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The acquisition of questions by a Mandarin-English bilingual child

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Foreword

I would like to thank my academic supervisor Yulia Rodina for helping me through this study and writing process. It was her course *First Language Acquisition* that introduced me to the wonders and mysteries of child language acquisition. It was her consistent patience and kindness that encouraged me to explore what I am truly interested in, and to carry this study through to the end. If it were not for her, this thesis would probably never see the light of day.

1 Introduction

It is always eye-opening to watch how a child can acquire a few thousand words, master the sound system and build sentences to express complex ideas within three years of birth. The ability of the child to acquire language naturally and effortlessly is what Pinker (1994) calls the 'language instinct': knowledge of language is not acquired as a result of teaching, but is to a large extent attributable to the human innate capacity for language acquisition. If a child's acquisition of a language is due to instinct, one would wonder whether a child acquiring two languages at the same time has *bilingual instinct*, since young bilingual children can become fluent speakers of two languages within a few years, while adults, even after years of learning, may not be able to produce a sentence without struggling with pronunciation, meaning of words and sentence structure at the same time. But is it really true that bilingual children can acquire their two languages at the same way and also similarly to monolingual children acquiring the same languages? Do the two languages of bilinguals develop independently without interfering with each other? Or is there interaction between the two languages that might cause delay and qualitative changes in the development of the languages? Linguists have conducted numerous longitudinal studies on early child bilingual development. Some studies (De Houwer 1990, Meisel 1994) suggest that when the two languages are acquired very early in life, each language develops separately, known as the Separate Development Hypothesis proposed by Houwer (1990, 2005). Others show that bilinguals' two languages can influence each other and that the weaker language is more vulnerable to cross-linguistic influence from the dominant language. As a result, bilingual's language development in the weaker language can be delayed or there can be some qualitative changes. This is known as the Interdependent Development Hypothesis (Döpke 2000; Hulk and Müller 2000; Paradis and Genesee 1996; Yip and Matthews 2007). While most studies on child bilingualism have been focused on Indo-European language pairs such as English-Dutch (De Houwer 1990), French-German (Meisel 1994), German-English (Döpke 2000), Dutch-French and German-Italian (Hulk and Müller, 2000), little research has been done on typologically distant language pairs, such as for example English and Mandarin. The numerous contrasts between the two languages will open up possibilities for interaction in various grammatical domains. Therefore, this study will investigate an English-Mandarin bilingual child Luna between the ages of 03;10 and 04;11, who is a heritage learner of Mandarin and has been exposed to English since she was 9 months old. The study will have two key implications: one is contributing to diversification of language pairs in the study of early child bilingual development; the other is of practical importance, representing a growing population

of early English-Mandarin bilingual children in recent years. I will primarily focus on investigating the child's acquisition of questions in English trying to identify stages of acquisition that are characteristic of English-speaking monolinguals (cf. Brown 1973). In order to study cross-linguistic effects, I will compare the acquisition of questions by Luna in both English and Mandarin. Previous research on the acquisition of questions in child bilinguals is rather limited. Yip and Matthews (2000, 2007) are most recent investigations. However, they only focused on the acquisition of *wh*- questions in English in Cantonese-English children. The novelty of the present study is that it will consider data from a previously unstudied language pair – Mandarin and English, and will extend the investigation to other question types, including yes/no- and embedded questions.

To investigate Luna's acquisition of questions I analyzed the transcripts of her communication with her caregivers and the interlocutors which are available in CHILDES database. Luna's corpus is part of the Child Heritage Chinese Corpus (Mai & Yip 2017). It contains recordings of three English-Mandarin bilingual children. I chose Luna's corpus for analysis, since there are a total of 26 hours and 51 minutes of recordings in English and Mandarin, which is also the longest among three English-Mandarin bilingual children in the Child Heritage Chinese Corpus. In this study, I will use MLUm (Mean Length of Utterance, measured in morphemes) to measure Luna's development in both languages and to investigate language dominance effects between the ages of 03;10-04;11. I will first analyze all Luna's English questions during the selected period. I will perform quantitative and qualitative analysis of the data. In English, I will study the acquisition of all question types in order to see if Luna goes through stages of development found in English monolinguals. In Mandarin, I will pay special attention to those question types where the word order is different in English and Mandarin. I will measure Luna's overall language development during the selected age period in terms of MLU in both languages. This is necessary in order to identify whether Luna is dominant in one of the languages, as language dominance has been found to be an important factor in child bilingualism and in the studies on cross-linguistic influence in particular.

There are three major findings in this study. 1) Luna's MLUm patterns in English and Mandarin indicate that she is rather balanced in the two languages between the ages of 03;10 and 04;11. 2) Luna acquired *single word*, *declarative* and *yes/no* questions in English before the age of 03;10, and acquired *wh*-questions at around the age of 04;08. She was still acquiring *embedded* questions during the period of development selected in the present study. 3) The analyses of Luna's questions in English and Mandarin show that there is little evidence of

interaction between the two languages. In short, the results of present study seem to support the Separate Development Hypothesis. However, as I speculate in the Discussion, they do not necessarily refute the Interdependent Development Hypothesis.

The rest of the paper is organized as follows.

In section 2, I will introduce how questions are formed in English and Mandarin, and the theoretical background on bilingual language development and cross-linguistic influence, and the developmental stages of monolinguals' and bilinguals' acquisition of English questions. I will also review Yip & Matthew's study (2000, 2007) of six Cantonese-English bilingual children's acquisition of *wh*- questions.

In section 3, I will propose my research questions and make my predictions. I will also introduce the subject of this study and describe the methods I used to collect and classify Luna's questions.

In section 4, I will present the results of Luna's MLU development in both languages between the ages of 03;10 and 04;11. I will perform both quantitative and qualitative analyses of Luna's all question types in English and some of her Mandarin questions where the word order is different from English.

Finally, I will summarize my major findings and discuss the implications of the results in section 5. I will also acknowledge the limitations of my study and make recommendations for future research.

2 Background

2.1 Question formation in English and Mandarin

In this section, I will present structural characteristics of interrogative structures in English and Mandarin, including both main clause and embedded questions. I will focus on comparing similarities and differences between the two languages. In addition, I will provide a separate discussion of *wh-in-situ* structures in both languages, since this is an area where cross-linguistic effects in bilingual child language acquisition were found in previous research (cf. Yip & Matthews, 2007). The examples in this section are from Pozzan and Quirk (2013).

2.1.1 English main clause and embedded questions

In English main clause questions, the auxiliary verb precedes the subject, illustrated in (1), known as subject-auxiliary inversion. It means that the word order of the subject and the auxiliary is 'inverted' compared to that of declarative sentences.

(1) What are you doing?

There are several different types of main clause questions in English. Their structural characteristics are present below:

Main Clause Questions

Question Type: English Yes/no questions

Word order: auxiliary verb + subject + main verb

A *yes/no* question is an interrogative construction such as in (2) that expects an answer of either "yes" or "no". In *yes/no* questions with lexical verbs like *eat*, an auxiliary verb typically appears in front of the subject. For example, the auxiliary *are* in (2) precedes the subject *you,* which is followed by the main verb *eating.*

(2) Are you eating pizza?

Although in *yes/no* questions, English has a subject-auxiliary inversion, it should be noted that questions like those in (3) are also grammatical in Standard English. Such questions are called declarative questions and have the form of a declarative sentence but are spoken with rising intonation at the end. These questions are commonly used in informal speech to express surprise or to ask for verification.

(3) You are eating pizza?

Question Type: English wh-questions

Word order: *wh*-word + auxiliary verb + subject + main verb

A *wh*-question is used for seeking content information related to persons (*who*), things (*what*), time (*when*), place (*where*), reason (*why*) and so on. *Wh*- questions differ depending on the positions where *wh*- words occur. There are *wh*- argument questions and *wh*-adjuncts questions. In a *wh*- argument question, information associated with persons (who), things (what) and facts (which) generally occurs in various subject and object positions. For example, **what** in (4) refers to the content information **pizza** in the object position of the answer. These positions (subjects, objects), known as argument positions, are required in a sentence structure. If the argument **pizza**, for example, is removed from the answer to the question, the sentence is ungrammatical, see (5).

(4) -**What** are you eating?

-I am eating **pizza**.

(5) -**What** are you eating?

- *I am eating ...

In a *wh*- adjunct question, content information associated with time (when), place (where), reason (why) and manner (how) does not occur in subject and object positions. For example, **why** in (6) refers to the content information highlighted in the answer in the clause beginning with **because**. The clause, which expresses a reason, is not in a subject or object position. Positions associated with time, place, reason and manner are known as "adjunct positions" and they are optional in a sentence structure. If the highlighted adjunct in (6) is removed from the answer to the question, the sentence is still grammatical, as shown in (7).

(6) -**Why** are you eating pizza?

- I am eating pizza **because I am hungry**.

