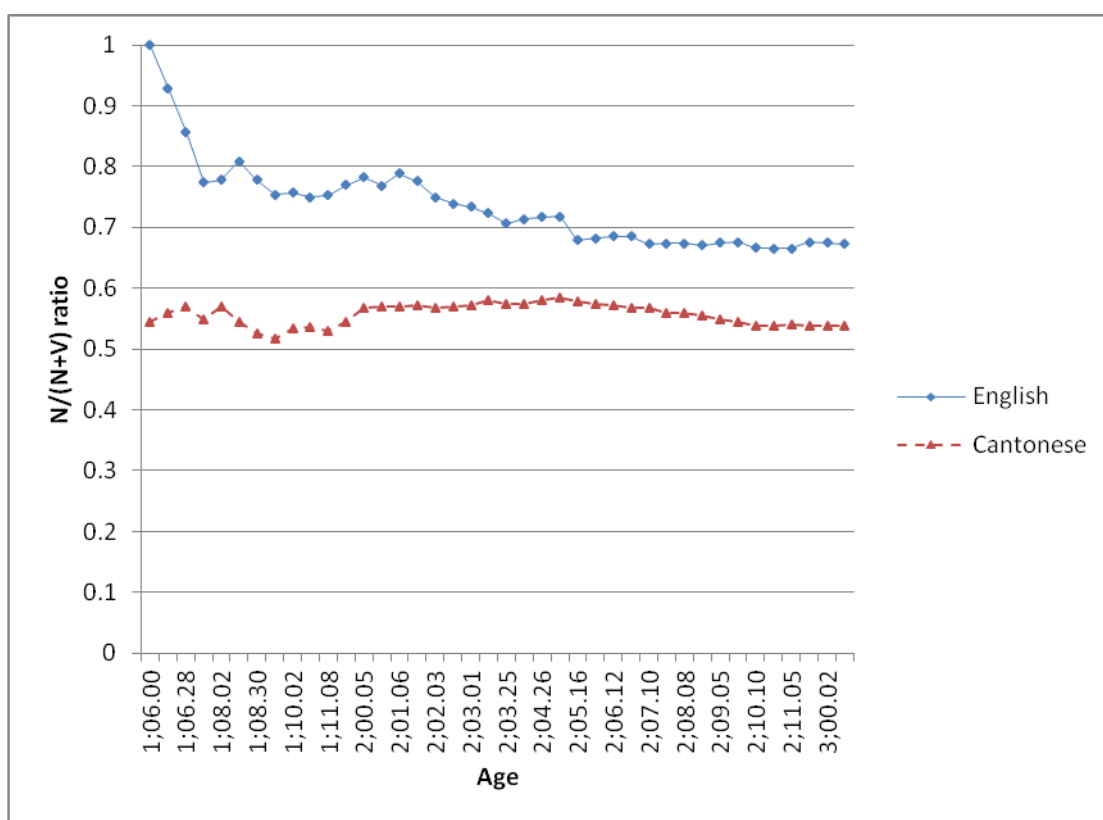
Figure 4.23 Cumulative N/(N+V) ratios in Sophie's English and Cantonese (type measure)

As shown in Figure 4.23, the initial N/(N+V) ratio in Sophie's English was 1 at 1;06.00. With the increase in verbs, the cumulative N/(N+V) ratio in her English gradually dropped to 0.79 at 2;01.06, and it further decreased to 0.72 at 2;05.02. From 2;06.02 till the end of the period of investigation, her English cumulative N/(N+V) ratio ranged between 0.65 and 0.7. As for the cumulative N/(N+V) ratio in Sophie's Cantonese, it ranged between 0.5 and 0.6 throughout the entire period of investigation, which shows that the cumulative proportion of nouns to verbs in her Cantonese remained lower than that in her English across the age span, even though the cumulative proportion of nouns to verbs in her English tended to decrease when her English nouns and verbs continued to develop.

Figure 4.24 shows the changes in cumulative N/(N+V) ratios in Charlotte's English and Cantonese throughout the whole period of investigation.
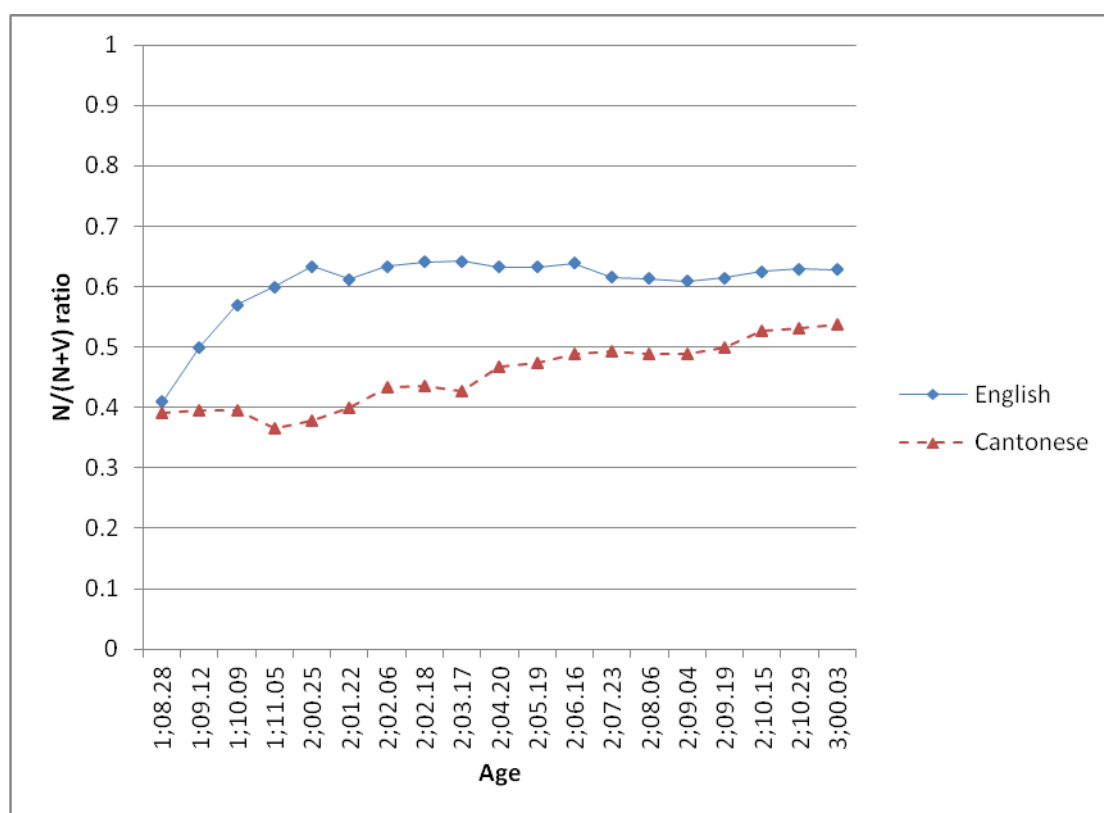
Figure 4.24 Cumulative N/(N+V) ratios in Charlotte's English and Cantonese (type measure)

The initial N/(N+V) ratio in Charlotte's English was 0.41 at 1;08.28, as can be seen from Figure 4.24. The cumulative N/(N+V) ratio in her English increased to 0.63 at 2;00.25, and it ranged between 0.61 and 0.64 from 2;01 onwards. As for Charlotte's Cantonese, the initial N/(N+V) ratio was 0.39 at 1;08.28. The cumulative N/(N+V) ratio in her Cantonese increased steadily from 2;01.22, reaching to 0.49 at 2;06.16 and 0.54 at 3;00.03. The cumulative N/(N+V) ratio in Charlotte's Cantonese ranged between 0.4 and 0.54 after 2;01, which remained lower than that in her English during the same age span. Even though the cumulative proportion of nouns to verbs in her Cantonese tended to increase, it still remained lower than that in her English across the age span. In short, for both bilingual children, the cumulative proportion of nouns in their English remained higher than that in their Cantonese throughout the entire period of investigation, as nouns and verbs continued to develop in both languages.

To summarize, based on the measures of N/(N+V) ratios and cumulative N/(N+V) ratios, the bilingual children's English exhibited a consistent noun bias while their Cantonese did not for the entire period of investigation. The discrepancies in the nature and extent of word category bias between their English and Cantonese can be attributed to the differences in language structures and properties in these two languages.

4.4.2 Language-specific considerations in early lexical development

The difference in the proportion of nouns to verbs between the bilingual children's English and Cantonese can be attributed to the differences in the licensing of null arguments and in the lexicalization patterns of nouns and verbs between these two languages.

4.4.2.1 Licensing of null arguments

Syntactically, although both English and Cantonese are SVO languages, they differ in whether null arguments are permitted. Cantonese allows both subject-drop and object-drop, whereas English prohibits both types of argument dropping. Both the subject and the object must remain in a sentence in English, but they can be omitted in a sentence in Cantonese if they are understood or they have been mentioned in the context. Therefore, compared with English, there are many more subject-verb and verb-object utterances in Cantonese, the pro-drop language, and thus Cantonese verbs can more easily occur in utterance-initial and utterance-final positions, both of which are considered as salient for children in a sentence (Slobin, 1973). However, in English, the non-pro-drop language, these salient positions in a sentence are usually occupied by nouns. Moreover, as subject-drop and object-drop can occur simultaneously in a sentence in Cantonese, there are also many more verb-only utterances in Cantonese than in English. As a result, proportionately, verbs in Cantonese occur more frequently than those in English whereas nouns in English occur more frequently than those in Cantonese. This can account for why the bilingual children acquired proportionately more nouns in English than in Cantonese but more verbs in Cantonese than in English, and why the noun bias in their English remained stronger than that in their Cantonese throughout the investigation. This also accord with Dhillon's (2010) study, in which he found that children acquiring English had the strongest noun bias and those acquiring Mandarin had the weakest noun bias in their early vocabularies, while the proportion of nouns to nouns + verbs in children acquiring Spanish, a pro-drop language which allows only the omission of subject pronouns, was in between those acquiring English or Mandarin.

4.4.2.2 Lexicalization patterns of nouns and verbs

Semantically, the difference in the lexicalization patterns of nouns and verbs between English and Cantonese is also a possible explanation for the difference in the bilingual children's lexical composition in these two languages. As discussed in section 2.2.3, Tardif (2006a, 2006b) reasoned that distinct nouns and general-purpose verbs are much more frequent in English, while distinct verbs and common root terms for nouns are more frequent in Chinese. In this study, I compare the nouns and verbs produced by the bilingual children in English and Cantonese through the analysis of their translation equivalents, with special attention to the nouns and verbs produced with more than one equivalent word in the other language. Tables 4.11 and 4.12 list the nouns with more than one translation equivalent in the other language produced by Sophie and Charlotte respectively.

Table 4.11 Sophie's nouns with more than one translation equivalent

Age of first occurrence	Cantonese equivalent	Age of first occurrence	English equivalent
1;06.00	*gau2zai2* 狗仔	1;11.08 2;02.16	*puppy* *dog*
1;06.14	*gwai1* 龜	2;02.03 2;05.02	*turtle* *tortoise*
1;06.28	*bui1* 杯	1;11.22 3;00.02	*cup* *glass*
1;10.17	*goek3* 腳	2;04.18 2;05.16 2;07.24	*feet* *foot* *leg*
2;00.05	*kwan4* 裙	2;03.25 2;06.12	*dress* *skirt*
1;06.00 1;06.14	*maau1* 貓 *meu1meu1* 喵喵	1;09.20	*cat*
2;05.02 2;09.05	*hau2* 口 *zeoi2* 咀	1;11.08	*mouth*

| 1;06.28 | neoi5zai2 女仔
'girl' | 2;01.20 | girl |
| 2;05.30 | sai3lou6neoi2 細路女
'little girl' (child) | | |

Table 4.12 Charlotte's nouns with more than one translation equivalent

Age of first occurrence	Cantonese equivalent	Age of first occurrence	English equivalent
2;10.29	liu6pin2 尿片	1;09.12 1;10.09	diaper[3] nappy[4]
2;04.20	kwan4 裙	1;10.09 2;07.23	dress skirt
2;04.20	je5 嘢	2;00.25 2;10.29	things stuff
1;09.12	goek3 腳	2;04.20 3;00.03	feet leg
2;10.15	siu2pang4jau5 小朋友	2;07.23 2;08.06	children child
2;02.18 2;10.15	be1be1 啤啤 'bear' (toy) hung4jan2 熊人 'bear' (animal)	1;09.12	bear
2;01.22 2;02.06	meu1meu1 喵喵 maau1 貓	1;11.05	cat

As can be seen from Table 4.11, Sophie produced 5 Cantonese nouns with two or more English equivalents, whereas she had 3 English nouns with more than one Cantonese equivalent. Charlotte produced 5 Cantonese nouns with more than one English equivalent, whereas she had 2 English nouns with more than one Cantonese equivalent, according to Table 4.12. As shown in these tables, both children produced the Cantonese nouns *kwan4* 'dress/skirt' and *goek3* 'foot/feet/leg' with two or more English equivalents, whereas they produced the English noun *cat* with two Cantonese

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[3] It is a word in American English. Its equivalent in British English is *nappy*.
[4] See (3).

equivalents. There is thus a total of 8 Cantonese nouns with two or more English equivalents but a total of only 4 English nouns with more than one Cantonese equivalent. Quantitatively, English tends to have more different noun types than does Cantonese, as the number of English noun equivalents is greater than that in Cantonese.