(7) I am eating pizza…

Embedded Clause Questions

An embedded question is a question that is included inside another question or statement. In English embedded questions, the word order of the subject and the auxiliary is the same as in declarative sentences, see (8). When the word order of the subject and the auxiliary is not target-like, see (9), such clauses will be considered as inversion errors.

(8) -Do you know what **she is** bringing?

- **She is** bringing pizza.

(9) *Do you know what is she bringing?

Question Type: English embedded yes/no questions

Word order: main clause + if/whether + subject + auxiliary + main verb

In an English embedded *yes/no* question, the embedded question is introduced by *whether, whether or not* and *if*, and the word order of the auxiliary and the subject is reversed compared with the original question, see (10) and (11), but the same as that of the declarative sentence.

(10) **Is he** eating pizza?

(11) Mary doesn't know if **he is** eating pizza.

Question Type: English embedded wh-argument

Word order: main clause + wh- + subject + auxiliary + main verb

An embedded *wh*- argument question is formed by including a *wh*- argument question inside another question or statement. The word order of the subject and the auxiliary is similar to embedded *yes/no* questions, with the subject preceding the auxiliary, illustrated in (12).

(12) Mary doesn't know what **he is** eating.

Question Type: English embedded wh-adjunct

Word order: main clause + wh- + subject + auxiliary + main verb

The formation of embedded *wh*- adjunct questions is similar to that of embedded *wh*-argument questions, with the word order being same. The only difference is that the question embedded is a *wh*- adjunct question instead of a *wh*- argument question in this case, as shown in (13).

(13) Mary doesn't know why **he is** eating.

2.1.2 Mandarin main clause and embedded questions

In Mandarin questions, the verb never precedes the subject either in the main clause questions or in the embedded questions.

Main Clause Questions

Question Type: Mandarin yes/no questions

Word order: subject + verb + Q-particle

The easiest way to form a *yes/no* question in Mandarin is to simply attach the question particle (Q-particle) *ma* to the end of a statement. There is no auxiliary in Mandarin, hence no inversion of the subject and the auxiliary, illustrated in (14). Thus, the word order of Mandarin *yes/no* questions is the same as that of declarative sentences.

(14) Bing chile (*Bing) ma?

Bing ate (*Bing) Q-particle

'Did Bing eat?'

Question Type: Mandarin wh- argument

Word order: subject + verb+ *wh*-words

Similar to the *yes/no* questions, the word order of Mandarin *wh*-argument questions is the same as the word order of declarative sentences, presented in (15). That means that *wh*-words stay right at the same position in the sentences without any structural change, i.e. *in situ*. Argument questions are formed by simply putting question words such as *shenme* 'what', *shui* 'who' and *nage* 'which' in the place of the content information (subject and object positions) we want to ask about.

(15) Bing chile (*Bing) shenme?

Bing ate **what**

'What did Bing eat?'

Question Type: Mandarin wh- adjunct

Word order: subject + verb (*wh*- words appear before or after the subject)

In Mandarin *wh*- adjunct questions, there is no inversion of the subject and the auxiliary, either. The only difference is that question words such as *weishenme* 'why', *zenme* 'how' and so on can appear in different positions in a sentence. For example, in (16) the question word *weishenme* appears in front of the subject *Bing*, but in (17) the question word is after the subject. Both questions are grammatical and have the same meaning.

(16) Weishenme Bing kule (*Bing)?

why **Bing cried** (*Bing)

'Why did Bing cry?'

(17) Bing weishenme kule (*Bing)?

Bing why **cried** (*Bing)

'Why did Bing cry?'

Embedded Clause Questions

Question Type: Mandarin embedded yes/no questions

Word order: main clause + subject + verb + Q-particle

The formation of Mandarin embedded *yes/no* questions is simple, compared with their English counterparts. The embedded question is simply formed by including a *yes/no* question inside another question or statement, without any structural change, illustrated in (18).

(18) Jiexi xiang zhidao Bing chile (*Bing) ma?

Jessie wants to know Bing ate (*Bing) Q-particle

'Jessie wants to know if Bing ate.'

Question Type: Mandarin embedded wh-argument questions

Word order: main clause + subject + verb + *wh*-argument

Similarly, Mandarin embedded *wh*-questions, both *wh*-argument questions and *wh*-adjunct questions, are formed by putting together a main clause and a *wh*-question, without any inversion or *wh*-movement, as shown in (19) and (20).

(19) Jiexi xiang zhidao Bing chile (*Bing) shenme.

Jessie wants to know Bing ate (*Bing) what

'Jessie wants to know what Bing ate.'

Question Type: Mandarin wh-adjunct questions

Word order: main clause + subject + verb + *wh*-adjunct

(20) Jiexi xiang zhidao weishenme Bing kule (*Bing).

Jessie wants to know why Bing cried (*Bing).

Jessie wants to know why Bing cried

To summarize, in 2.1.1 and 2.1.2, I have discussed the formation of main clause and embedded questions in English and Mandarin. One of the major differences between the two languages is that English has subject-auxiliary inversion in main clause questions while Mandarin does not. Therefore, English and Mandarin have different word orders in the main clause questions, but the word orders are the same in embedded questions. Another difference is that *wh*- words are moved to the sentence initial position in *wh*- questions in English, both in main clause questions and embedded questions, but they are not fronted in Mandarin. Mandarin, has no overt *wh*-movement, that is *wh*-words remain *in-situ*. This phenomenon is discussed in more detail in section 2.1.3. There are no *wh-in-situ* structures in English, however it allows the so-called echo questions which will be discussed in 2.1.4.

2.1.3 Wh-in-situ in Mandarin

Wh- argument interrogatives exemplified by (21) are known as 'wh-in-situ' questions. In these questions, the *wh*- phrase such as *shenme* 'what' in (21) appears in the same position as a corresponding phrase like *henduo dongxi* 'many things' in (22).

(21) Bing chile (*Bing) shenme?

Bing ate what

'What did Bing eat?'

(22) Bing chile (*Bing) henduo dongxi.

Bing ate many things.

'Bing ate many things.'

In a typical *wh*-argument interrogative, the word order seems to follow a *'subject + verb + wh-'* pattern. However, it should be noted that *wh*- words do not always appear after the verb. For example, in the *where* question (23), the questioned part '*where*' comes before the verb '*come'*, just as it does in the declarative sentence in (24). Therefore, the *wh*- words do not

necessarily appear after the verb but can occur wherever the corresponding phrases in declarative sentences would occur.

(23) Bing cong nali lai?

Bing from *where* come

'Where does Bing come from?'

(24) Bing cong Beijing lai.

Bing *from Beijing* come.

'Bing comes from Beijing.'

2.1.4 Echo questions in English

Wh-words can sometimes occur in sentence final position in English, as in the examples in (25) and (26) from Yip and Matthews (2007). The questions in (25) and (26) are called echo questions. According to Nordquist (2020), an "echo question is a type of direct question that repeats part or all of something which someone else has just asked and is one form of echo utterance. Echo questions are also referred to as "repeat, please" questions. The reason people generally echo a question they have been asked is that they have not fully understood or heard what was said or they simply cannot believe anyone would ask such a question". In (25), *what* remains in situ to show unfamiliarity and lack of understanding. According to Quirk et al. (1972: 408), this is a 'recapitulatory' echo question. The example in (26) is a different type where the mother asks her son to elaborate the verb phrase *gone*. It is described as an 'explicatory' echo question by Quirk et al. (1972: 409).

(25) A: I learn prestidigitation.

B: You learnt *what*?

(26) 'Ma,' he said, softly. 'Dad's gone.'

'Gone *where*?' (Mitch Albom, The Five People You Meet in Heaven, 2003: 135)

In sum, echo questions typically appear as a variant of a previous utterance with a particular intonation, and bear a close resemblance to it in form and meaning (Artstein, 2002).

2.2 Bilingual language development and cross-linguistic influence

Research on child bilingual acquisition has been centered on the question of unitary system versus two differentiated systems in children who are exposed simultaneously to two languages (Volterra and Taeschner, 1978; Genesee, 1989; Meisel, 1989). Specifically, do young children learn two languages independently or do the two languages interact with each other? Holders of the unitary language system hypothesis believe that learning two languages simultaneously from birth stretches the limits of infants' ability to acquire language and that they will be confused and unable to differentiate between languages. Bilingual codemixing by children is often taken as evidence that they are unable to separate their two languages. However, there are at least three sources of evidence against the unitary system. The first source is research on the milestones of language development in children raised bilingually. If simultaneous acquisition of two languages is beyond children's capacity, one would expect that bilingual children would be delayed in their language development in comparison with monolingual children. However, in a study of a French-English infant, Maneva and Genesee (2002) found that the infant adopted variegated babbling with each parent, one of who spoke French and the other English, between 10 and 12 months of age, the same age as monolingual children. In a larger study of 73 infants learning English and Spanish, Kimbrough Oller, Eilers, Urbano, and Cobo-Lewis (1997) found that the onset of babbling did not differ significantly for the bilingual and monolingual infants. As for word combinations, Paradis and Genesee's (1996) study of English-French children found that they began to produce word combinations within the same timeframe as that of monolinguals, between 1.5 and 2 years of age.