Qualitatively, the production of translation equivalents for nouns by the bilingual children also reflects the differences in the lexicalization patterns of nouns between English and Cantonese. Let us discuss the example of Cantonese noun *kwan4* with their English equivalents *dress* and *skirt*, which were produced by both bilingual children. In English, the noun *skirt* refers to a tube- or cone-shaped garment that hangs from the waist and covers all or part of the legs, whereas the noun *dress* refers to a garment consisting of a skirt with an attached bodice. In Cantonese, the equivalents are *bun3jit6kwan4* 'skirt' and *lin4san1kwan4* 'one-piece dress' respectively. Both nouns share the common root term *kwan4* 'dress/skirt', and Cantonese speakers can use only the root term to refer to both objects. However, in English, it would be incorrect to use only one word *skirt* to refer to a dress, and vice versa.

Another example is the Cantonese noun *goek3* with their English equivalents *leg*, *foot*, and *feet*, all of which were produced by both bilingual children. In English, the noun *leg* refers to the lower limb extending from the knee to the ankle, whereas the noun *foot* refers to the terminal portion of a limb and the noun *feet* is the plural form of *foot*. In Cantonese, the equivalent word for *leg* is *siu2teoi2* or *goek3gwaa1long4*, whereas that for *foot* and *feet* is *goek3baan2*. Both *goek3gwaa1long4* and *goek3baan2* share the common root term *goek3* 'leg/foot', and Cantonese speakers can use only the root term to refer to both body parts. But in English, it would be incorrect to use only one word *leg(s)* to refer to a foot or feet, and vice versa. From this point of view,

English nouns are more distinct than those in Cantonese, and this can account for why the bilingual children had a greater proportion of nouns in English than in Cantonese.

Tables 4.13 and 4.14 list the verbs with more than one translation equivalent produced by Sophie and Charlotte respectively.

Table 4.13 Sophie's verbs with more than one translation equivalent

Age of first occurrence	Cantonese equivalent	Age of first occurrence	English equivalent
1;08.16	*teng1* 聽	2;09.24	*hear*
		2;11.05	*listen*
2;00.05	*paa4* 爬	2;04.26	*climb*
		2;06.12	*crawl*
1;06.14	*lo2* 攞	2;02.03	*take*
1;10.17	*lik1* 扐	2;03.25	*get*
2;05.30	*ling1* 拎	2;07.10	*carry*
1;06.14	*tai2* 睇 'see/look/watch/read'	1;06.28	*look*
1;07.18	*gin3* 見 'see'	1;08.30	*see*
2;09.24	*mong6* 望 'look (at)'	2;04.26	*watch*
1;06.14	*daa1* 打 'hit/beat (someone)'	2;03.25	*hit*
2;10.10	*dap6* 揼 'beat (someone/something)'	2;10.10	*beat*
1;06.28	*zaa1* 揸 'hold (in hands)'	1;07.18	*hold*
1;08.16	*pou5* 抱 'hold (in arms)'		
1;11.08	*laam2* 攬 'embrace/hold (tightly in both arms)'		
1;11.22	*to1* 拖 'hold (hands)'		
1;06.00	*soeng2* 想 'want to (do)'	1;08.30	*want*
2;00.18	*oi3* 愛[5] 'want (something)'		

[5] There are two meanings for the Cantonese verb *oi3* 愛: "want" and "love". Here, the verb produced by the child means "want" only, as shown in the following conversation:

*INV:　你愛唔愛張被呀？
　　　 nei5　oi3-m4-oi3　zoeng1　pei2　aa3?
　　　 you　want-NEG-want　CL　　blanket　SFP
　　　 'Do you want the blanket?'
*CHI:　唔 愛 呀。
　　　 m4　oi3　aa3.
　　　 NEG　want　SFP.
　　　 'No, I don't.'

(Sophie 2;00.18)

1;08.16	*taan4* 彈 'play (piano/music)'	1;09.20	*play*
1;10.17	*waan2* 玩 'play (toys/games)'		
2;03.01	*daa2* 打 'play (balls)'		
1;06.14	*dit3* 跌 'fall'	2;00.18	*fall*
2;04.26	*lam3* 冧 'fall/collapse'		
1;09.20	*wan2* 搵 'look for'	2;01.20	*find*
1;11.22	*caau3* 搜 'look for (everywhere)'		
1;08.30	*mo2* 摸 'touch with hand gently'	2;02.03	*touch*
1;09.20	*duk1* 篤 'touch with finger'		
2;03.25	*dim3* 掂 'touch'		
1;06.14	*sik1* 識 'know (languages/skills)'	2;02.16	*know*
1;10.17	*zi1* 知 'know (facts)'		
1;06.00	*baai2* 擺	2;03.25	*put*
2;05.30	*fong3* 放		
2;07.10	*zai1* 擠		
1;08.02	*gong2* 講	2;03.25	*tell*
2;07.01	*waa6* 話		
1;06.14	*zin2* 剪 'cut with scissors'	2;04.26	*cut*
2;03.14	*cit3* 切 'cut with knife'		
2;06.12	*zing2dou2* 整倒 '(get) hurt'	2;05.16	*hurt*
2;07.24	*sau6soeng1* 受傷 '(get) hurt'		
2;07.24	*syun2* 損 'injure/hurt'		
1;08.30	*teoi1* 推 'push'	2;05.16	*push*
1;08.30	*ung2* 擁 'push from behind'		
1;06.28	*dam2* 扰 'throw (away)'	2;07.01	*throw*
2;05.02	*deng3* 掟 'throw (over a distance)'		
2;09.05	*diu6/deu6* 掉 'throw (away)'		
1;11.22	*lei1* 匿 'hide oneself'	3;00.09	*hide*
2;06.12	*wan3* 韞 'hide/trap in a limited space'		

Table 4.14 Charlotte's verbs with more than one translation equivalent

Age of first occurrence	Cantonese equivalent	Age of first occurrence	English equivalent
1;11.05	*zing2* 整	2;02.06	*make*
		2;07.23	*fix*
1;11.05	*daa2* 打	2;01.22	*beat*
		3;00.03	*hit*

2;01.22	zung1ji3 鍾意	2;00.25	like
		2;04.20	love
2;04.20	tai2 睇	1;08.28	look
		1;08.28	see
		2;01.22	watch
2;05.19	saan1 閂	2;04.20	close
		2;05.19	shut
1;08.28	zoek3 著 'wear (clothes/shoes/socks)'	2;00.25	dress
2;05.19	daai3 戴 'wear (hats/caps/glasses/rings)'	2;07.23	wear
1;10.09	lo2 攞	1;10.09	take
2;06.16	lik1 扐	1;11.05	get
1;08.28	fong3 放	1;08.28	put
2;01.22	baai2 擺		
1;08.28	zi1 知 'know (facts)'	2;00.25	know
1;09.12	sik1 識 'know (languages/skills)'		
2;10.15	pou5 抱 'hold (in arms)'	2;01.22	hold
2;10.15	to1 拖 'hold (hands)'		
2;02.06	dit3 跌 'fall'	2;03.17	fall
2;08.06	lam3 冧 'fall/collapse'		

As shown in Table 4.13, Charlotte had 9 Cantonese verbs with more than one English equivalent whereas she produced 8 English verbs with more than one Cantonese equivalent. Only one of her Cantonese verbs was produced with three English equivalents across the age span. On the other hand, Sophie produced 10 Cantonese verbs with more than one English equivalent while she had 22 English verbs with more than one Cantonese equivalent. As seen from Table 4.14, Sophie produced 6 Cantonese verbs with more than two English equivalents, whereas she had 12 English verbs with three or more Cantonese equivalents. These two tables demonstrate that both children produced the English verbs *fall*, *get*, *hold*, *know*, *put* and *take* with two or more Cantonese equivalents whereas they produced the Cantonese verbs *lo2* 'take', *lik1* 'take/carry', *tai2* 'look/see/watch/read' and *daa2* 'hit'

with two or more English equivalents. There is a total of 15 Cantonese verbs with more than one English equivalent but a total of 25 English verbs with more than one Cantonese equivalent. Quantitatively, Cantonese tends to have more distinct verb types, as the number of Cantonese verb equivalents is greater than that in English.

Qualitatively, the production of translation equivalents for verbs by the bilingual children also reflects the differences in the lexicalization patterns of verbs between English and Cantonese. Let us discuss the example of the verb *know* and its Cantonese equivalents *sik1* and *zi1*, all of which were produced by both bilingual children. In Cantonese, the verb *sik1* is used for language(s) and skill(s) that one knows while the verb *zi1* is used for fact(s) that one knows. See examples (1a), (1b), (1c), and (1d):

(1) a. 我識英文

     ngo5   sik1   Jing1man2

     I   know   English

     'I know English'

   b. *我知英文

     ngo5   zi1   Jing1man2

     I   know   English

     'I know this person'

   c. 我識彈琴

     ngo5   sik1   taan4   kam4

     I   know   play   piano

     'I know [how to] play the piano'

d. *我知彈琴

   ngo5   zi1   taan4   kam4

   I   know   play   piano

   'I know [how to] play the piano'

In example (1a), the verb *sik1* 'know' takes the object *Jing1man2* 'English', and in example (1c), this verb takes the verb-object phrase *taan4 kam4* 'play the piano'. A language and a skill follow the verb *sik1* 'know' respectively in these two examples. In this case, it would be incorrect to use the verb *zi1* 'know', as shown in example (1b) and (1d). Now we look at the examples (2a), (2b), (2c), and (2d):

(2) a. 我知今日係星期六

     ngo5   zi1   gam1jat4   hai6   sing1kei4luk6

     I   know   today   be   Saturday

     'I know today is Saturday'

     b. *我識今日係星期六

     ngo5   sik1   gam1jat4   hai6   sing1kei4luk6

     I   know   today   be   Saturday

     'I know today is Saturday'

     c. 我知佢係瑪莉

     ngo5   zi1   keoi5   hai6   Maa5lei5

     I   know   s/he   be   Mary

     'I know she is Mary'

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d. *我識佢係瑪莉

ngo5   sik1   keoi5   hai6   Maa5lei5

I   know   s/he   be   Mary

'I know she is Mary'

In example (2a), the verb *zi1* 'know' takes the proposition *gam1jat6 hai6 sing1kei4luk6* 'today is Saturday', and in example (2c), this verb takes the proposition *keoi5 hai6 Maa5lei6* 'she is Mary'. Two facts follow the verb *zi1* 'know' in these two examples. In this case, it would be incorrect to use the verb *sik1* 'know', as shown in example (2b) an (2d). However, in English, we can use only one verb *know* to refer to all the instances of *zi1* and *sik1* in examples (1a), (1c), (2a), and (2d).

Now we look at the example of the verb *hold* and its Cantonese equivalents *zaa1* 'hold (in hands)', *pou5* 'hold (in arms)', *laam2* 'embrace/hold (tightly in both arms)' and *to1* 'hold (hands)', which were produced by the bilingual children. In Cantonese, different verbs are used to refer to actions of holding. The verb *zaa1* encodes the action "holding something in hand(s)", whereas the verb *to1* encodes the action "holding hands". The verb *pou5* refers to the action "holding someone or something in arms" while the verb *laam2* refers to the action "to hold someone or something tightly with both arms". Although there are many distinct verbs in English for different actions of holding, English speakers can still use only one verb *hold*, together with the object noun and a prepositional phrase. But in Cantonese, more than one verb is used to refer to all these actions. From this perspective, many verbs in Cantonese are more distinct and specific than those in English. The greater proportion of verbs in Cantonese among the bilingual children may be attributed to distinct and specific verbs in Cantonese.

It is thus clear that nouns are more distinct in English and verbs are more specific in Cantonese in terms of meaning. Frequent occurrences of distinct nouns raise the proportion of nouns to verbs in English, while frequent occurrences of specific verbs lower the proportion of nouns to verbs in Cantonese for the bilingual children.

4.4.3 Summary

The proportion of nouns to nouns + verbs was greater in English than in Cantonese for both bilingual children, as shown in their N/(N+V) ratios and the cumulative N/(N+V) ratios. Regardless of which was the dominant language for the bilingual children and which stage they were at, the predominance of nouns in their English was stronger than that in their Cantonese. The findings confirm the hypotheses set out in section 3.2, where we predicted that the noun bias in English is stronger than that in Cantonese due to their differences in the relative saliency of nouns and verbs. The difference in the proportion of nouns to verbs between the bilingual children's English and Cantonese in this study also accord with the results found in Tardif's (1996, 2006a, 2006b) studies, in which she showed that Mandarin- and Cantonese-speaking children acquired proportionately more verbs than English-speaking children. From this perspective, the "noun bias" is language-specific rather than universal across children's lexical development.

4.5 Analysis of morphological and syntactic markings on nouns and verbs in Cantonese-English bilingual children

Apart from the relative proportion of nouns and verbs, researchers are also interested in whether the children can distinguish nouns from verbs in their development of early vocabularies. This section reports the findings on the morphological and syntactic markings that the bilingual children used on nouns and

verbs in English and Cantonese. The ages of first occurrence of each morphological and syntactic marking used by each child in each language are presented, and the frequencies of these morphological and syntactic markings on their five most frequent nouns and five most frequent verbs in each language are reported. All the results show that the bilingual children are able to make distinctions between these two categories of words in both languages from very early on.

4.5.1 Morphological and syntactic markings on English nouns and verbs

Table 4.15 presents the age of first occurrence of each morphological and syntactic marking on nouns and verbs in Sophie's English.

Table 4.15 Age of first occurrence of morphological and syntactic markings on nouns and verbs in Sophie's English

	Nouns	Verbs
a/an/the + target	*a*: 1;06.28 *the*: 1;07.18	NIL
target + -*s* (plural suffix)	1;08.30	NIL
target + -*s* (third person singular suffix)	NIL	2;09.24
target + -*ing* (progressive aspect suffix)	NIL	2;02.03
target + -*ed* (past tense / perfective aspect suffix)	NIL	NIL

As shown in Table 4.15, the morphological and syntactic markings for nouns and for verbs did not overlap in Sophie's English throughout the investigation. She was already able to use noun modifiers such as determiners and plural suffix to modify nouns before 1;09. See examples (3a) and (3b):

(3) a. *CHI: a boy.

   *INV: a boy.

   *INV: and a girl.   (Sophie 1;06.28)

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b. *CHI: the dwarf.

*INV: dig something.　　(Sophie 1;07.18)

In examples (3a) and (3b), Sophie used the determiner *a* before the noun *boy* as early as 1;06.28 and she used the determiner *the* before the noun *dwarf* as early as 1;07.18. Sophie could also use the plural suffix *-s* to modify the noun *wheel*, as shown in example (4):

(4) *CHI: wheels.

*INV: ya wheels.　　　　(Sophie 1;08.30)

The verb modifiers developed only after age two in Sophie's English, as can be seen from Table 4.15. But still, she used the verb suffixes *–s* and *–ing* to modify only verbs and she never used them on nouns. See examples (5) and (6):

(5) *INV: I want to drink some.

*CHI: she wants to eat.　　(Sophie 2;09.24)

(6) *CHI: cats are sleeping.

*CHI: sleeping cats.　　(Sophie 2;02.03)

In example (5), Sophie first used the third person singular suffix *–s* to modify the verb *want* at 2;09.24. She first used the progressive aspect suffix *–ing* to modify the verb *sleep* at 2;02.03, as can be seen from example (6).

According to the number of word tokens, the five most frequent nouns in Sophie's English included *witch*, *monster*, *cat*, *bear*, and *ant* whereas the five most

frequent verbs in her English included *want*, *eat*, *go*, *come*, and *sleep*. The actual total frequency of these nouns and verbs are listed in Appendix 2. Table 4.16 reports the frequency of morphological and syntactic markings used by Sophie on these target nouns and verbs.

Table 4.16 Frequency of morphological and syntactic markings on target words in Sophie's English

	Nouns	Verbs
Bare form	162 (60.0%)	648 (90.9%)
a/an/the + target	87 (32.2%)	0
target + *-s* (plural suffix)	21 (7.8%)	0
target + *-s* (third person singular suffix)	0	1 (0.1%)
target + *-ing* (progressive aspect suffix)	0	55 (7.7%)
target + *-ed* (past tense / perfective aspect suffix)	0	0
Uncodable	0	9 (1.3%)
Total tokens	270	713

Although many target nouns and verbs occurred in bare forms, the morphological and syntactic markings for nouns and for verbs did not overlap in Sophie's English throughout the investigation, as shown in Table 4.16. 32.2% of her target nouns followed the determiner *a*, *an*, or *the*, whereas no verbs were modified by the determiners. 7.7% of her target verbs took the progressive aspect suffix –*ing*, whereas no nouns were modified by the verb suffix.

Table 4.17 presents the age of first occurrence of each morphological and syntactic marking on nouns and verbs in Charlotte's English.

Table 4.17 Age of first occurrence of morphological and syntactic markings on nouns and verbs in Charlotte's English

	Nouns	Verbs
a/an/the + target	*a*: 1;08.28 *the*: 1;10.29	NIL
target + *-s* (plural suffix)	1;09.12	NIL
target + *-s* (third person singular suffix)	NIL	2;02.06
target + *-ing* (progressive aspect suffix)	NIL	1;09.12
target + *-ed* (past tense / perfective aspect suffix)	NIL	NIL

Same as Sophie, the morphological and syntactic markings for nouns and for verbs did not overlap in Charlotte's English throughout the investigation, as can be seen from Table 4.17. Charlotte first used the noun modifiers such as determiners and plural suffix to modify nouns before 1;11. See examples (7a) and (7b):

(7) a. *CHI: it's a baby.

      *INV: baby.   (Charlotte 1;08.28)

   b. *INV: 要著啊?

          jiu3   zoek3   aa4

          need   wear   SFP

          '[you] need to wear [it]?'

      *CHI: the shoe.   (Charlotte 1;10.29)

In examples (7a) and (7b), Charlotte used the determiner *a* before the noun *baby* as early as 1;08.28 and she used the determiner *the* before the noun *shoe* at 1;10.29. She could also use the plural suffix *-s* to modify the noun *shoe*, as can be seen from example (8):

(8) *CHI: ah, shoes.

    *INV: 冇鞋呀.

        mou5   haai4   aa3

        NEG   shoe   SFP

        '[there are] no shoes.'   (Charlotte 1;09.12)

The verb modifiers started to develop since 1;09.12 in Charlotte's English, as can be seen from Table 4.17. Same as Sophie, Charlotte used the verb suffixes –*s* and –*ing* to modify only verbs but not nouns. See examples (9) and (10):

(9) *CHI: she wants a Gaga.

    *INV: huh?   (Charlotte 2;02.06)

(10) *CHI: look, Baby's crying.

    *INV: Baby.   (Charlotte 1;09.12)

As shown in example (9), Charlotte first used the third person singular suffix –*s* to modify the verb *want* at 2;02.06. She first used the progressive aspect suffix –*ing* to modify the verb *cry* at 1;09.12, as can be seen from example (10).

According to the number of word tokens, the five most frequent nouns in Charlotte's English included *baby*, *shoe*, *girl*, *rabbit*, and *hand* whereas the five most frequent verbs in her English included *want*, *put*, *look*, *go*, and *sit*. The actual total frequency of these nouns and verbs are listed in Appendix 2. Table 4.18 reports the frequency of morphological and syntactic markings used by Charlotte on these target nouns and verbs.

Table 4.18 Frequency of morphological and syntactic markings on target words in Charlotte's English

	Nouns	Verbs
Bare form	353 (76.9%)	1,167 (95.0%)
a/an/the + target	63 (13.7%)	0
target + -*s* (plural suffix)	41 (8.9%)	0
target + -*s* (third person singular suffix)	0	27 (2.2%)
target + -*ing* (progressive aspect suffix)	0	31 (2.5%)
target + -*ed* (past tense / perfective aspect suffix)	0	0
Uncodable	2 (0.4%)	4 (0.3%)
Total tokens	459	1,229

Although many target nouns and verbs were produced in bare forms, the morphological and syntactic markings for nouns and for verbs did not overlap in Charlotte's English throughout the investigation, as shown in Table 4.18. 13.7% of her target nouns followed the determiner *a*, *an*, or *the*, whereas no verbs were modified by the determiners. 2.5% of her target verbs took the progressive aspect suffix –*ing*, whereas no nouns were modified by the verb suffix.

To summarize, both bilingual children in this study were able to distinguish verbs from nouns in English from very early on. They used the plural suffix –*s* and determiners such as *a* and *the* for only nouns whereas they used the inflections such as the progressive aspect suffix –*ing* for only verbs. The morphological and syntactic markings for nouns and for verbs did not overlap in their English.

4.5.2 Morphological and syntactic markings on Cantonese nouns and verbs

Table 4.19 presents the age of first occurrence of each morphological and syntactic marking on nouns and verbs in Sophie's Cantonese.

Table 4.19 Age of first occurrence of morphological and syntactic markings on verbs in Sophie's Cantonese

	Nouns	Verbs
CL + target	*go3*: 1;06.28 *di1*: 1;06.28 *gaa3*: 1;06.28 *tiu4*: 2;00.05 *zek3*: 2;01.06	NIL
m4/mei6/m4hou2 + target	NIL	1;08.16
target + *m4* + target	NIL	1;10.17
target + ASP	NIL	*zo2*: 1;06.14 *zyu6*: 1;06.28 *gan2*: 1;08.16 *haa5*: 1;09.20 *gwo3*: 2;04.26

As can be seen from Table 4.19, the morphological and syntactic markings for nouns and for verbs did not overlap in Sophie's Cantonese throughout the investigation. Sophie first used the classifiers to modify nouns as early as 1;06.28. See examples (11a), (11b), and (11c):

(11) a. *CHI: 嗰個獅子呀.

       go2   go3   si1zi2   aa3

       that   CL   lion   SFP

       'That lion.'

   *INV: 係唔係好慘呀?

       hai6-m4-hai6   hou2 caam2 aa3

       be-NEG-be   very   poor   SFP

       'Is it very poor?'   (Sophie 1;06.28)

b. *CHI: 啲碟.

  di1 dip2

  CL plate

  'The plates.'

 *INV: 濕晒.

  sap1 saai3

  wet all/completely

  'All are completely wet.' (Sophie 1;06.28)

c. *INV: 呢個呢?

  li1 go3 ne1?

  this CL SFP

  'How about this (one)?'

 *CHI: 架的士.

  gaa3 dik1si2

  CL taxi

  'The taxi.'   (Sophie 1;06.28)

Sophie first used the classifier *go3* to modify the noun *si1zi2* 'lion' at 1;06.28, as shown in example (11a). Although example (11a) is a case of overgeneralization of the classifier *go3*[6], Sophie's use of this classifier still illustrates that the noun category developed in her Cantonese as early as 1;06 as she could produce a [classifier + noun] phrase. Apart from *go3*, she also used the classifier *di1* to modify the noun *dip2* 'plate' and the classifier *gaa3* to modify the noun *dik1si2* 'taxi' at the same age, as shown in examples (11b) and (11c). Although most of the utterances at 1;06.28

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[6] For the noun *si1zi2* 'lion', the classifier *zek3* rather than *go3* is commonly used in adult Cantonese.

consisted of only two words, they can still demonstrate that there was already a category of nouns in Sophie's Cantonese from very early on.

The verb modifiers started to develop since 1;06.14 in Sophie's Cantonese, as shown in Table 4.19. She was already able to use different aspect markers for different verbs before age two and she never produced them after a noun. See examples (12a), (12b), (12c) and (12d):

(12) a. *CHI: 走咗呀.

zau2   zo2   aa3

leave   PFV   SFP

'[S/he] has left.'

　*INV: 邊個走咗呀?

bin1go3   zau2   zo2   aa3

who   leave   PFV   SFP

'Who has left?'   (Sophie 1;06.14)

　b. *INV: is this a cake?

　*CHI: 揸住!

zaa1   zyu6

hold   DUR

'Hold it!'   (Sophie 1;06.28)

　c. *INV: 唔講嘢冇聲架.

m4   gong2   je5   mou5   seng1   gaa3

NEG   speak   thing   NEG   sound   SFP

'[If you] don't speak, there's no sound.'

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*CHI: 錄緊呀.

luk6　　gan2　　aa3

record　　PROG　　SFP

'It's recording.'　　　　　　(Sophie 1;08.16)

d. *INV: Where are the forks?

*CHI: 睇呀，睇吓.

tai2　　aa3　　tai2　　haa5

look　　SFP　　look　　DEL

'Look. Take a look.'　　　　(Sophie 1;09.20)

Sophie used the perfective aspect marker *zo2* to modify the verb *zau2* 'leave' in example (12a). She used the durative aspect marker *zyu6* to modify the verb *zaa1* 'hold' in example (12b). These two aspect markers were first produced with verbs at 1;06. The verb *luk6* 'record' was modified by the progressive aspect marker *gan2* in example (12c), and the verb *tai2* 'look/see' was modified by the delimitative aspect marker *haa5* in example (12d). These two aspect markers were first produced with verbs before 1;09.

Apart from aspect markers, Sophie was also able to use the negation word *m4* and A-not-A form of a question for different verbs before age two, as shown in examples (13) and (14) respectively.

(13)*INV: 你去邊呀?

lei5　　heoi3　　bin1　　aa3

you　　go　　where　　SFP

'Where do you go to?'

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*CHI: 唔想呀.

    m4   soeng2   aa3

    NEG   want   SFP

    '[I] don't want.'   (Sophie 1;08.16)

(14) *INV: 唔犀利唔搖 lu3.

    m4 sai1lei6 m4 jiu4 lu3

    NEG incredible NEG shake SFP

    '[If it's] not incredible, [then we] don't shake [it].'