The second source of evidence is grammatical constraints on child bilingual codemixing. If children learning two languages simultaneously treat both languages as part of one system, one should expect them to codemix extensively since they initially have one lexical system, and they should produce many ungrammatical mixed utterances because they are unable to differentiate the two grammatical systems. However, Genesee, Nicoladis & Paradis (1995) found that French-English bilingual children in Montreal aged 01;10-02;02 produced mixed utterances less than 3% of the time, which is far less often than one would expect if they were

unable to differentiate between French and English. Similarly, Sauve and Genesee's study (2000) of young French-English children in Montreal found that codemixing occurred less than 4% of the time, and there were virtually no grammatical errors when codemixing occurred. The same findings have been reported in studies of other language pairs, for example, German and French (Meisel, 1994), English and Estonian (Vihman, 1998).

The third source of evidence is bilingual children's differentiated use of two languages. If simultaneous bilingual children have a unitary language system, one would expect them to have difficulty using their languages appropriately. This is not what was found in Genesee et al. (1995). The authors investigated 2-year-old bilinguals who were acquiring French and English simultaneously from their parents, who adopted the one parent/one language policy. They found that these children were able to use their two languages appropriately with different caretakers. They used more of the mother's language with the mother and, conversely more of the father's language with the father.

Taken together, the evidence reviewed above demonstrates that bilingual children are able to differentiate between the two languages from early on. The question is do the two languages develop independently or do they interact with each other?

Some researchers argue that the separation of the two systems implies the independent development without interaction. For example, the Separate Development Hypothesis proposed by Houwer (1990, 2005) holds that when the two languages are acquired very early in life each language develops separately. De Houwer (1990) investigated spontaneous speech of a Dutch-English bilingual girl, Kate, for the age period between 2;7 and 3;4. The child was exposed to both Dutch and English since birth and heard two languages regularly. De Houwer focused on investigating Kate's morphosyntactic development, more specifically, Kate's acquisition of the respective gender systems in the two languages, plural formation, noun phrases with an adjective as head and noun phrase-internal syntagmatic structure. Although the internal structure of singular noun phrases and the types of items that can feature within them are similar for both English and Dutch, there are major differences: in English, a natural gender rule is used which operates on personal and possessive pronouns, but not on articles, adjectives, or demonstrative pronouns. In Dutch, on the other hand, a syntactic gender system largely determines the form of all these five types of elements, in combination with a natural gender rule which applies to some pronominal elements only. If the child applies the rules from one language to the other, it will certainly not work, resulting in non-adult-like overgeneralizations,

or non-adult-like under-extensions. However, Kate's data shows that she mostly used Dutch morphosyntactic devices when producing Dutch utterances, and English morphosyntactic devices when producing English utterances. In addition, the morphosyntactic devices were not only relatable to only one language, they were also used in a language-specific manner. De Houwer also compared Kate's Dutch speech production with that of monolingual Dutch-speaking children, and Kate's English speech production with that of monolingual English-speaking children. It was found that in most cases Kate uses English and Dutch in the same way as the monolingual children.

In contrast, the Interdependent Development Hypothesis (Döpke 2000; Hulk and Müller 2000; Paradis and Genesee 1996; Yip and Matthews 2007) suggests that bilinguals' two languages can influence each other and that the weaker language is more vulnerable to cross-linguistic influence from the dominant language. As a result, bilingual's language development in the weaker language can be delayed or there can be some qualitative changes. Döpke (2000) analyzed bilingual data from four German-English children, who heard German from the mother and English from the father. Although English was also the language spoken between the parents and in the society at large, the mothers were very consistent with their own language choice and insisted on 'one parent-one language' rule. As a result, all children were able to use German spontaneously throughout the period of recording, which started between 2;0 and 2;7 and finished between 3;5 and 5;0. Döpke compared the developmental structures of these German-English bilingual children with those of the average monolingual child, focusing on the base position of the verb in the verb phrase, the position of verbs in relation to negation and modal particles, the development of finiteness. She shows that most of the untypical developmental structures found in the speech of bilingual children also occur in monolingual data but that they are more frequent in the bilingual data. Thus, it provides evidence for cross-linguistic influence.

Hulk and Müller (2000) compared the development of object drop in a bilingual Dutch-French and a German-Italian child to the development in the respective monolingual children. The Dutch-French child Anouk has been living in Amsterdam from birth and was brought up bilingually by her French mother who speaks only French to her and her Dutch father, who speaks only Dutch to her. From about six months of age onwards Anouk attended a Dutch kindergarten for three days a week. Anouk's speech was recorded between 2;3;13 and 3;10;7. The German-Italian child Carlotta has been raised in German from birth and was brought up bilingually by her Italian mother and her German father. Both speak their respective mother

tongues to Carlotta. Italian is also the language spoken between the parents. The child has been video-recorded starting at the age of 1;8;28. Hulk & M*ü*ller found that the bilingual children use object drop in their Romance language in a way similar to monolinguals but to a much higher degree, which indicates the influence of the Germanic topic-drop language (Dutch/German) on the Romance non-topic-drop language (French/Italian).

Thus, both Döpke (2000) and Hulk and Müller (2000) report evidence supporting the Interdependent Development Hypothesis.

2.2.1 Definition of transfer and cross-linguistic influence

Transfer is defined as 'incorporation of a grammatical property into one language from the other' (Paradis & Genesee, 1996), meaning that the transferred grammatical properties should not be present in the recipient language and thus not be found in monolingual development. However, cross-linguistic influence can take more forms such as quantitative differences between monolingual and bilingual development. For example, null objects are found in early monolingual child English with a frequency of 2.8% to 9%, while the frequency of null objects in bilingual children of Yip and Matthews' study (2007) is around 19% to 34%, much higher than the monolingual counterparts. Since monolingual children also show this grammatical property, it is difficult to say if null object is 'transferred' from the other language, but the quantitative difference in the frequencies of null objects can be considered as cross-linguistic influence.

To determine whether there is cross-linguistic influence, it is therefore necessary to compare bilingual and monolingual language development, qualitatively and quantitatively. We need to find structures that are not found in monolingual development or to demonstrate the difference in frequency or productivity of structures in the target language.

2.2.2 Factors accounting for cross-linguistic influence

2.2.2.1 Language dominance

Language dominance is considered as one of the important factors that accounts for the direction of transfer in bilingual acquisition. Studies have reported incorporation of elements from a dominant to a less dominant language (Gawlitzek- Maiwald & Tracy, 1996; Hulk and van der Linden, 1996; Döpke, 1997; Yip & Matthews, 2000). Yip and Matthews studied

syntactic transfer, including *wh*-in-situ structures and null objects, in a Cantonese-English bilingual child, Timmy. They found that these structures were qualitatively and quantitatively distinct from that found in monolingual children. The occurrence of these non-target-like structures peaks during the period when Timmy is more dominant in Cantonese than English, indicating a close relationship between direction of cross-linguistic influence and language dominance.

Language dominance can be measured by computing Mean Length of Utterance (MLU) for each language at different stages: the dominant language should have higher MLU value than the less dominant one. The amount of input from each language also plays a major role in determining language dominance (Döpke, 1992). Dominance can also be inferred from children's language preferences. In some cases, children are reluctant to use a certain language. If this behavior is systematic over a period of development, the language that the child is more willing to speak is considered to be dominant. (Saunders, 1988).

MLU as a measurement of language development and dominance

As mentioned above, many measures such as Mean Length of Utterance (MLU) and language preference are used by linguists to assess children's bilingual development. Mean Length of Utterance (MLU), measured in words (MLUw) or morphemes (MLUm), has been taken as the most objective indicator of a child's linguistic development in each language. As Brown (1973, p. 53-54), the proposer of MLU, argued, "MLU is an excellent simple index of grammatical development because almost every new kind of knowledge increases length: the number of semantic roles expressed in a sentence, the addition of obligatory morphemes, coding modulation of meaning… and, of course, embedding and coordinating. All alike have the common effect on the surface form of the sentence of increasing length (especially if measured in morphemes, which includes bound forms like inflections rather than words)."