  *CHI: 搖唔搖呀?

    jiu4-m4-jiu4 aa3

    shake-NEG-shake SFP

    '[Would you] shake [it]?'   (Sophie 1;10.17)

In example (13), the negation word *m4* preceded the verb *soeng2* 'want', and in example (14), the verb *jiu4* 'shake' occurred in A-not-A form of a question.

According to the number of word tokens, the five most frequent nouns in Sophie's Cantonese included *gwai1* 'tortoise', *seoi2* 'water', *sau2* 'hand', *bi4bi1* 'baby', and *tong2* 'candy' whereas the five most frequent verbs in her Cantonese included *jiu3* 'need', *sik6* 'eat', *tai2* 'look/see/read', *waak6* 'draw', and *bei2* 'give'. The actual total frequency of these nouns and verbs are reported in Appendix 2. Table 4.20 reports the frequency of morphological and syntactic markings used by Sophie on these target nouns and verbs.

Table 4.20 Frequency of morphological and syntactic markings on target words in Sophie's Cantonese

	Nouns	Verbs
Bare form	313 (89.4%)	1,066 (86.8%)
CL + target	28 (8.0%)	0
m4/mei6/m4hou2 + target	0	121 (9.9%)
target + *m4* + target	0	9 (0.7%)
target + ASP	0	27 (2.2%)
Uncodable	9 (2.6%)	5 (0.4%)
Total tokens	350	1,228

Although many target nouns and verbs occurred in bare forms, the morphological and syntactic markings for nouns and for verbs did not overlap in Sophie's Cantonese throughout the investigation, as shown in Table 4.20. 8% of her target nouns followed a classifier, whereas no verbs were modified by the classifiers. 9.9% of her target verbs followed the negation word *m4*, *mei6*, or *m4hou2* and 2.2% took an aspect marker, while no nouns were modified by these verb modifiers.

Table 4.21 presents the age of first occurrence of each morphological and syntactic marking on nouns and verbs in Charlotte's Cantonese.

Table 4.21 Age of first occurrence of morphological and syntactic markings on verbs in Charlotte's Cantonese

	Nouns	Verbs
CL + target	*go3*: 1;08.28 *zek3*: 1;10.09	NIL
m4/mei6/m4hou2 + target	NIL	1;09.12
target + *m4* + target	NIL	NIL
target + ASP	NIL	*zo2*: 2;00.25 *haa5*: 2;06.16 *zyu6*: 2;10.15

As shown in Table 4.21, the morphological and syntactic markings for nouns and for verbs did not overlap in Charlotte's Cantonese throughout the investigation.

Charlotte started to use classifiers to modify nouns before age two. As can be seen from example (15a), she first used the classifier *go3* to modify the noun *bui1* as early as 1;08.28. In example (15b), she used the classifier *zek3* before the noun *goek3* at 1;10.09.

(15) a. *INV: 有冇杯呀?

      jau5   mou5   bui1   aa3

      have   NEG   cup   SFP

      '[Do you] have cups?'

   *CHI: 個杯呀.

      go3   bui1   aa3

      CL   cup   SFP

      'The cup.'   (Charlotte 1;08.28)

  b. *CHI: 呢隻腳.

      li1   zek3   goek3

      this   CL   leg/foot

      'This leg/foot.'

   *INV: 依度啊?

      ji1dou6   aa4

      here   SFP

      'Here?'   (Charlotte 1;10.09)

(16) *INV: 唔使擺喇.

      m4   sai2   baai2   laa3

      NEG   need   put   SFP

      '[You] don't need to put [it here].'

   *CHI: 唔識.

      m4   sik1

      NEG   know

      '[I] don't know.'   (Charlotte 1;09.12)

As can be seen from Table 4.21, the verb modifiers started to develop since 1;09.12 in Charlotte's Cantonese. She started to modify verbs by the negation word *m4* at this age. In example (16), Charlotte produced the negation word *m4* before the verb *sik1* 'know'.

However, being different from Sophie's results in Cantonese, Charlotte produced aspect markers after verbs only after 2;00 and none of her verbs occurred in A-not-A form of a question. But still, she never used the negation word *m4* and aspect markers to modify nouns, showing that she was able to distinguish the categories of nouns and verbs in Cantonese from very early on. See examples (17a), (17b) and (17c):

(17) a. *INV: What's this?

    *CHI: 爛咗呀.

        laan6   zo2   aa3

        broken   PFV   SFP

        '[It] has broken.'   (Charlotte 2;00.25)

b. *CHI: 睇吓.

　　tai2　　haa5

　　look/see　DEL

　　'Have a look.'

*INV: 睇吓.

　　tai2　　haa5

　　look/see　DEL

　　'Have a look.'　　　　　(Charlotte 2;06.16)

c. *CHI: 拖住呀.

　　to1　zyu6　aa3

　　hold　DUR　SFP

　　'Hold [it].'

*INV: 係呀，拖住呀.

　　hai6　aa3　to1　　zyu6　aa3

　　yes　SFP　hold　DUR　SFP

　　'Yes, hold [it].'　　　　(Charlotte 2;10.15)

Charlotte used the perfective aspect marker *zo2* to modify the verb *laan6* 'broken' at 2;00.25, as shown in example (17a). In example (17b), the verb *tai2* 'look/see' was followed by the delimitative aspect marker *haa5*, and in example (17c), the verb *to1* 'hold' was followed by the durative aspect marker *zyu6*. These two aspect markers were first produced with verbs after age two.

According to the number of word tokens, the five most frequent nouns in Charlotte's Cantonese included *faa1* 'flower', *che1* 'car', *bi4bi1* 'baby', *saam1* 'clothes', and *maau1* 'cat' whereas the five most frequent verbs in her Cantonese

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included *soeng2* 'want', *zoek3* 'wear', *sik6* 'eat', *bong1* 'help', and *laan6* 'broken'. The actual total frequency of these nouns and verbs are reported in Appendix 2. Table 4.22 reports the frequency of morphological and syntactic markings used by Charlotte on these target nouns and verbs.

Table 4.22 Frequency of morphological and syntactic markings on target words in Charlotte's Cantonese

	Nouns	Verbs
Bare form	132 (95.0%)	164 (95.3%)
CL + target	5 (3.6%)	0
m4/mei6/m4hou2 + target	0	0
target + *m4* + target	0	0
target + ASP	0	8 (4.7%)
Uncodable	2 (1.4%)	0
Total tokens	139	172

Although many target nouns and verbs were produced in bare forms, the morphological and syntactic markings for nouns and for verbs did not overlap in Charlotte's Cantonese throughout the investigation, as shown in Table 4.22. 3.6% of her target nouns followed a classifier, whereas no verbs were modified by the classifiers. 4.7% of her target verbs took an aspect marker, while no nouns were modified by aspect markers.

In short, both bilingual children in this study were able to distinguish verbs from nouns in Cantonese from very early on. They used the classifiers such as *go3*, *di1*, and *zek3* for only nouns whereas they used aspect markers such as *zo2*, *gan2*, *haa5*, and *zyu6*, negation word *m4* and A-not-A form of a question for only verbs. The morphological and syntactic markings for nouns and for verbs did not overlap in their Cantonese.

4.5.3 Summary

In English, both Sophie and Charlotte had already started to use determiners and plural marker *–s* for nouns but not verbs before age two, and they were able to use third person singular suffix *–s* and progressive aspect suffix *–ing* for verbs but not nouns throughout the investigation. In Cantonese, both bilingual children had already started to use classifiers for nouns but not verbs before age two, and they could use aspect markers and negation word *m4* for verbs but not nouns throughout the investigation. These results demonstrate that the bilingual children were able to make noun-verb distinctions in both languages throughout the investigation, and that the categories of nouns and verbs started to develop in the earliest stage of their lexical development.

4.6 Summary of major findings

The major findings of this thesis are summarized as follows. First, there is a noun bias in the lexical development in English among all the three children throughout the investigation. The number of noun types exceeded that of verb types at every stage. Nouns developed faster than verbs in terms of cumulative development throughout the age span. Although the N/(N+V) ratio in all the three children in this study tended to decrease across stages, it still remained greater than 0.55 at every stage. Similar results were reported in the English of both bilingual children and their monolingual counterparts. Thus, we can conclude that the noun bias consistently occurs in the lexical development in English.

Contrary to English, Cantonese does not show any consistent noun bias among the three children throughout the investigation. Although Sophie, the Cantonese-dominant bilingual child, and CCC, the monolingual Cantonese-speaking child, had a N/(N+V) ratio greater than 0.55 during the period before 2;00, the ratio

decreased across stages and their initial noun bias in Cantonese eventually disappeared. Their number of verb types surpassed that of noun types at the final stage. On the other hand, Charlotte, the English-dominant bilingual child, had a $N/(N+V)$ ratio smaller than 0.45 during the period before 2;00, showing that she did not start with a noun bias, but rather a verb bias, in the lexical development of Cantonese. Unlike Sophie and CCC, the proportion of nouns to nouns + verbs in Charlotte's Cantonese showed a tendency to increase from 2;00 onwards, leading to disappearance of her initial verb bias. Charlotte's results may be attributed to her language dominance of English, which exerts cross-linguistic influence in the lexical composition in Cantonese.

Based on the measures of $N/(N+V)$ ratios and cumulative $N/(N+V)$ ratios, a stronger noun bias is observed in the lexical composition of the bilingual children's English than in their Cantonese throughout the investigation. The proportion of nouns to verbs in their English remained greater than that in their Cantonese across the age span, showing that the noun bias is language-specific rather than universal in children's lexical development. Language-specific factors such as the licensing of null arguments and the semantic properties of nouns and verbs provide possible reasons for the differences in the lexical composition between the bilingual children's English and Cantonese.

In addition, the lexical developmental patterns are different between the bilingual and monolingual children in either language. In English, the noun bias in Sophie and Charlotte, the Cantonese-English bilingual children, tended to be weaker than that in Peter, the monolingual English-speaking child, whereas in Cantonese, the proportion of nouns to verbs in the bilingual children's Cantonese was greater than that in CCC, the monolingual Cantonese-speaking child. The differences in the lexical composition between bilingual and monolingual children can be explained by cross-linguistic

influence, as shown in the results on translation equivalents of nouns and verbs of the bilingual children. Both bilingual children's Cantonese nouns retained a greater proportion of English equivalents than their Cantonese verbs did throughout the investigation. This shows cross-linguistic influence from English to Cantonese at the lexical level in the sense that they first acquired many nouns in English, a "noun-friendly" language, and then it facilitated their acquisition of the Cantonese equivalents of these nouns. It results in the increase in the proportion of nouns to verbs in Cantonese for the bilingual children. In addition, the bilingual children's English verbs retained a greater proportion of Cantonese equivalents than their English nouns did. This shows cross-linguistic influence from Cantonese to English in the sense that they first acquired many verbs in Cantonese, a "verb-friendly" language, and then it facilitated their acquisition of the English equivalents of these verbs. It results in the decrease in the proportion of nouns to verbs in English for the bilingual children.

The lexical composition in each language is also compared between the English-dominant and Cantonese dominant bilingual children. In English, the proportion of nouns to verbs in Charlotte, the English-dominant bilingual child, was even smaller than that in Sophie, the Cantonese-dominant bilingual child, throughout the investigation. This shows that language dominance does not play a significant role as expected in cross-linguistic influence in the lexical composition of the bilingual children's English. On the other hand, language dominance plays a significant role in the lexical development of the bilingual children's Cantonese. In particular, Charlotte's language dominance of English exerts cross-linguistic influence in the lexical development of her Cantonese. She had a different developmental pattern of nouns and verbs from Sophie and the monolingual Cantonese-speaking child in the sense that the proportion of nouns to verbs in her Cantonese tended to increase after

2;00.

Finally, an analysis of morphological and syntactic markings for nouns and verbs produced by the bilingual children in each language was conducted. Results show that the bilingual children had already started to use appropriate morphological and syntactic markings for nouns and for verbs in both English and Cantonese before age two. Their morphological and syntactic markings for nouns and for verbs did not overlap in each language. This suggests that the categories of nouns and verbs started to develop from very early on in both languages of bilingual children and that they were able to make noun-verb distinctions throughout the investigation.

Chapter 5: Conclusions

This chapter summarizes the major findings of our study and highlights its significance and contributions. Basically, our study argues against the view of universal noun bias put forward by Gentner (1982, 2006). Instead, our data supports Tardif's (1996) view that the noun bias is language-specific. In this study, a stronger noun bias in English than in Cantonese is observed in the lexical development in all children throughout the investigation. Language-specific factors such as licensing of null arguments and lexicalization patterns of nouns and verbs provide possible reasons for the differences observed in children's lexical composition across languages. At the same time, the effect of cross-linguistic influences narrows the differences in the lexical composition between English and Cantonese for the bilingual children. Finally, we call attention to some limitations of this study and a few suggestions for future research are made at the end of this chapter.

5.1 Conclusions

One of the long-standing debates in the child language acquisition literature centers on whether the noun bias is universal or language-specific in children's lexical acquisition. Gentner (1982) proposed the Natural Partitions Hypothesis which states that concepts of objects encoded by nouns are cross-linguistically similar and easy while concepts of actions or states encoded by verbs and other grammatical categories are language-specific and difficult for children, giving rise to a noun bias in children's early vocabulary (Gentner, 1982). If the noun bias is indeed universal, the same bias is expected to show up in monolingual and bilingual children, regardless of the target language. However, such a bias is not found in the bilingual children's Cantonese and their monolingual peers in this study. The noun bias is only shown consistently in the

lexical development in their English but not in their Cantonese throughout the investigation. The proportion of nouns to nouns + verbs remains greater than 0.55 in the children's English, whereas such a proportion in their Cantonese remains lower than that in their English across the age span. English nouns develop faster than verbs in all children throughout their age span, whereas the same pattern is not observed in their Cantonese at all stages. The children's lexical developmental patterns observed in this study accord with the findings in Tardif's (1996) study on Mandarin-speaking children and Leung's (1998) study on Cantonese-speaking children who did not produce a greater number of noun types than verb types during the period of investigation. The difference in the lexical composition between English and Cantonese of the bilingual children under investigation is also consistent with Lee's (2009) study on two bilingual children who had a greater proportion of noun types to verb types in English than in Cantonese during the period of investigation. Moreover, the bilingual children in this study are shown to be able to distinguish verbs from nouns, not only in English, but also in Cantonese, from very early on. This accords with Tardif's (2006a, 2006b) studies which show that Mandarin-speaking children make noun-verb distinctions by using noun and verb modifiers discriminately at a very early stage.

The findings in this thesis support Tardif's (1996, 2006a, 2006b) claim that the noun bias is language-specific in children's lexical development. The results of our study provide strong evidence for language-specific effects of word category bias in children's lexical development. Two language-specific factors, namely the licensing of null arguments and semantic properties, have been discussed. Both subject-drop and object-drop are widely permitted in Cantonese (e.g. Huang, 1984; Li & Thompson, 1981; etc.), whereas they are prohibited in English. English nouns are more distinct than those in Cantonese, whereas Cantonese verbs are more specific

than those in English in terms of semantic properties. From this point of view, English favours nouns, leading to the increase in the proportion of nouns to verbs in children's English lexicons. Unlike English, Cantonese favours verbs but not nouns, and this lowers the proportion of nouns to verbs in children's Cantonese lexicons.

In addition, cross-linguistic influence plays a significant role in the bilingual children's lexical development, as shown in their translation equivalents for nouns and verbs between the two languages. In English, a language in favour of nouns, many nouns are acquired first. When cross-linguistic influence occurs at the lexical level, having acquired nouns first in English facilitates the acquisition of nouns in Cantonese, as shown in the proportion of Cantonese nouns with English equivalents which remains greater than that for verbs. As a result, the bilingual children acquire proportionately more nouns and fewer verbs than their monolingual counterparts do, leading to the increase in the proportion of nouns to verbs in the bilinguals' Cantonese. In Cantonese, a language which favours verbs, many verbs are acquired first. When cross-linguistic influence occurs at the lexical level, having acquired verbs first in Cantonese facilitates the acquisition of verbs in English, as shown in the proportion of English verbs with Cantonese equivalents which remains greater than that for nouns. As a result, the bilingual children acquire proportionately more verbs and fewer nouns than their monolingual peers do, leading to the decrease in the proportion of nouns to verbs in the bilinguals' English. Cross-linguistic influence occurs in both directions at the lexical level, and its effect narrows the differences in the proportion of nouns and verbs between English and Cantonese for the bilingual children.

5.2 Limitations and suggestions for further research

There are a number of limitations in this study. First, the findings of this study are based on a limited number of monolingual and bilingual children. There are only

two Cantonese-English bilingual children, one monolingual Cantonese-speaking child and one monolingual English-speaking child in this study. It would be better if more children can be included, so that a fuller picture of early lexical acquisition across different children can be obtained. Second, due to the limited availability of data in the corpora, the children in this study were not young enough for us to capture their very first words. In this study, the age of the children in their first recording sessions ranged between 1;06 and 1;10. If earlier speech samples of these children can be included, the relative order of the first emergence of nouns and verbs can then be determined. In other words, in order to investigate the developmental sequence of word categories in their "earliest" stage of lexical development, children's naturalistic speech samples when their first words are produced should be collected and analyzed. Third, the length and interval of recording sessions across children and corpora were not consistent and the relative order of emergence of a noun and verb spurt cannot be determined for all the children in this study. In order to examine the emergence and occurrence of noun and verb spurts among the children, the length and interval of recording sessions should better be controlled across children and corpora.

Appendices

Appendix 1: Translation equivalents for nouns and verbs in Cantonese-English bilingual children

Table 1 List of equivalent words for Sophie's nouns from 1;06.00 to 3;00.09

No.	Word	Age at which word appeared	Equivalent	Age at which equivalent appeared
1	*ball*	1;06.00	**bo1bo1 波波**	1;06.14
2	*bear*	1;06.00	**hung4jan2 熊人**	1;06.14
3	*mouse*	1;06.00	**lou5syu2 老鼠**	2;01.20
4	*wolf*	1;06.00	**long4 狼**	2;04.26
5	**sau2 手**	1;06.00	*hand*	1;06.00
6	**ngau4 牛**	1;06.00	*cow*	1;11.08
7	**tou3zai2 兔仔**	1;06.00	*rabbit*	1;06.00
8	**gau2zai2 狗仔**	1;06.00	*puppy*	1;11.08
9	**gau2zai2 狗仔**	1;06.00	*dog*	2;02.16
10	**mun4 門**	1;06.00	*door*	1;10.02
11	**jyu2 魚**	1;06.00	*fish*	2;01.20
12	**si1zi2 獅子**	1;06.00	*lion*	1;06.14
13	**zyu1 豬**	1;06.00	*pig*	1;11.22
14	**gei1 機**	1;06.00	*machines*	3;00.02
15	**maau1 貓**	1;06.00	*cat*	1;09.20
16	**gai1 雞**	1;06.00	*chicken*	2;01.06
17	*key*	1;06.14	**so2si4 鎖匙**	2;03.25
18	*tea*	1;06.14	**caa4 茶**	1;08.02
19	**wou1wou1 汪汪**	1;06.14	*puppy*	1;11.08
20	**wou1wou1 汪汪**	1;06.14	*dog*	2;02.16
21	**ce1 車**	1;06.14	*car*	2;04.18
22	**fei1gei1 飛機**	1;06.14	*aeroplane*	2;04.26
23	**syu1 書**	1;06.14	*book*	2;00.05
24	**zi2 紙**	1;06.14	*paper*	2;01.06
25	**be1be1 啤啤**	1;06.14	*teddy bear*	2;03.25
26	**daai2 帶**	1;06.14	*tape*	2;01.06
27	**hap2 盒**	1;06.14	*box*	1;06.14
28	**zoek3zai2 雀仔**	1;06.14	*bird*	2;03.01
29	**meu1meu1 喵喵**	1;06.14	*cat*	1;09.20
30	**beng2 餅**	1;06.14	*biscuit*	2;01.20
31	**gwai1 龜**	1;06.14	*turtle*	2;02.03
32	**gwai1 龜**	1;06.14	*tortoise*	2;05.02
33	*apple*	1;06.28	**ping4gwo2 蘋果**	1;08.16
34	*bean*	1;06.28	**dau2 豆**	2;08.08
35	*cake*	1;06.28	**daan6gou1 蛋糕**	1;07.18
36	*piano*	1;06.28	**kam4 琴**	1;08.02
37	*umbrella*	1;06.28	**ze1 遮**	1;10.02

38	*neoi5zai2 女仔*	1;06.28	*girl*	2;01.20
39	*baa1si2 巴士*	1;06.28	*bus*	3;00.09
40	*seoi2 水*	1;06.28	*water*	1;08.16
41	*bui1 杯*	1;06.28	*cup*	1;11.22
42	*bui1 杯*	1;06.28	*glass*	3;00.02
43	*faa1 花*	1;06.28	*flower*	1;08.02
44	*fung1sin3 風扇*	1;06.28	*fan*	2;02.03
45	*maa5lau1 馬騮*	1;06.28	*monkey*	1;11.08
46	*bi4bi1 啤啤*	1;06.28	*baby*	1;07.18
47	*daan2daan2 蛋蛋*	1;06.28	*egg*	2;01.06
48	*syu6 樹*	1;06.28	*tree*	2;02.03
49	*moon*	1;07.18	*jyut6loeng6 月亮*	1;11.22
50	*spider*	1;07.18	*zi1zyu1 蜘蛛*	2;03.14
51	*towel*	1;07.18	*sau2gan1 手巾*	2;03.01
52	*maa5 馬*	1;07.18	*horse*	1;08.02
53	*haai4 鞋*	1;07.18	*shoe*	1;10.02
54	*gai1daan2 雞蛋*	1;07.18	*egg*	2;01.06
55	*gaat6zaat2 甲由*	1;07.18	*cockroach*	2;01.20
56	*banana*	1;08.02	*hoeng1ziu1 香蕉*	1;09.20
57	*crab*	1;08.02	*haai5 蟹*	1;08.16
58	*baau1baau1 包包*	1;08.02	*bread*	2;04.18
59	*waa2 畫*	1;08.02	*drawing*	2;05.30
60	*waa2 畫*	1;08.02	*picture*	2;11.18
61	*caang2 橙*	1;08.02	*orange*	2;02.16
62	*tau4 頭*	1;08.02	*head*	1;08.16
63	*eye*	1;08.16	*ngaan5 眼*	1;10.17
64	*fairy*	1;08.16	*san4sin1 神仙*	2;06.12
65	*nose*	1;08.16	*bei6go1 鼻哥*	1;11.08
66	*toe*	1;08.16	*goek3zi2 腳趾*	2;01.20
67	*watch*	1;08.16	*biu1 錶*	1;10.02
68	*sing1sing1 星星*	1;08.16	*star*	2;07.10
69	*soeng1fung1 傷風*	1;08.16	*cold*	1;08.16
70	*bag*	1;08.30	*doi2 袋*	1;11.22
71	*hat*	1;08.30	*mou2 帽*	1;11.08
72	*witch*	1;08.30	*mou4po4 巫婆*	2;05.02
73	*gim3 劍*	1;08.30	*sword*	2;07.01
74	*dang1 燈*	1;08.30	*light*	2;02.16
75	*dinosaur*	1;09.20	*hung2lung4 恐龍*	1;10.02
76	*fork*	1;09.20	*caa1 叉*	3;00.02
77	*mong1gwo2 芒果*	1;09.20	*mango*	2;02.03
78	*jyun4hyun1 圓圈*	1;09.20	*circle*	1;11.08
79	*house*	1;10.02	*uk1 屋*	2;01.06
80	*telephone*	1;10.02	*din6waa2 電話*	2;02.16
81	*dang3 凳*	1;10.02	*chair*	2;00.18
82	*aap3 鴨*	1;10.02	*duck*	2;03.01
83	*aap3zai2 鴨仔*	1;10.02	*ducklings*	2;06.12
84	*sheep*	1;10.17	*joeng4 羊*	2;05.02