Although it is recognized that MLUw (measured in words) is useful for within-language comparisons, a few questions arise when it comes to cross-linguistic comparison. Firstly, since the calculation of MLUw depends on what constitutes a word, it would be difficult to use MLUw measure Chinese, whose phonological, morphological and syntactic criteria for wordhood do not always coincide (Packard, 2000). Second, if a child is acquiring an agglutinating language and an isolating language, MLUw will not be comparable because agglutinating languages have numerous affixes attached to a word stem, resulting in less word counts compared to isolating languages. Another measure, MLUm (measured in morphemes),

is likely to solve this problem. If the corpus is transcribed in a way to mark morpheme divisions, MLUm can be computed automatically by CLAN software. Usually, to compute a child's MLU(m), a sample of 50-100 utterances is analysed to draw conclusions about the child's overall production. Each word a child produces is broken down into morphemes. A morpheme is the smallest, indivisible unit of meaning. For example, the word "walk" is one morpheme, while "walked" is two morphemes: "Walk" carries its own meaning and "ed" signifies past tense. After counting the morphemes for each of the child's utterances, they are totalled and divided by the total number of utterances. The formula is as follow:

$$MLUm = \frac{Total\ number\ of\ morphemes}{Total\ number\ of\ utterances}$$

2.2.2.2 Developmental asynchrony

As Paradis and Genesee suggest (1996), "Transfer is most likely to occur if the child has reached a more advance level of syntactic complexity in one language than the other. Such a discrepancy could occur either because it is typical in the monolingual acquisition of two languages, or because the child is more dominant in one of his or her languages." The quotation indicates that transfer between the bilingual child's languages is not necessarily due to dominance. It could also be that one language is more developed than the other in a certain domain of grammar, thus setting the stage for transfer. Yip and Matthews (2007) illustrated by an example, if relative clauses develop in Chinese at age 2;06 while in English at age 3;00, there should be a period where even balanced bilingual children will be able to form relative clauses in Chinese but not in English, and thus can transfer the Chinese structure to their English. This is recognized as developmental asynchrony, part of the Bilingual Bootstrapping Hypothesis proposed by Gawlitzek-Maiwald and Tracy (1996, p. 902). They define bootstrapping as 'something that has been acquired in language A fulfills a booster function for language B' and the condition for bilingual bootstrapping to work is that one language develops faster than the other regarding a certain grammatical domain, so that the more developed language facilitates the development of the less developed language. For example, in their study of an English-German bilingual child, tense and agreement was present in the child's German while absent in his English, meaning that his German is ahead of English. The child produced some mixed utterances such as *Ich hab ge-climbed up* ('I have climbed up'). The word *ge-climbed* consists of an English lexical verb and a German tense structure, but the reverse pattern German verb within English clause structure was not found. According to Gawlitzek-Maiwald

and Tracy (1996), this was attributed to cross-linguistic influence from the child's more advanced language German to the less advanced English.

2.2.2.3 Ambiguity of input

According to Müller (1998), ambiguous input is a major source of cross-linguistic influence in bilingual development. She holds that transfer from language A to language B can result from ambiguity in the input in language B. In her study of German-English bilingual children, the direction of transfer is unilateral, with German being the target of transfer, regardless of whether it is the dominant language. It is explained that German allows both verb-object and object-verb word order in subordinate clauses, while English has only verb-object order. Therefore, there is no ambiguity in English and thus no transfer from German. Döpke (1998) also found cross-linguistic influence from English to German in her study of three German-English bilingual children. She holds that the partially overlapping structures in the input (verb-object in German and English main clauses) might lead to the over-extension of non-target structures in the bilingual children's German, which is not found in monolingual German children. As Hulk and Müller's hypothesis (2000, p. 228-229) stated "syntactic cross-linguistic influence occurs only if language A has a syntactic construction which may seem to allow more than one syntactic analysis and, at the same time, language B contains evidence for one of these two analyses. In other words, there has to be a certain overlap of the two systems at the surface level."

2.3 The acquisition of questions in English-speaking monolinguals and bilinguals

2.3.1 The acquisition of questions by monolingual children

The acquisition of questions by monolingual children goes through developmental stages. Brown (1973) established a sequence of five stages in children's earliest development based on the two indexes: MLU (Mean Length of Utterance) and upper bound (length of the longest utterance in a given example). Both values increased with age in the three longitudinal corpora analyzed (Eve, Adam and Sarah, all of them are monolingual English-speaking children). Each stage was associated with the child's productive use (at least 90% of the contexts in which they are required) of certain structures of English questions, and individual differences were observed in the age at which each child reached the various stages. Despite the advantages of using MLU to compare children's linguistic development, Brown still pointed out some

limitations, starting from Stage V onwards. He argued that, at that stage, children's various linguistic productions and their MLU begin to depend more on the nature of the interaction than on what children know (Brown, 1973).

Owens (2001) summarized the different stages of monolingual development, MLUs and the relevant interrogative structures within Brown's framework, and I compiled the information as follows in Table 1:

Stage	**Age (in months)**	**MLU**	**Interrogative**
Early I	12-22	1.0-1.5	Yes/no asked with rising intonation on a single word; what and where
Late I	27-28	1.5-2.0	That + X; what + noun phrase + (doing)?
Early II	27-28	2-2.25	Where + noun phrase + (going)?
Late II	28-30	2.25-2.5	What or where + subj. + pred. ; Earliest inversion appears
Early III	31-32	2.5-2.75	With copula in What/where + copula + subj.
Late III	33-34	2.75-3.0	Auxiliary verbs do, can begin to appear in questions; inversion of subject and auxiliary verb appears in yes/no questions
Early IV	35-37	3.0-3.5	Inversion of auxiliary verb and subject in wh-questions
Late IV	38-40	3.5-3.75	Inversion of copula and subject in yes/no questions; adds do to yes/no questions; adds when and how
Stage V	41-46	3.75-4.5	Add modals; stabilizes inverted auxiliary; some adultlike tag questions appear

Post-V	47+	4.5+	Questions other than one-word questions appear; negative interrogatives beyond age 5

Table 1-Different stages of monolingual development in terms of interrogative structures.

It should be noted that earliest inversion appears in Late II (MLU 2.25-2.5), and inversion of subject and auxiliary verb stabilizes in Stage V (MLU 3.75-4.5).

Later, Lightbown and Spada (2013) illustrated the five stages with more examples: single word questions such as, 'Cookie?' 'Mommy book?' emerge at the earliest stage. Then children start to use declarative sentences with rising intonation to ask more questions, for example, 'You like this?'. The third stage is also called 'fronting' stage, because children seem to form questions by moving certain words to the front of the sentence, for example, 'Do I can have a cookie?' 'Why you don't have one?'. At Stage 4, children can form yes-no questions where there are no auxiliaries in the original declarative sentence, such as 'Do dogs like ice cream?', but they cannot use both inversion and *wh*- words. For example, they say 'Is he crying?' instead of 'Why is he crying?'. Therefore, *yes/no* questions are acquired before *wh*- questions by English-speaking children. At the next stage, children can form both yes-no questions and *wh*-questions correctly with certain difficulty in negative questions and embedded sentences such as 'Why the teddy bear can't go outside?' and 'Ask him why can't he go out.' At Stage 6, children are able to form all questions correctly.

2.3.2 The acquisition of questions by bilingual children

Pienemann, Johnston and Brindley (1988) investigated the sequence in the acquisition of English questions by learners of English from various L1 backgrounds. The overall development stages are similar to the ones observed in first language acquisition. At Stage 1, bilingual speakers begin asking questions by using single words or sentence fragments. Then they use declarative sentences with rising intonation to form questions. At stage 3, fronting sentences such as 'Does in this picture there is four astronauts?' 'Where the children are playing?' start to emerge without inversion. The first three stages of acquisition by bilinguals are the same as the ones by monolingual English children. However, some differences attributed to first language influence start to display from Stage 4. For example, monolingual children use subject-auxiliary inversion in Stage 4. But German speakers, influenced by German, may use full verb inversion such as *Like you baseball*? (Magst du baseball.). At Stage 5, bilinguals can use inversion in *wh*- questions with both an auxiliary and a main verb, for example, 'How do

you say proche?' 'What's the boy doing?' At Stage 6, the bilingual speakers can also form complex questions such as negative questions and embedded questions just as monolingual English speakers.

To sum up, the overall developmental sequences of English questions are similar for monolingual and bilingual children. Both mono- and bilingual children ask simple questions such as single words or declarative sentences with rising intonation in the beginning. Then they start to use fronting without inversion. At Stage 4, having acquired *yes/no* questions, monolingual children may have difficulties dealing with both inversion and *wh*- word at the same time, while bilingual children may be influenced by their L1, using the wrong inversion just as German speakers mentioned above. Then both children start to form more complex questions like embedded questions and negative questions with overgeneralization by using inversion, before all question types are formed correctly.

2.4 Cross-linguistic influence in the acquisition of English questions in child bilinguals

As mentioned above, both monolingual and bilingual children make mistakes in Stage 3 and Stage 4 when they acquire English questions. It seems that fronting in Stage 3 and inversion in Stage 4 are challenging for children, especially for bilinguals due to the influence of their L1. Now English is a *wh*- movement language, while some Asian languages such as Cantonese, Korean, Japanese and Mandarin are in-situ languages. Will Asian bilinguals be influenced by their in-situ L1 when they acquire English *wh*- questions? Linguists have conducted research on bilingual children of *wh*-movement vs. in-situ language pairs to find if there are occurrences of in-situ English questions in their production, and compare with that of monolingual English children. Mishina-Mori (2005) investigated *wh*- questions by two Japanese- English bilingual children living in the United States. The author found no instances of in-situ questions in the naturalistic data. Park-Johnson (2017) examined *wh*- questions produced by seven Korean-English bilingual children (children's ages range from 2;4 to 7;11). All children were exposed to little English until they were enrolled in English preschool at approximately age 3;00. Given that some of the children use Korean more than half (and up to 95%), it is safe to assume that these children are Korean dominant. However, Park-Johnson's study also reveal no instances of wh-in-situ questions, despite the fact that all children are proved to have acquired Korean in-situ questions and they have received sufficient wh-in-situ English input from investigators who use in-situ English questions in their interview sessions, usually for clarification. Park-Johnson

held that no transfer of in-situ in Japanese and Korean bilingual children can be attributed to the different word order, with English being SVO and Korean and Japanese SOV. If this is the case, one would wonder if Cantonese and Mandarin bilingual children produce in-situ questions, being that both languages are in-situ and the same word order with English.

2.4.1 Wh-in-situ questions in Cantonese-English bilingual children

Although *wh-in-situ* questions are not target-like in English, they are in Cantonese and Mandarin. For example, the English question 'What do you say?' (27) has *wh*-word moved to the sentence initial position, while *wh*-word in Cantonese (28) and in Mandarin (29) remain in-situ.

(27) What do you say?

(28) Lei5 gong2 mat1 je5?

you say what

'What do you say?'

(29) Ni shuo shenme?

you say what

'What do you say?'

Such wh-in-situ questions are found in bilingual Cantonese-English child Timmy's production. Peng (1998) selected one file from each month from Timmy's data and compared with a file of similar MLU from a monolingual child Eve's data in order to achieve comparability. He counted the number of *wh-* questions and *wh-in-situ* questions of both children and found that 65.5% of Timmy's (age 2;01-2;11 MLU 2.236-3.12) questions were *wh-in-situ* questions while only 1.1% of Eve's (age 1;08-2;00 MLU 1.99-2.973) questions were 'in-situ'. Moreover, the two instances of Eve's *wh-in-situ* questions are found not entirely spontaneous, but more like expansion on the previous adult utterance. Therefore, it demonstrates a striking contrast between the bilingual's frequent use of *wh-in-situ* questions and monolinguals' near zero use of 'in-situ'.

Yip and Matthews (2000) conducted further investigation by adding more data to Timmy's original six files, presenting an overall developmental pattern. It is clear in Figure 1 that Timmy shows a steady growth in the first stage, starting from 2;01 with around 30% of what-in-situ questions and peaking at 2;08 with 100% of in-situ questions. Then the percentage of in-situ

gradually fall from 2;08 to 3;04, but it still remains optional toward the end of the period under investigation at 3;06. Interestingly, the growth of first stage matches the MLU differential in Timmy's data where the MLU for Cantonese consistently exceeds that for English. Yip and Matthews therefore believed that dominance is one key factor of the bilingual's transfer of *wh-in-situ*.

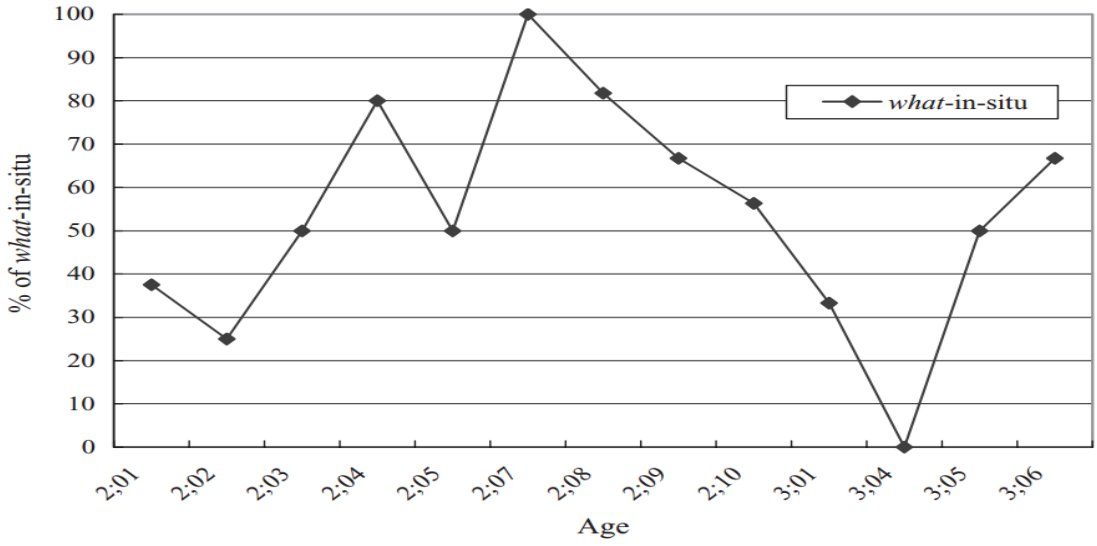

Figure 1- Longitudinal development of Timmy's what-in-situ questions (Yip and Matthews, 2000)

Yip and Matthews (2007) expanded the study by including the data from five other bilingual children: Sophie, Alicia, Llywelyn, Kathryn and Charlotte (Timmy, Sophie and Alicia are siblings). They counted different kinds of *wh-* questions (subject and non-subject what and where questions) and *wh-in-situ* questions produced by the six bilingual children. After deducting the formulaic questions from the total number of *wh-* questions, they computed the percentage of fronted vs. in-situ what and where questions. Table 2 shows that all six bilingual children produced *what-in-situ* question to varying degrees. The three siblings Timmy, Sophie and Alicia produced *what-in-situ* questions rather frequently, ranging from 31.2% to 92.3%. Lywelyn's results are similar with a percentage of 66.7%. However, only 2 what-in-situ questions are found in Kathryn and Charlotte's data, with only 13.3% and 25% in-situ questions separately. The situation for where-in-situ questions is alike, given that Kathryn and Charlotte produced none in-situ questions while the other four children Timmy, Sophie, Alicia and Llywelyn produced in-situ questions to varying degrees, 20% and 33.3% for Timmy and Llywelyn, and 100% for both Sophie and Alicia. The fact that Kathryn and Charlotte are non-

Cantonese-dominant children demonstrates the role of dominance in the language transfer and cross-linguistic influence.

Type of *wh* question	Timmy	Sophie	Alicia	Llywelyn	Kathryn	Charlotte
What (subject)	5	1	0	1	0	0
What (non-subject)						
fronted	6 (7.7%)	22 (68.8%)	4 (57.1%)	2 (33.3%)	13 (86.7%)	6 (75.0%)
in-situ	72 (92.3%)	10 (31.2%)	3 (42.9%)	4 (66.7%)	2 (13.3%)	2 (25.0%)
Total no. of non-formulaic tokens	78	32	7	6	15	8
Formulaic [*wh*at ('s/is/are) X?]	19	76	33	27	14	9
Total no. of *what* (non-subject) questions	97	108	40	33	29	17
Where						
fronted	8 (80.0%)	0	0	6 (66.7%)	6 (100%)	3 (100%)
in-situ	2 (20.0%)	11 (100%)	9 (100%)	3 (33.3%)	0	0
Total no. of non-formulaic tokens	10	11	9	9	6	3
Formulaic [*where* ('s/is/are) X?]	14	1	7	10	11	11
Total no. of *where* questions	24	12	15	19	17	14

Table 2- wh-in-situ questions in six bilingual children. (Yip and Matthews, 2007)

To investigate cross-linguistic effects Yip and Matthews (2007) compared the order of acquisition of English *wh-* words and Cantonese *wh-* words in bilingual children. From Table 3, English what questions first emerge at 27.2 months on average for bilingual Cantonese-English children, while Cantonese mat1 je5 (what) questions emerge earlier at 25.5 months. The rest *where*, *who* and *why* questions follow the same pattern: Cantonese *wh-* questions emerge earlier than English counterparts for bilingual Cantonese-English children, which provides illustration for the transfer of Cantonese in-situ structures. Moreover, when the average age of emergence of English *wh-* words in monolingual English children and bilingual Cantonese-English children is compared, the influence of Cantonese gets more evident. For monolingual English children, *what* and *where* questions emerge at 26 months, while bilingual Cantonese-English children emerge later at 27.2 months on average. *Who* questions emerge at about the same time for both monolingual and bilingual children at around the age of 28 months old. However, Cantonese-English children seem acquire why questions earlier with the emergence at 30.8 months, about 4 months earlier than monolingual children. The striking fact that English why questions are acquired earlier by Cantonese-dominant children than monolingual children is consistent with acceleration under Cantonese influence.