85	*sheep*	1;10.17	**joeng4kwan4** 羊群	2;09.24
86	**gung1zai2** 公仔	1;10.17	*doll*	2;07.10
87	**taai3joeng4** 太陽	1;10.17	*sun*	1;11.22
88	**hei3seoi2** 汽水	1;10.17	*cola*	2;09.05
89	**hei3seoi2** 汽水	1;10.17	*soft drink*	2;09.05
90	**goek3** 腳	1;10.17	*feet*	2;04.18
91	**goek3** 腳	1;10.17	*foot*	2;05.16
92	**goek3** 腳	1;10.17	*leg*	2;07.24
93	**tong2** 糖	1;10.17	*sweet*	2;08.08
94	**tau4faat3** 頭髮	1;10.17	*hair*	2;04.18
95	*cheese*	1;11.08	**zi1si2** 芝士	2;03.14
96	*donkey*	1;11.08	**lou4zai2** 驢仔	2;05.02
97	*mouth*	1;11.08	**hau2** 口	2;05.02
98	*mouth*	1;11.08	**zeoi2** 咀	2;09.05
99	**daai6ban6zoeng6** 大笨象	1;11.08	*elephant*	2;01.06
100	**wu4dip2** 蝴蝶	1;11.08	*butterfly*	2;04.26
101	*candle*	1;11.22	**laap6zuk1** 蠟燭	2;10.10
102	*owl*	1;11.22	**maau1tau4jing1** 貓頭鷹	2;05.16
103	**si6bing1** 士兵	1;11.22	*soldier*	2;05.02
104	**siu2cau2** 小丑	1;11.22	*clown*	2;04.26
105	**gaap3cung4** 甲蟲	1;11.22	*beetle*	2;07.24
106	**gwaai3sau3** 怪獸	1;11.22	*monster*	2;02.16
107	**faan6** 飯	1;11.22	*rice*	2;03.14
108	**din6si6** 電視	1;11.22	*tv*	1;11.22
109	**wo1ngau4** 蝸牛	1;11.22	*snail*	2;01.06
110	**hok6haau6** 學校	1;11.22	*school*	2;05.16
111	**syu4tiu2** 薯條	1;11.22	*French fries*	2;08.22
112	**cung4** 蟲	1;11.22	*worm*	2;05.16
113	**ji1sang1** 醫生	1;11.22	*doctor*	2;06.12
114	**joek6** 藥	1;11.22	*medicine*	2;09.24
115	*boy*	2;00.05	**naam4zai2** 男仔	2;10.24
116	*castle*	2;00.05	**bou2leoi5** 堡壘	2;05.02
117	**gung1zyu2** 公主	2;00.05	*princess*	2;00.05
118	**fo2** 火	2;00.05	*fire*	2;05.16
119	**zyu1gu1lik1** 朱古力	2;00.05	*chocolate*	2;01.20
120	**mei5baa1** 尾巴	2;00.05	*tail*	2;00.05
121	**cing1waa1** 青蛙	2;00.05	*frog*	2;04.26
122	**duk6** 毒	2;00.05	*poison*	2;03.01
123	**kwan4** 裙	2;00.05	*dress*	2;03.25
124	**kwan4** 裙	2;00.05	*skirt*	2;06.12
125	**cin2** 錢	2;00.05	*money*	2;02.03
126	**syu4pin2** 薯片	2;00.05	*chips*	2;05.02
127	**gung1jyun2** 公園	2;00.18	*park*	2;08.22
128	**pang4jau5** 朋友	2;00.18	*friend*	2;05.16
129	**syut3gou1** 雪糕	2;00.18	*ice-cream*	2;03.01
130	**ging2caat3** 警察	2;00.18	*policeman*	2;04.26
131	**je5sik6** 嘢食	2;00.18	*food*	2;08.08

132	*teacher*	2;01.06	**sin1saang1 先生**	2;11.05
133	**wong4zi2 王子**	2;01.06	*prince*	2;05.16
134	*girl*	2;01.20	**sai3lou6neoi2 細路女**	2;05.30
135	*toy*	2;01.20	**wun6geoi6 玩具**	2;03.25
136	**ngai5 蟻**	2;01.20	*ant*	2;01.20
137	*face*	2;02.03	**min6 面**	2;03.01
138	*song*	2;02.03	**go1 歌**	2;02.16
139	**dou1 刀**	2;02.03	*knife*	2;04.26
140	**zi6 字**	2;02.16	*words*	2;11.18
141	**hei3kau4 氣球**	2;02.16	*balloon*	2;02.16
142	**se4 蛇**	2;02.16	*snake*	2;05.02
143	**saan1 山**	2;03.01	*mountain*	2;07.01
144	**coi2hung4 彩虹**	2;03.01	*rainbow*	2;03.01
145	**faan1gaan2 番梘**	2;03.01	*soap*	2;03.01
146	**ling4mung1caa4 檸檬茶**	2;03.01	*lemon tea*	2;09.05
147	*meat*	2;03.14	**juk6 肉**	2;06.12
148	**gwai2 鬼**	2;03.14	*ghost*	2;05.02
149	**je5 嘢**	2;03.14	*thing*	2;06.12
150	*gorilla*	2;03.25	**sing1sing1 猩猩**	2;05.02
151	*milk*	2;03.25	**naai1naai1 奶奶**	2;09.05
152	*story*	2;03.25	**gu2zai2 故仔**	2;09.24
153	**meng2 名**	2;03.25	*name*	2;07.10
154	**uk1kei2 屋企**	2;03.25	*home*	2;06.12
155	*bread*	2;04.18	**min6baau1 麵包**	2;05.16
156	*computer*	2;04.18	**din6lou5 電腦**	2;09.24
157	*gun*	2;04.18	**coeng1 槍**	2;05.30
158	**seon4gou1 唇膏**	2;04.18	*lipstick*	2;05.30
159	*bicycle*	2;04.26	**daan1ce1 單車**	2;05.30
160	*king*	2;04.26	**wong4dai3 皇帝**	2;05.02
161	*king*	2;04.26	**wong4soeng6 皇上**	3;00.09
162	**syun4 船**	2;04.26	*ship*	2;07.10
163	*bed*	2;05.02	**cong4 床**	2;08.22
164	*queen*	2;05.16	**wong4hau6 皇后**	3;00.09
165	**bui3hok3 貝殼**	2;05.30	*shell*	2;05.30
166	**suk1mai5 粟米**	2;06.12	*corn*	2;06.12
167	*band*	2;07.10	**joeng6gan2 橡筋**	2;07.24
168	**lik6 力**	2;07.10	*power*	2;10.10
169	**si6jau4 豉油**	2;08.08	*soya sauce*	2;09.24
170	*lemon*	2;09.05	**ling4mung1 檸檬**	2;09.24
171	*wine*	2;09.05	**jau2 酒**	2;10.24
172	*table*	2;09.24	**toi2 檯**	2;10.10
173	**jam1ngok6 音樂**	2;09.24	*music*	2;11.18
174	**sam1lam4 森林**	2;10.10	*forest*	2;10.10
175	**si6do1be1lei2 士多啤梨**	2;11.05	*strawberry*	2;11.05
176	**mo1seot6 魔術**	2;11.18	*magic*	2;11.18
177	**mo1seot6si1 魔術師**	2;11.18	*magician*	2;11.18

Table 2 List of equivalent words for Sophie's verbs from 1;06.00 to 3;00.09

No.	Word	Age at which word appeared	Equivalent	Age at which equivalent appeared
1	*heoi3 去*	1;06.00	*go*	1;06.14
2	*hai6 係*	1;06.00	*is*	1;10.17
3	*sai2 洗*	1;06.00	*wash*	1;07.18
4	*hoi1 開*	1;06.00	*open*	1;09.20
5	*soeng2 想*	1;06.00	*want*	1;08.30
6	*tek3 踢*	1;06.00	*kick*	2;05.16
7	*baai2 擺*	1;06.00	*put*	2;03.25
8	*daa2 打*	1;06.14	*hit*	2;03.25
9	*jau5 有*	1;06.14	*have*	1;11.08
10	*ngaau5 咬*	1;06.14	*bite*	2;02.16
11	*bei2 俾*	1;06.14	*let*	2;03.14
12	*zin2 剪*	1;06.14	*cut*	2;04.26
13	*dit3 跌*	1;06.14	*fall*	2;00.18
14	*tai2 睇*	1;06.14	*look*	1;06.28
15	*tai2 睇*	1;06.14	*watch*	2;04.26
16	*sik1 識*	1;06.14	*know*	2;02.16
17	*lo2 攞*	1;06.14	*take*	2;02.03
18	*lo2 攞*	1;06.14	*get*	2;03.25
19	*fan3gaau3 瞓覺*	1;06.14	*sleep*	1;11.22
20	*like*	1;06.28	*zung1ji3 鍾意*	1;09.20
21	*look*	1;06.28	*mong6 望*	2;09.24
22	*co5 坐*	1;06.28	*sit*	1;07.18
23	*sik6 食*	1;06.28	*eat*	1;08.16
24	*jam2 飲*	1;06.28	*drink*	2;08.22
25	*lok6jyu5 落雨*	1;06.28	*raining*	2;03.01
26	*jaa1 揸*	1;06.28	*hold*	1;07.18
27	*dam2 揼*	1;06.28	*throw*	2;07.01
28	*come*	1;07.18	*lai4 嚟*	1;10.17
29	*hold*	1;07.18	*pou5 抱*	1;08.16
30	*hold*	1;07.18	*laam2 攬*	1;11.08
31	*hold*	1;07.18	*to1(sau2) 拖(手)*	1;11.22
32	*gin3 見*	1;07.18	*see*	1;08.30
33	*jiu3 要*	1;07.18	*need*	2;02.03
34	*zuk1 捉*	1;07.18	*catch*	2;10.10
35	*haam3 喊*	1;07.18	*cry*	2;04.18
36	*zing2 整*	1;07.18	*make*	2;02.03
37	*bei2 畀*	1;08.02	*give*	2;01.20
38	*waak6 畫*	1;08.02	*draw*	1;10.02
39	*gong2 講*	1;08.02	*tell*	2;03.25
40	*haang4 行*	1;08.16	*walk*	2;05.16
41	*fei1 飛*	1;08.16	*fly*	2;01.20
42	*tiu3 跳*	1;08.16	*jump*	2;03.01
43	*taan4(kam4) 彈(琴)*	1;08.16	*play*	1;09.20
44	*seng2 醒*	1;08.16	*wake*	2;05.16

45	*teng1* 聽	1;08.16	*hear*	2;09.24
46	*teng1* 聽	1;08.16	*listen*	2;11.05
47	*cook*	1;08.30	*jyu2* 煮	1;11.22
48	*want*	1;08.30	*oi3* 愛	2;00.18
49	*giu3* 叫	1;08.30	*call*	2;07.10
50	*teoi1* 推	1;08.30	*push*	2;05.16
51	*mo2* 摸	1;08.30	*touch*	2;02.03
52	*caai2/jaai2* 踩	1;08.30	*step*	2;10.10
53	*laan6* 爛	1;08.30	*broken*	2;05.02
54	*ung2* 擁	1;08.30	*push*	2;05.16
55	*ask*	1;09.20	*man6* 問	2;07.24
56	*open*	1;09.20	*daa2hoi1* 打開	2;03.25
57	*play*	1;09.20	*waan2* 玩	1;10.17
58	*saan1* 閂	1;09.20	*close*	3;00.02
59	*wan2* 搵	1;09.20	*find*	2;01.20
60	*duk1* 篤	1;09.20	*touch*	2;02.03
61	*zyun3* 轉	1;09.20	*turn*	2;02.16
62	*kei5* 企	1;10.02	*stand*	2;07.10
63	*gam6* 撳	1;10.02	*press*	2;05.02
64	*wai3* 餵	1;10.02	*feed*	2;11.18
65	*lik1* 扐	1;10.17	*carry*	2;07.10
66	*sei2* 死	1;10.17	*die*	2;03.01
67	*cung1loeng4* 沖涼	1;10.17	*bathe*	2;08.08
68	*zi1* 知	1;10.17	*know*	2;02.16
69	*sai2baak6baak6* 洗白白	1;10.17	*bathe*	2;08.08
70	*maai5* 買	1;10.17	*buy*	2;04.18
71	*zou6* 做	1;11.08	*do*	2;03.25
72	*waa6* 話	1;11.08	*say*	2;05.16
73	*sek3* 錫	1;11.08	*kiss*	2;05.16
74	*lei1* 匿	1;11.22	*hide*	3;00.09
75	*king1gai2* 傾偈	1;11.22	*talk*	2;07.10
76	*caau3* 摷	1;11.22	*find*	2;01.20
77	*paa4* 爬	2;00.05	*climb*	2;04.26
78	*paa4* 爬	2;00.05	*crawl*	2;06.12
79	*fall*	2;00.18	*lam3* 冧	2;04.26
80	*daai3* 帶	2;00.18	*bring*	2;10.10
81	*bong2* 綁	2;00.18	*tie*	2;07.10
82	*bong1* 幫	2;00.18	*help*	2;05.30
83	*gau3* 救	2;01.06	*save*	2;09.24
84	*saat3* 殺	2;01.06	*kill*	2;05.16
85	*pull*	2;01.20	*laai1* 拉	2;09.24
86	*touch*	2;02.03	*dim3* 掂	2;03.25
87	*jau4seoi2* 游水	2;02.03	*swim*	2;04.26
88	*dang2* 等	2;02.16	*wait*	2;07.10
89	*fight*	2;03.01	*daa2gaau1* 打交	2;03.25
90	*daa2(bo1)* 打(波)	2;03.01	*play*	1;09.20
91	*oi3lai4* 愛嚟	2;03.01	*use (to)*	2;09.24

92	*try*	2;03.14	*si3 試*	2;03.25
93	*write*	2;03.14	*se2 寫*	2;03.25
94	*cit3 切*	2;03.14	*cut*	2;04.26
95	*blew*	2;03.25	*ceoi1 吹*	2;09.24
96	*put*	2;03.25	*fong3 放*	2;05.30
97	*put*	2;03.25	*zai1 擠*	2;07.10
98	*tell*	2;03.25	*waa6 話*	2;07.01
99	*saat3sei2 殺死*	2;03.25	*kill*	2;05.16
100	*gaau2 搞*	2;03.25	*do*	2;03.25
101	*daa2(din6waa2) 打(電話)*	2;04.18	*call*	2;07.10
102	*hurt*	2;05.16	*zing2dou2 整倒*	2;06.12
103	*hurt*	2;05.16	*sau6soeng1 受傷*	2;07.24
104	*hurt*	2;05.16	*syun2 損*	2;07.24
105	*jung6 用*	2;05.16	*use*	2;09.24
106	*git3fan1 結婚*	2;05.16	*marry*	2;07.24
107	*ke4 騎*	2;05.16	*ride*	2;07.10
108	*ling1 拎*	2;05.30	*carry*	2;07.10
109	*gan1 跟*	2;05.30	*follow*	2;10.10
110	*wan3 搵*	2;06.12	*hide*	3;00.09
111	*throw*	2;07.01	*diu6/deu6 掉*	2;09.05
112	*comb*	2;07.24	*so1 梳*	2;08.08
113	*care*	2;08.22	*ziu3gu3 照顧*	3;00.02
114	*doctor*	2;09.05	*ji1 醫*	3;00.09
115	*dap6 揼*	2;10.10	*beat*	2;10.10