English ***wh-***	Monolingual Average age	Bilingual Average age	**Cantonese** ***wh-***	Monolingual Average age	Bilingual Average age
what	26	27.2	*mat1 je5* 'what'	26.8	25.5
where	26	29.6	*bin1 dou6* 'where'	28.6	26.0
who	28	28.1	*bin1 go3* 'who'	31.9	26.2
why	35	30.8	*dim2 gaai2* 'why'	31.3	27.8

Table 3- Average age of first emergence of Cantonese and English wh- words in monolingual English and Cantonese children and in Cantonese-dominant bilingual children. (data from Yip and Matthews, 2007)

More complex questions such as embedded questions were also studied by the researchers. The earliest production of indirect questions by Sophie were found left in-situ (Sophie 2;08;25). Then at age 4;03, Sophie starts to front *wh-* phrases.

(30) No. I don't know Timmy is where, no. (Sophie 2;08;25)

(31) … I know. I know. I know it's where. (Sophie 3;03;18)

(32) I want to see Alicia what he doing. (Sophie 4;03;28)

But the majority of the bilingual children use subject-auxiliary inversion in their embedded questions just as in main clause questions.

(33) I know where is it. (Sophie 5;05;00)

(34) No, I know where is the park. (Kathryn 4;04;29)

(35) … I don't know what is this. (Llywelyn 3;00;27)

(36) I don't know where is Ma. (Charlotte 2;09;04)

In their study (2007), Yip and Matthews have found many in-situ examples in Cantonese-English bilingual children. They evidenced cross-linguistic influence from Cantonese to English and the role of dominance in three ways:

a) By comparing the development of Timmy's *wh-in-situ* questions with the MLU differential in Timmy's data, they found that the growth of *wh-in-situ* questions matches with Timmy's dominance of Cantonese over English.

b) They compared the proportion of *wh-in-situ* questions, specifically *what* and *where* questions, among Cantonese dominant children and non-Cantonese-dominant children. It shows a strong correlation between dominance and the occurrences of in-situ structures.

c) By comparing the age of first emergence of English and Cantonese *wh-* words by bilingual children, they proved that Cantonese *wh-* words are acquired before English, which lays the foundation for transfer. The striking fact that *why* questions are acquired earlier by bilingual children than monolingual English children proves further the influence of Cantonese.

3 Present study

3.1 Research questions

The present study investigates the interaction of two linguistic systems in a bilingual Mandarin-English child called Luna who is born and raised in the United States and has Mandarin as her heritage language.

Luna is one of the three children in the Child Heritage Corpus available on CHILDES (Mai & Yip 2017). I will analyze Luna's longitudinal data between the ages of 03;10 and 04;11. I chose Luna's data for the following reasons. Firstly, the speech data of Luna is spontaneous, collected by recording interaction between the child and adult interlocutors in naturalistic settings. Studying such data allows me to follow language development over time and has the advantage of avoiding the influences induced by experimental methods. Second, all of Luna's recordings are transcribed into texts, in a way that mark morpheme divisions which can be convenient in computing Luna's MLU in both languages. Last but not least, Luna's corpus contains considerable amount of data: 29 English recordings (from 3;10 to 4;11) and 50 Mandarin recordings (from 02;00 to 04;11). In comparison, the corpus of another Mandarin-English child in that corpus has only 9 English recordings (from 02;08 to 03;09) and 32 Mandarin recordings (from 02;00 to 03;11). Thus, Luna's corpus is likely to provide more examples for analysis.

The major goal of this study is to investigate how Luna acquires different types of questions in English, the societal majority language. Since Luna is a bilingual child acquiring English and Mandarin from birth I am particularly interested in whether Luna's two languages – English and Mandarin – develop independently from each other (cf. the Separate Development Hypothesis, De Houwer 1990, 2005) or whether there is evidence of cross-linguistic influence between the languages (cf. the Interdependent Development Hypothesis), as is shown in Döpke (2000) and Hulk and Müller's (2000) study of German-English children as well as in Yip and Matthews (2000, 2007) for Cantonese-English bilinguals. In the present study, I will try to compare Luna's acquisition of questions to that of the monolingual children, and I will compare the acquisition of questions in the two languages focusing on the patterns of CLI in both English and Mandarin. In light of the evidence presented in Yip and Matthews (2000), I will investigate whether the patterns of CLI can be explained by language dominance. I propose the following four research questions:

RQ1: What are the characteristics of Luna's language development in terms of MLU in the two languages between the ages of 3;10-4;11? Are there signs of languages dominance?

RQ2: What question types does Luna produce in English between the ages of 3;10 and 4;11? What question types has she acquired?

RQ3: Is there evidence of cross-linguistic influence from Mandarin in the acquisition of *wh*-questions in English? If yes, can the observed pattern be explained by her overall language development in terms of MLU?

RQ4: Is there evidence of cross-linguistic influence from English in the acquisition of *wh*-questions in Mandarin? If yes, can the observed pattern be explained by her overall language development in terms of MLU?

Since language dominance has been found to be an important factor in child bilingualism and in the studies on cross-linguistic influence, the first question is proposed to find out the characteristics of Luna's language development, and whether she is dominant in certain language or balanced in both languages. Given that MLU (Mean Length of Utterance) is considered as an objective measure of language development and language dominance, as described in section 2.2.2.1, I will use software CLAN to compute Luna's MLUs in Mandarin and English between the ages of 03;10 and 04;11, and compare the values of MLU in the two languages.

According to Brown (1973) and Lightbown & Spada (2013), children under age 5 are still acquiring interrogative structures. Since we do not know which stages Luna was going through between the ages of 03;10 and 04;11, and whether the development of her questions is delayed, the second question is asked to find whether Luna acquired the different questions types, i.e., how many different types of questions she produces in different files and how many of them are target-like. I will collect and analyze all of Luna's English questions. Qualitatively, I will analyze non-target like structures in Luna's English questions and compare them with adult English and questions produced by monolingual children. Quantitatively, I will calculate the proportions of different question types and the frequencies of non-target like structures, and also compare them with those of monolingual children.

In Yip and Matthews' study (2000) of a Cantonese-English bilingual child, Timmy (02;01-03;06), they demonstrate that there is cross-linguistic influence from *wh-in-situ* language

Cantonese on *wh-movement* language English, and the development pattern of *wh-in-situ* questions correlates with Timmy's dominance of Cantonese over English in MLUw. Since Mandarin and Cantonese share the same word order and in-situ structures, it would be interesting to find if Luna's *wh-* questions are influenced by Mandarin, and if it can be explained by her MLU development in English and Mandarin. Therefore, I proposed the third question. To answer this question, we need to describe Luna's development pattern of MLU in both languages, which has been covered by the first question. In addition, we need to collect Luna's *wh-* questions and find if there are in-situ structures, which has been included in the second question. If Luna's *wh-* questions are indeed influenced by Mandarin, we will find if there is correlation between Luna's MLU patterns and occurrences of *wh-in-situ* questions.

Since cross-linguistic influence can be bilateral, it is also necessary to investigate whether Luna's *wh-* questions in Mandarin are influenced by her English. Therefore, I proposed the fourth question. I will analyze Luna's Mandarin questions focusing in particular on subject-verb inversion and *wh*-movement, since this is where the question structures in the two languages differ.

In light of Yip and Matthews' study (2000, 2007), I predict if Luna is dominant in Mandarin, there will be transfer from Mandarin into English. In this case, Luna may struggle with subject-verb inversion even at Stage V and there will be *wh-in-situ* forms. If Luna is dominant in English, I predict syntactic transfer from English into Mandarin. In this case, Luna will erroneously use subject-verb inversion and she will front *wh*-words in Mandarin questions.

3.2 The subject

Luna was born in New York and her parents are both native speakers of Mandarin. She has been exposed to Mandarin at home since birth and her parents addressed her almost exclusively in Mandarin. Before 9 months old, Luna was primarily taken care of by her parents and her maternal grandparents, who also addressed Luna in Mandarin. From 9 months to 3 years old, Luna spent approximately seven hours a day during weekdays at a local daycare, where English was the language of communication. According to McLaughlin (1978), a child who receives regular exposure to two languages before three is considered a case of simultaneous acquisition, while a child who does not receive input in a second language until after age three will be a case of successive acquisition. Given Luna's early exposer to English,

it is safe to say that she is a simultaneous bilingual child. From 3;02 to 5;08, Luna attended an English-medium pre-school, and she was particularly close to the Chinese-speaking children in her class. At home, the language of communication between Luna and her younger sister is also Mandarin. It can thus be concluded that Luna received considerable amount of exposure to both languages in early childhood.

Luna's corpus is part of the Child Heritage Chinese Corpus obtained from CHILDES database (Mai & Yip 2017), and the transcripts of Luna's longitudinal recordings are all available. The corpus contains 13 hours and 22 minutes of recordings of Luna interacting with parents at home from 2;00-4;01 and 13 hours and 29 minutes of recordings of Luna interacting with researchers via Skype from 3;10-4;11 (4 hours 56 minutes in Mandarin, 8 hours and 33 minutes in English), totaling to 26 hours and 51 minutes in both languages. However, the data is not distributed equally, as there are 29 files in English over a period 3;10.15 and 4;11.06 and there are 50 files in Mandarin over a period of 2;00.05 and 4;11.06. I discuss the selection of files included in the present study in section 3.3.1.

3.3 Data collection

In this study, we need to collect all intelligible questions produced by Luna in the recording period so that we can analyze her English and Mandarin questions and find whether there is cross-linguistic influence between the two languages. We also need to compute Luna's MLU in Mandarin and English so that we can find whether the cross-linguistic influence, if there is any, can be explained by language dominance. Although dominance can be inferred by the amount of input and language preference, it is difficult to judge Luna's language dominance by these measures, since Luna has received considerable amount input of both languages since as early as 9 months old and her language preference is not known. Therefore, the data collection consists of two parts: One is selecting pairs of Mandarin and English files and have them computed by software CLAN. The reason for selection will be explained in section 3.3.1; The other is collecting and categorizing Luna's English and Mandarin questions.

3.3.1 The selection of Luna's English and Mandarin recordings

Luna's English speech production was recorded between the ages of 03;10;15 and 04;11;15, and there are 29 recordings in total. Most of them were recorded at a week's interval,

so there are two or three recordings each month except when Luna was 04;07, 04;10 and 04;11. The lengths of the recordings range from 9.48 minutes to 28.32 minutes.

The recording of Luna's Mandarin started earlier than English, and she was recorded in Mandarin between 02;00;05 and 04;11;06. There are 50 Mandarin recordings in total. Before 03;09;19, Luna was recorded twice or thrice a month. From 03;09;19 to 04;11;06, she was recorded once a month, and the lengths of these recordings range from 11.67 minutes to 34.45 minutes. Table 4 provides an overview of Luna's recordings in both Mandarin and English. The abbreviations in the interlocutor column represent the names of investigators and family members: SOP Sophia Investigator, KAY Kay Investigator, MAG Maggie Investigator, LAN Lana Investigator, JEN Jenny Investigator, MOT Mother, FAT Father, GRA Grandfather.

Mandarin				English			
Age	file	interlocutor	Length	age	file	interlocutor	length
02;00-03;09	35 recordings			02;00-03;09	0 recording		
03;10	03;10;13	LAN	30.52	03;10	03;10;15	SOP	9.67
					03;10;22	SOP/KAY	10.37
					03;10;29	KAY	12.40
03;11	03;11;10	LAN	18.77	03;11	03;11;10	KAY/SOP	13.23
	03;11;12	LAN	14.13		03;11;17	SOP	16.00
					03;11;24	SOP	15.48
04;00	04;00;22	MOT	32.25	04;00	04;00;08	SOP/LAN	16.35
					04;00;29	MAG/SOP	24.47
04;01	04;01;05	MOT	23.85	04;01	04;01;07	SOP/LAN	12.8
					04;01;21	SOP	11.32
					04;01;28	SOP	23.47
04;02	04;02;15	LAN/MAG MOT/GRA	23.18	04;02	04;02;04	SOP/LAN MAG	25.13
					04;02;22	JEN/SOP LAN/MAG	28.32
04;03	**04;03;21**	MOT/MAG	33.23	04;03	**04;03;00**	SOP/MAG	9.48
					04;03;07	SOP/FAT/MAG	27.97
04;04	**04;04;19**	FAT/MAG	28.93	04;04	**04;04;19**	MAG	27.9
					04;04;25	MAG	26.65
	04;05;09	MAG	27.58		04;05;09	MAG	20.98

04;05				04;05	04;05;16	MAG	19.40
					04;05;23	MAG	24.13
04;06	04;06;13	MAG	34.45	04;06	04;06;13	MAG	10.13
					04;06;26	MAG	12.05
04;07	04;07;24	MAG	27.75	04;07	04;07;10	MAG	10.87
04;08	04;08;21	MAG	23.87	04;08	04;08;07	MAG	13.55
					04;08;21	MAG	19.73
04;09	04;09;18	MAG/MOT	29.92	04;09	04;09;04	MAG	15.17
					04;09;18	MAG	10.67
04;10	04;10;16	MAG	11.67	04;10	04;10;16	MAG	27.25
04;11	04;11;06	MAG	22.23	04;11	04;11;06	MAG	17.98

Table 4- Overview of Luna's recordings in Mandarin and English.

Before 03;10, there are 35 recordings of Luna's Mandarin while there are none of Luna's English, therefore it is impossible to compare Luna's MLU between 02;00 and 03;09. From 03;10 to 04;11, Luna's Mandarin was recorded once a month except for 03;11, while English was recorded twice or thrice a month. Thus, during this period there are 15 recording in Mandarin and 29 recordings in English. To ensure that Mandarin recordings and English recordings are comparable, some English recordings must be excluded, so that the number of the recordings in both languages is equal. Since Mandarin was recorded regularly, almost once a month, I decided to choose English recordings that were recorded on the same day as Mandarin or recorded on a close date. For example, at the age of 04;04 there is only one Mandarin file 04;04;19, and two English files 04;04;19 and 04;04;25. Since English file 04;04;19 was recorded on the same day as Mandarin file, I selected file 04;04;19 (English) for analysis. However, for age 04;03 none of English recordings (04;03;00 and 04;03;07) was recorded on the same day as Mandarin (04;03;21), so I selected English file 04;03;07 that was recorded on a closer date with Mandarin file.

For the MLU analysis I selected 14 files in each language, illustrated in Table 5.

Mandarin				English			
Age	file	interlocutor	Length	age	file	interlocutor	length
03;10	03;10;13	LAN	30.52	03;10	03;10;15	SOP	9.67
03;11	03;11;10	LAN	18.77	03;11	03;11;10	KAY/SOP	13.23
04;00	04;00;22	MOT	32.25	04;00	04;00;29	MAG/SOP	24.47
04;01	04;01;05	MOT	23.85	04;01	04;01;07	SOP/LAN	12.80

04;02	04;02;15	LAN/MAG MOT/GRA	23.18	04;02	04;02;22	JEN/SOP	28.32
04;03	04;03;21	MOT/MAG	33.23	04;03	04;03;07	SOP/FAT/MAG	27.97
04;04	04;04;19	FAT/MAG	28.93	04;04	04;04;19	MAG	27.90
04;05	04;05;09	MAG	27.58	04;05	04;05;09	MAG	20.98
04;06	04;06;13	MAG	34.45	04;06	04;06;13	MAG	10.13
04;07	04;07;24	MAG	27.75	04;07	04;07;10	MAG	10.87
04;08	04;08;21	MAG	23.87	04;08	04;08;21	MAG	19.73
04;09	04;09;18	MAG/MOT	29.92	04;09	04;09;18	MAG	10.67
04;10	04;10;16	MAG	11.67	04;10	04;10;16	MAG	27.25
04;11	04;11;06	MAG	22.23	04;11	04;11;06	MAG	17.98

Table 5- Mandarin and English files selected once a month between 03;10 and 04;11

3.3.2 The collection and classification of Luna's English questions

English questions are defined by Cambridge Dictionary: A questions is anything we write or say which requires a response. In writing, questions are usually followed by a question mark. Since Luna's recordings were all transcribed in texts, I searched for question mark '?' to find Luna's English questions. In addition, since there is no question mark in English embedded questions, such as 'I don't know what they are doing.', I searched through Luna's English production in all transcripts and collected her embedded questions. Then, questions that contain unintelligible portions (transcribed 'xxx' in the corpus) that interfere with the analysis of the sentence construction are excluded. Questions that were repeated in the same turn are also excluded. Finally, I classified the questions into five types based on the following definitions.

3.3.2.1 Single word questions

According to Lightbown and Spada (2013), single word questions are children's earliest questions. They are formed by single words or simple two- or three-word sentences with rising intonation. For example, 'Cookie?' 'Mommy book?' At the same time, children may produce some correct questions such as 'What's that?', not because they have acquired *wh*- questions, but because these questions are learned as chunks. Yip and Matthews (2007) considered these questions as instantiations of a formula or formulaic questions, because bilingual children at this stage do not yet have agreement but are able to show copula in *wh*- questions. (Yip, Matthews & Leung 2001). Thus, there is still some time before children learn that there are variations of the *What's X* questions such as 'What are those?' and produce real *wh*- questions. Therefore, questions taking the form of a *wh*-word followed by an optional contracted copula

and an NP as *What('s) X*? will be classified into *single word* questions or formulaic questions, as in (37)-(38). However, if the copula is not contracted, the questions will be classified into *wh-* questions. See examples in (39)-(40).