Table 3 List of equivalent words for Charlotte's nouns from 1;08.28 to 3;00.03

No.	Word	Age at which word appeared	Equivalent	Age at which equivalent appeared
1	*baby*	1;08.28	***bi4bi1 啤啤***	1;08.28
2	*clock*	1;08.28	***zung1 鐘***	2;00.25
3	*shoe*	1;08.28	***haai4 鞋***	1;08.28
4	*sock*	1;08.28	***mat6 襪***	1;09.12
5	***naai1naai1 奶奶***	1;08.28	*milk*	2;00.25
6	***bui1 杯***	1;08.28	*cup*	1;09.12
7	***saam1 衫***	1;08.28	*clothes*	2;05.19
8	***faan6 飯***	1;08.28	*rice*	2;00.25
9	***ziu1 蕉***	1;08.28	*banana*	1;09.12
10	*apple*	1;09.12	***ping4gwo2 蘋果***	2;01.22
11	*ball*	1;09.12	***bo1bo1 波波***	1;09.12
12	*bear*	1;09.12	***be1be1 啤啤***	2;02.18
13	*bear*	1;09.12	***hung4jan2 熊人***	2;10.15
14	*book*	1;09.12	***syu1 書***	2;10.15
15	*diaper*	1;09.12	***liu6pin2 尿片***	2;10.29
16	*dog*	1;09.12	***wou1wou1 汪汪***	2;00.25
17	*hand*	1;09.12	***sau2 手***	1;09.12
18	*juice*	1;09.12	***gwo2zap1 果汁***	2;06.16
19	*key*	1;09.12	***so2si4 鎖匙***	1;09.12
20	***goek3 腳***	1;09.12	*feet*	2;04.20
21	***goek3 腳***	1;09.12	*leg*	3;00.03
22	***fu3 褲***	1;09.12	*trousers*	2;02.18
23	*bag*	1;10.09	***doi2 袋***	2;05.19
24	*bus*	1;10.09	***baa1si2 巴士***	1;10.09
25	*doctor*	1;10.09	***ji1sang1 醫生***	2;10.15
26	*dress*	1;10.09	***kwan4 裙***	2;04.20
27	*fish*	1;10.09	***jyu2 魚***	2;09.19
28	*flower*	1;10.09	***faa1 花***	1;10.09
29	*nappie*	1;10.09	***liu6pin2 尿片***	2;10.29
30	*orange*	1;10.09	***caang2 橙***	2;06.16
31	*sticker*	1;10.09	***tip3zi2 貼紙***	2;02.06
32	*sun*	1;10.09	***taai3joeng4 太陽***	2;02.06
33	***dang3 凳***	1;10.09	*chair*	1;11.05
34	*aeroplane*	1;11.05	***fei1gei1 飛機***	2;05.19
35	*bird*	1;11.05	***zoek3zai2 雀仔***	2;03.17
36	*car*	1;11.05	***ce1 車***	2;01.22
37	*cat*	1;11.05	***meu1meu1 喵喵***	2;01.22
38	*cat*	1;11.05	***maau1 貓***	2;02.06
39	*rabbit*	1;11.05	***tou3zai2 兔仔***	2;04.20
40	*teddy bear*	1;11.05	***be1be1 啤啤***	2;02.18
41	*egg*	2;00.25	***daan2daan2 蛋蛋***	2;00.25
42	*hair*	2;00.25	***tau4faat3 頭髮***	2;00.25
43	*paper*	2;00.25	***zi2 紙***	2;00.25
44	*plate*	2;00.25	***dip2 碟***	2;02.06

45	*things*	2;00.25	**je5 嘢**	2;04.20
46	*watch*	2;00.25	**biu1 錶**	2;02.06
47	*water*	2;00.25	**seoi2 水**	2;04.20
48	*mouse*	2;01.22	**lou5syu2 老鼠**	2;09.19
49	**bat1 筆**	2;01.22	*pen*	2;06.16
50	*star*	2;02.06	**sing1sing1 星星**	2;04.20
51	*bowl*	2;03.17	**wun2 碗**	3;00.03
52	*pig*	2;03.17	**zyu1 豬**	2;10.15
53	*tree*	2;03.17	**syu6 樹**	2;07.23
54	**sau2zi2 手指**	2;04.20	*finger*	2;06.16
55	**kwan4 裙**	2;04.20	*skirt*	2;07.23
56	**wu4dip2 蝴蝶**	2;04.20	*butterfly*	2;07.23
57	**zeon1zeon1 樽樽**	2;04.20	*bottle*	2;10.15
58	**je5 嘢**	2;04.20	*stuff*	2;10.29
59	*door*	2;05.19	**mun4 門**	2;05.19
60	*ear*	2;06.16	**ji5zai2 耳仔**	2;10.15
61	**gang1 羹**	2;06.16	*spoon*	2;09.19
62	*children*	2;07.23	**siu2pang4jau5 小朋友**	2;10.15
63	*word*	2;07.23	**zi6 字**	2;10.15
64	*child*	2;08.06	**siu2pang4jau5 小朋友**	2;10.15
65	*driver*	2;09.19	**si1gei1 司機**	2;10.15
66	*window*	2;09.19	**coeng1 窗**	2;09.19
67	**dei6 地**	2;10.15	*floor*	3;00.03
68	*space*	3;00.03	**wai2 位**	3;00.03

Table 4 List of equivalent words for Charlotte's verbs from 1;08.28 to 3;00.03

No.	Word	Age at which word appeared	Equivalent	Age at which equivalent appeared
1	*eat*	1;08.28	**sik6 食**	1;10.09
2	*give*	1;08.28	**bei2 畀**	1;10.09
3	*go*	1;08.28	**heoi3 去**	1;09.12
4	*is*	1;08.28	**hai6 係**	1;08.28
5	*look*	1;08.28	**tai2 睇**	2;04.20
6	*put*	1;08.28	**fong3 放**	1;08.28
7	*put*	1;08.28	**baai2 擺**	2;01.22
8	*see*	1;08.28	**tai2 睇**	2;04.20
9	*sleep*	1;08.28	**fan3gaau3 瞓覺**	2;00.25
10	*want*	1;08.28	**soeng2 想**	1;08.28
11	**jau5 有**	1;08.28	*have*	2;01.22
12	**co5 坐**	1;08.28	*sit*	1;09.12
13	**laai1 拉**	1;08.28	*pull*	2;10.29
14	**waan2 玩**	1;08.28	*play*	2;00.25
15	**zi1 知**	1;08.28	*know*	2;00.25
16	**zyu2 煮**	1;08.28	*cook*	2;00.25
17	**zoek3 著**	1;08.28	*dress*	2;00.25
18	**zoek3 著**	1;08.28	*wear*	2;07.23
19	**jam2 飲**	1;08.28	*drink*	2;00.25
20	*broke*	1;09.12	**zing2laan6 整爛**	2;04.20
21	*broken*	1;09.12	**laan6 爛**	1;11.05
22	*come*	1;09.12	**lai4 嚟**	1;09.12
23	*cry*	1;09.12	**haam3 喊**	2;03.17
24	*do*	1;09.12	**gaau2 搞**	2;00.25
25	*got*	1;09.12	**lo2 攞**	1;10.09
26	*open*	1;09.12	**hoi1 開**	1;11.05
27	**wun6 換**	1;09.12	*change*	1;10.09
28	**sik1 識**	1;09.12	*know*	2;00.25
29	*help*	1;10.09	**bong1 幫**	2;00.25
30	*need*	1;10.09	**jiu3 要**	1;10.09
31	*take*	1;10.09	**lo2 攞**	1;10.09
32	*take*	1;10.09	**lik1 扐**	2;06.16
33	**faan1gung1 返工**	1;10.09	*work*	2;02.06
34	**lo2 攞**	1;10.09	*get*	1;11.05
35	**daa2 打**	1;11.05	*beat*	2;01.22
36	**daa2 打**	1;11.05	*hit*	3;00.03
37	**zing2 整**	1;11.05	*make*	2;02.06
38	**zing2 整**	1;11.05	*fix*	2;07.23
39	*find*	2;00.25	**wan2 搵**	2;00.25
40	*like*	2;00.25	**zung1ji3 鍾意**	2;01.22
41	*listen*	2;00.25	**teng1 聽**	3;00.03
42	**ngaau5 咬**	2;00.25	*bite*	2;09.04
43	**kam2 擒**	2;00.25	*cover*	2;05.19
44	**duk6 讀**	2;00.25	*read*	2;01.22

45	*cut*	2;01.22	**cit3** 切	2;02.06
46	*draw*	2;01.22	**waak6** 畫	2;01.22
47	*hold*	2;01.22	**pou5** 抱	2;10.15
48	*hold*	2;01.22	**to1(sau2)** 拖(手)	2;10.15
49	*say*	2;01.22	**waa6** 話	2;04.20
50	*watch*	2;01.22	**tai2** 睇	2;04.20
51	**zung1ji3** 鍾意	2;01.22	*love*	2;04.20
52	**dit3** 跌	2;02.06	*fall*	2;03.17
53	*fall*	2;03.17	**lam3** 冧	2;08.06
54	**se2** 寫	2;03.17	*write*	2;07.23
55	*close*	2;04.20	**saan1** 閂	2;05.19
56	*stick*	2;04.20	**tip3** 貼	2;04.20
57	*bathe*	2;05.19	**cung1loeng4** 沖涼	2;05.19
58	*shut*	2;05.19	**saan1** 閂	2;05.19
59	**daai3** 戴	2;05.19	*wear*	2;07.23
60	*call*	2;08.06	**daa2(din6waa2)** 打(電話)	2;10.15

Appendix 2: Total tokens of five most frequent nouns and five most frequent verbs produced by each child in each language

Table 1 Frequency of five most frequent nouns and five most frequent verbs in Sophie's English

Nouns	Total frequency	Verbs	Total frequency
witch	65	*want*	318
monster	62	*eat*	128
cat	57	*go*	113
bear	45	*come*	82
ant	41	*sleep*	72

Table 2 Frequency of five most frequent nouns and five most frequent verbs in Charlotte's English

Nouns	Total frequency	Verbs	Total frequency
baby	226	*want*	537
girl	73	*put*	244
shoe	73	*look*	162
rabbit	44	*go*	153
hand	43	*sit*	133

Table 3 Frequency of five most frequent nouns and five most frequent verbs in Sophie's Cantonese

Nouns	Total frequency	Verbs	Total frequency
gwai1 'tortoise'	102	*jiu3* 'need'	367
seoi2 'water'	94	*sik6* 'eat'	332
sau2 'hand'	53	*tai2* 'look/see/read'	226
bi4bi1 'baby'	51	*waak6* 'draw'	181
tong2 'candy'	50	*bei2* 'give'	122

Table 4 Frequency of five most frequent nouns and five most frequent verbs in Charlotte's Cantonese

Nouns	Total frequency	Verbs	Total frequency
faa1 'flower'	34	*soeng2* 'want'	63
che1 'car'	32	*zoek3* 'wear'	48
maau1 'cat'	28	*sik6* 'eat'	23
bi4bi1 'baby'	25	*bong1* 'help'	20
saam1 'clothes'	20	*laan6* 'broken'	18

References

Au, T. K., Dapretto, M. & Song, Y. K. (1994). Input vs. constraints: Early word acquisition in Korean and English. *Journal of Memory and Language, 33*, 567-582.

Baker, C., & Prys Jones, S. (1998). *Encyclopedia of bilingualism and bilingual education*. Clevedon: Multilingual Matters.

Bates, E., Marchman, V., Thal, D., Fenson, L., Dale, P., Reznick, J. S., Reilly, J. & Hartung, J. (1994). Developmental and stylistic variation in the composition of early vocabulary. *Journal of Child Language, 21*(2), 85-124.

Bloom, L., Hood, L., & Lightbown, P. (1974). Imitation in language development: If, when and why. *Cognitive Psychology, 6*, 380–420.

Bloom, L., Tinker, E., & Margulis, C. (1993). The words children learn: Evidence against a noun bias in early vocabularies. *Cognitive Development, 8*, 431–450.

Caselli, M. C., Bates, C., Casadio, P., Fenson, L., Fenson, J., Sanderl, L., & Weir, J. (1995). A cross-linguistic study of early lexical development. *Cognitive Development, 10*, 159-199.

Chao, Y. R. (1968). *A grammar of spoken Chinese*. Berkeley: University of California Press.

Cheng, L. L.-S. & Sybesma, R. P. E. (1999). Bare and not-so-bare nouns and the structure of NP. *Linguistic Inquiry, 30*(4), 509-542.

Cheng, L. L.-S. & Sybesma, R. P. E. (2005). Classifiers in four varieties of Chinese. In G. Cinque & R. S. Kayne (Eds.), *The Oxford handbook of comparative syntax* (pp. 259-292). New York: Oxford University Press.

Cheung, H. N. S 張洪年 (2007). *A Grammar of Cantonese Spoken in Hong Kong, Revised Edition* [香港粵語語法的研究(增訂版)]. Hong Kong: Chinese University of Hong Kong Press.

Cheung, H., Chang, C., Ke, H., & Tsay, S. (2011). 張顯達、張鑑如、柯華葳、蔡素

娟 (2011)。台灣兒童語言語料庫之建置(NSC96-2420-H-002-030).

Childers, J. B., Vaughan, J., & Burquest, D. A. (2007). Joint attention and early word learning in Ngas-speaking infants in Nigeria. *Journal of Child Language, 34*(2), 199-225.

Choi, S. & Gopnik, A. (1995). Early acquisition of verbs in Korean: A cross-linguistic study. *Journal of Child Language, 22*(3), 497-529.

Conboy, B. T. & Thal, D. (2006). Ties between the lexicon and grammar: Cross-sectional and longitudinal studies of bilingual toddlers. *Child Development, 77*, 712-735.

David, A. & Li, W. (2005). The composition of the bilingual lexicon. In J. Cohen, K. T. McAlister, K. Rolstad & J. MacSwan (Eds.), *ISB4: Proceedings of the 4th International Symposium on Bilingualism* (pp.594-607). Somerville, MA: Cascadilla Press.

Deuchar, M. & Muntz, R. (2003). Factors accounting for code-mixing in an early developing bilingual. In N. Müller (Ed.), *(In)vulnerable Domains in Multilingualism* (pp.161-190). Amsterdam: John Benjamins.

Deuchar, M. & Quay, S. (2000). *Bilingual acquisition: Theoretical implications of a case study*. Oxford: Oxford University Press.

Dhillon, R. (2010). Examining the 'Noun Bias': A structural approach, *University of Pennsylvania Working Papers in Linguistics*: Vol. 16: Iss. 1, Article 7. Available at: http://repository.upenn.edu/pwpl/vol16/iss1/7

Döpke, S. (1998). Competing language structures: The acquisition of verb placement by bilingual German–English children. *Journal of Child Language, 25*(3), 555–584.

Dromi, E. (1987). *Early lexical development*. Cambridge: Cambridge University Press.

Erbaugh, M. S. (1992). The acquisition of Mandarin. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition* (Vol. 3, pp.373-455). Hillsdale, NJ:

Erlbaum.

Fenson, L., Dale, P., Resnick, J. S., Thal, D., Bates, E., Hartung, J., Pethick, S., & Reilly, J. (1993) *MacArthur Communicative Development Inventories: User's guide and technical manual*. San Diego: Singular Publishing Group.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, Vol. 59, No. 5, Serial No. 242.

Francis, E. & Matthews, S. (2005). A multi-dimensional approach to the category 'verb' in Cantonese. *Journal of Linguistics, 41*, 267-305.

Francis, E. & Matthews, S. (2006). Categoriality and object extraction in Cantonese serial verb constructions. *Natural Language & Linguistic Theory, 24*(3), 751-801.

Genesee, F., Nicoladis, E., & Paradis, J. (1995). Language differentiation in early bilingual development. *Journal of Child Language, 22*, 611–631.

Gentner, D. (1978). On relational meaning: The acquisition of verb meaning. *Child Development, 49*, 988-998.

Gentner, D. (1982). Why nouns are learned before verbs: linguistic relativity versus natural partitioning. In S. Kuczaj (Ed.), *Language development (vol. 2): Language, thought and culture* (pp.301-334). Hillsdale, NJ: Lawrence Erlbaum Associates.

Gentner, D. (2006). Why verbs are hard to learn. In K. Hirsh-Pasek & R.M. Golinkoff (Eds.), *Action meets word: How children learn verbs* (pp. 544-564). New York: Oxford University Press.

Gentner, D. & Boroditsky, L. (2001). Individuation, relativity and early word learning. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 215-256). Cambridge: Cambridge University Press.

Gentner, D. & Boroditsky, L. (2009). Early acquisition of nouns and verbs: Evidence from Navajo. In V. Gathercole (Ed.), *Routes to Language: Studies in honor of*

Melissa Bowerman (pp. 5-36). New York: Psychology Press.

Goldfield, B. A. (1993). Noun bias in maternal speech to one-year-olds. *Journal of Child Language, 20*, 85-99.

Gopnik, A. & Meltzoff, A. (1987). The development of categorization in the second year and its relation to other cognitive and linguistic developments. *Child Development 58*, 1523-1531.

Gopnik, A., Choi, S., & Baumberger, T. (1996). Cross-linguistic differences in early semantic and cognitive development. *Cognitive Development, 11*(2), 197-227.

Greenfield, P. M. & Smith, J. H. (1976). *The structure of communication in early language development*. New York: Academic Press.

Huang, C. T. J. (1984). On the distribution and reference of empty pronouns. *Linguistic Inquiry, 15*(4), 531–574

Hulk, A. & Müller, N. (2000). Bilingual first language acquisition at the interface between syntax and pragmatics. *Bilingualism: Language and Cognition, 3*, 227-244.

Huttenlocher, J. (1974). The origins of language comprehension. In R. L. Solso (Ed.), *Theories in cognitive psychology* (pp. 331–368). New York: Erlbaum.

Itani-Adams, Y. (2007). Lexical and grammatical development in Japanese-English bilingual first language acquisition. In F. Mansouri (Ed.), *Second language acquisition research: Theory-construction and testing* (pp.173-198). Newcastle: Cambridge Scholars Press.

Kauschke, C. & Hofmeister, C. (2002). Early lexical development in German: A study on vocabulary growth and vocabulary composition during the second and third year of life. *Journal of Child Language, 29*(4), 735–757.

Kim, M., McGregor, K. K., Thompson, C. K. (2000). Early lexical development in English-and Korean-speaking children: Language-general and language-specific patterns. *Journal of Child Language, 27*(2), 225-254.

Lau, W. M. V. (1999). A study of adjectives in Cantonese. Unpublished MPhil thesis, University of Hong Kong.

Lee, J. (2009). Early lexical composition of Cantonese-English bilingual children. In J. Chandlee, M. Franchinis, S. Lord, & M. Rheiner, (Eds.), *BUCLD 33 Proceedings Supplement of the 33rd Annual Boston University Conference on Language Development*.
Available at: http://www.bu.edu/linguistics/BUCLD/supplement33/Lee.pdf

Lee, T. H. T., Wong, C., Leung, S., Man, P., Cheung, A., Szeto, K., & Wong, C. S. P. (1996). *The Development of Grammatical Competence in Cantonese-speaking Children*. Report of RGC earmarked grant 1991-94.

Leopold, W. F. (1970). *Speech development of a bilingual child: A linguist's record (Vol. I)*. New York: AMS Press.

Leung, V. W. Y. (1998). *The use of nouns versus verbs in Cantonese-speaking children's early vocabularies and their mothers' speech*. Unpublished B.Sc. dissertation, University of Hong Kong.

Levey, S. & Cruz, D. (2003). The first words produced by children in bilingual English/Mandarin Chinese environments. *Communication Disorders Quarterly 24*(3), 129-136.

Li, C. N. & Thompson, S. A. (1981). *Mandarin Chinese: A functional reference grammar*. Berkeley: University of California Press.

Liu, S. (2007). Early vocabulary development in English, Mandarin and Cantonese: A cross-linguistic study based on CHILDES. Unpublished MA thesis, University of Richmond.

Macnamara, J. (1972). Cognitive basis of language learning in infants. *Psychological Review, 79*, 1-13.

MacWhinney, B. (2000). *The CHILDES Project: Tools for analyzing talk (3rd ed.)*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Maratsos, M. (1988). The acquisition of formal word classes. In Y. Levy, I. M.

Schlesinger, M. D. S. Braine (Eds.), *Categories and processes in language acquisition* (pp. 31–44). Hillsdale, NJ: Lawrence Erlbaum.

Matthews, S & Yip, V. (2011). *Cantonese: A comprehensive grammar (2ⁿᵈ edition)*. London: Routledge.

Miyata, S., Oshima-Takane, Y., & Nishisawa, H. (2003). Noun bias in early Japanese vocabulary and characteristics of maternal speech. *Studies in Language Sciences, 3*, 87-101.

Nelson, K. (1973). Structure and strategy in learning to talk. *Monograph of the Society for Research in Child Development, 38*(1-2), No. 149.

Nelson, K., Hampson, J., & Kessler Shaw, L. (1993). Nouns in early lexicons: Evidence, explanations, and extensions. *Journal of Child Language, 20*, 61–84.

Nicoladis, E. (2001). Finding first words in the input: Evidence from a bilingual child. In J. Cenoz & F. Genesee (Eds.), *Trends in bilingual acquisition* (pp. 131-147). Amsterdam: John Benjamins.

Ninio, A. (1988). On formal grammatical categories in early child language. In Y. Levy, I. Schlesinger, & M. D. S. Braine (Eds.), *Categories and processes in language acquisition* (pp. 99-119). Hillsdale, NJ: Erlbaum.

Ogura, T., Dale, P. S., Yamashita, Y., Murase, T., & Mahieu, A. (2006). The use of nouns and verbs by Japanese children and their caregivers in book-reading and toy-playing contexts. *Journal of Child Language, 33*(1), 1-29.

Paradis, J. & Genesee, F. (1996). Syntactic acquisition in bilingual children: Autonomous or interdependent? *Studies in Second Language Acquisition*, 18, 1–25.

Pine, J. M. (1992). How referential are "referential" children? Relationships between maternal-report and observational measures of vocabulary composition and usage. *Journal of Child Language, 19*, 75-86.

Pine, J. M., Lieven, E. V. M., & Rowland, C. (1996). Observational and checklist measures of vocabulary composition: What do they mean? *Journal of Child*

Language, 23, 573-589.

Sandhofer, C., Smith, L., & Luo, J. (2000). Counting nouns and verbs in the input: Differential frequencies, different kinds of learning?. *Journal of Child Language, 27*(3), 561-585.

Schieffelin, B. B. (1990). *The give and take of everyday life: Language socialization of Kaluli children*. New York: Cambridge University Press.

Slobin, D. I. (1973). Cognitive prerequisites for the development of grammar. In C. Ferguson & D.I. Slobin (Eds.), *Studies of child language development* (pp. 240-249). New York: Holt, Rinehart & Winston.

Talmy, L. (1975). Semantics and syntax of motion. In J. P. Kimball (Ed.), *Syntax and semantics (Vol. 4)*(pp. 181-238). New York: Academic Press.

Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Shopen (Ed.), *Language typology and syntactic description* (pp. 57-149). Boston: Cambridge University Press.

Tardif, T. (1996). Nouns are not always learned before verbs: Evidence from Mandarin speakers' early vocabularies. *Developmental Psychology, 32*, 492-504.

Tardif, T. (2006a). The importance of verbs in Chinese. In P. Li, L. H. Tan, E. Bates & O. J. L. Tzeng (Eds.), *The handbook of East Asian psycholinguistics (Vol. 1): Chinese* (pp.124-135). Cambridge: Cambridge University Press.

Tardif, T. (2006b). But are they really verbs? Chinese words for action. In K. Hirsh-Pasek & R.M. Golinkoff (Eds.), *Action meets word: How children learn verbs* (pp. 477-498). New York: Oxford University Press.

Tardif, T., Fletcher, P., Liang, W., Zhang, Z., Kaciroti, N., & Marchman, V. A. (2008). Baby's first 10 words. *Developmental Psychology, 44*, 929-938.

Tardif, T., Gelman, S. A., & Xu, F. (1999). Putting the "noun bias" in context: A comparison of English and Mandarin. *Child Development, 70*(3), 620-635.

Tardif, T., Shatz, M., & Naigles, L. (1997). Caregiver speech and children's use of nouns versus verbs: A comparison of English, Italian, and Mandarin. *Journal of Child Language, 24*, 535-566.

Wang, Q., Lillo-Martin, D., Best, C. T., & Levitt, A. (1992). Null Subject Versus Null Object: Some Evidence From the Acquisition of Chinese and English. *Language Acquisition*, *2*(3), 221-254.

Wong, H. Y. (2010). The acquisition of verb particle constructions in Cantonese-English bilingual children. Unpublished MPhil thesis, Chinese University of Hong Kong.

Yang, J. C. (2011, September). Noun bias in Mandarin: Revisited. Poster presented at National Conference on Linguistics, National Sun Yat-sen University, Kaohsiung.

Yip, V. & Matthews, S. (2007). *The bilingual child: Early development and language contact*. Cambridge: Cambridge University Press.

Yip, V. & Matthews, S. (2008, July). Lexical development in Cantonese-English bilingual children. Poster presented at XI International Congress for the Study of Child Language (IASCL), University of Edinburgh, Edinburgh.