(37) what's that? (Luna 03;11;17)

(38) where's the radio? (Luna 04;03;07)

(39) what is that? (Luna 04;01;28)

(40) hey, where are you? (Luna 04;05;16)

3.3.2.2 Declarative questions

Declarative questions, by definition, are *yes/no* questions that have the form of a declarative sentence but is spoken with rising intonation at the end. Declarative questions are commonly used in informal speech to express surprise or ask for verification. The most likely response to a declarative question is agreement or confirmation. Some examples are:

(41) you say this? (Luna 04;00;29)

(42) she's a girl? (Luna 04;04;25)

Questions that have the same word order as declarative sentences with a question mark at the end will be classified into declarative questions.

3.3.2.3 Yes/no questions

It is defined in Cambridge Dictionary that questions that need either a yes or a no answer are called yes-no questions. *Yes/no* questions are formed by moving a light verb (are, can, will, and so on), which generally occurs between the subject and the sentence's main verb in the statement, to the beginning of the sentence. (O'Grady, 2005)

statement *yes–no question*

He can go --- Move the light verb --> Can he __ go?

Therefore, questions that begin with light verbs will be classified into *yes/no* questions. Some examples are:

(43) do you see them? (Luna 04;02;04)

(44) is that Bubu? (Luna 04;03;07)

3.3.2.4 *Wh-* questions

Words like *who*, *what*, *where*, *why*, *how*, and *when* are used to ask questions in English. Because of their spelling, they are often called "wh-words" and the questions in which they

appear are called “wh-questions”. (O’Grady, 2005) It should be noted that how questions are also included in *wh*- questions.

Main clause questions that contain *wh*-words will be categorized as *wh*- questions. Some of Luna’s *wh*- questions:

(45) why he can’t go outside? (Luna 03;10;15)

(46) Look, he is doing what. (Luna 04;02;04)

(47) no, how they get in? (Luna 04;06;26)

3.3.2.5 Embedded questions

In English grammar, an embedded question is a question that appears in a declarative statement or in another question. Phrases such as ‘Do you know…’ ‘I don’t know…’ are commonly used to introduce embedded questions. Here are some Luna’s embedded questions:

(48) I don’t know what he doing. (Luna 04;01;28)

(49) I know how to write my baby name. (Luna 04;05;16)

(50) let me ask who is that. (Luna 04;05;23)

After categorizing Luna’s English questions into the above five question types, we need to count questions of each type in each file and add the number of total questions of each file, so that we can calculate the proportions of each type of questions later. Since there are 29 English recordings in Luna’s corpus and the intervals between these recordings are different, it is rather inconvenient if we observe 29 groups of data and present all of them in the figure. Therefore, we need to group the data. The 29 groups of data can be categorized by month. For example, file 031015, file 031022 and file 031029 are categorized as the data of 03;10, so we could count the total number of each type of questions in 03;10. Altogether, there are 14 months in Luna’s English recordings (03;10-04;11) and 29 groups of data are condensed into 14 groups of data. The intervals between every two groups of data are as equal as one month.

3.3.3 The collection and classification of Luna’s Mandarin questions

Since the direction of cross-linguistic influence can be bilateral, it is necessary to collect Luna’s Mandarin questions and find if there are non-target like structures. The similar criteria were adopted in the collection of Luna’s Mandarin questions, that is excluding unintelligible sentences and questions that were repeated in the same turn. It should be noted that mixed utterances (Mandarin structures with English vocabulary) are included in Mandarin questions as well, because Luna learned these words most likely in English community and she was not

able to translate them into Mandarin, hence the mixed sentences. (51)-(52) are examples of Luna's mixed sentences, where she used English words *Batman* and *Lego*, but within a typical Mandarin *wh-in-situ* structure.

(51) *CHI: keshi wo zhidao Batman@s shi shenme yang.
But I know Batman is like what.
But I know what Batman is like.

(52) *CHI: ke wo keyi geni kankan nage Lego@s shi shenme yang de .
But I can to you show that Lego is like what.
But I can show you what that Lego is like.

Similarly, Luna's Mandarin questions are categorized into different types based on the features of Mandarin questions and the classification of English questions, because the two languages share some definitions of different questions types.

3.3.3.1 Single word questions

Like English, there are questions formed by single or simple two- or three- word sentences with rising intonation in Luna's Mandarin. See examples in (53)-(54). Similarly, there are also *wh-* questions like *What's X* that are learned as chunks in Luna's Mandarin. For example, the word *zenme* in (55) is translated as *how* in English, and thus the question *zenme gao de* ('how (it) works?') should be classified into *wh-* questions. However, since (55) is a set phrase and learned as chunks, which is produced by children from a very young age, it is categorized in to *single word* questions.

(53) na yaokongqi ne?
That remote-control SFP? (Luna Mandarin 031013)

(54) da ying ma?
Big hawk SFP? (Luna Mandarin 040105)

(55) zenme gao de?
How work SFP (Luna Mandarin 040215)

3.3.3.2 Yes/no questions

An English *yes/no* question is defined as a question that needs either a yes or a no answer, but there is no direct translation of yes or no in Mandarin answers. In linguistics, a *yes/no* question, formally known as a polar question, is a question whose expected answer is one of

two choices, one that affirms the question and one that denies the question. Under this definition, *yes/no* questions in Mandarin can be expressed in the following two forms.

a. Declarative form

Since the formation of English declarative questions, that is a declarative sentence with a rising intonation at the end, is exactly the formation rule for one type of Mandarin *yes/no* questions, only adding a SFP (sentence final particle) at the end. I categorize Mandarin declarative questions as *yes/no* questions instead of a separate type. (56)-(57) are some examples of this form.

(56) na nvderen haogaode naren shi laoshi ma?
that woman very tall that person is teacher SFP ?
'Is that woman, that very tall person a teacher?' (Luna Mandarin 040105)

(57) ni xiang kan ma?
you want see SFP
'Do you want to see?' (Luna Mandarin 040321)

b. A-not-A form

A-not-A questions have a unique interrogative pattern that does not permit simple *yes/no* answers and instead requires a response that echoes or negates the original question. These questions are formed by attaching a negative form not-A to the original verb A, and adding a question mark at the end of the sentence. For example, in (58), Q stands for question, A for affirmative, and N for negative:

(58) **Q:** ni zhi buzhidao ya?
you know not-know SFP
'Do you know or not?'
A: zhidao. (know)
N: buzhidao. (not know) (Luna Mandarin 040509)

3.3.3.3 *Wh*- questions

In English, questions that contain *wh*- words such as *what*, *who*, *where, when* and *how*, and expect an answer other than "yes" or "no", are called *wh*- questions. In Mandarin, there are

many *wh-* words functioning similarly to English. For example, *shenme* is the word for 'what' in Mandarin, and *shui* for 'who', *nali* for 'where', *zenme* for 'how'. If Luna's main clause Mandarin questions contain such *wh-* words and are not set phrases discussed in single word questions, then these questions will be categorized as *wh-* questions. Some examples are:

(59) ni zai gan shenme ?
you are doing what
'What are you doing?' (Luna Mandarin 031013)

(60) shui neng jiu ta?
'Who can help it?' (Luna Mandarin 040022)

3.3.3.4 Embedded questions

Mandarin embedded questions and English embedded questions are very similar, both formed by including a question in a declarative statement or in another question. Mandarin embedded questions are often introduced by phrases such as *ni zhidao ma*, just like 'do you know…' in English. Here are some of Luna's Mandarin embedded questions.

(61) wo zhidao lanqiu shi zenme wan de.
I know basketball is how play SFP.
I know how basketball is played. (Luna Mandarin 040918)

(62) ni zhidao ma women xuexiao ye you sange.
You know Q-particle our school also has three.
Do you know our school also has three (things)? (Luna Mandarin 041016)

4 Results

In this section, I will present the results of MLU computation and discuss Luna's language development and language dominance between the ages of 03;10 and 04;11. In addition, I will analyze Luna's questions in English as well as some of her Mandarin questions, so that we can find what question types Luna has acquired between the ages of 03;10 and 04;11, and whether there is cross-linguistic influence between the two languages.

4.1 The computation of Luna's MLUs and language dominance

As is described in 2.2.2.1, MLU can be measured in words (MLUw), or measured in morphemes (MLUm). In this study, I choose to use MLUm to measure Luna's English and Mandarin development for the following reasons. Firstly, it is difficult to use MLUw measure in Chinese, because the calculation of MLUw depends on what constitutes a word, and the phonological, morphological and syntactic criteria for wordhood in Mandarin Chinese do not always coincide with English (Packard, 2000). Second, in Brown's (1973) study of three monolingual English children, he adopted MLUm to measure their morphosyntactic development and established a sequence of five stages with relevant MLUs and grammatical structures. If I use the same measure (MLUm), it would be easier to compare Luna's MLUs and English data with monolingual English children. Third, Luna's corpus is transcribed in a way to mark morpheme divisions, thus MLUm can be computed easily by the CLAN software. The example in (63) is an extract of transcription of Luna's Mandarin file (03;10;13).

(63)

*CHI: 嘿 [<] !
%mor: co|hei1=hey !
%gra: 1|0|INCROOT 2|1|PUNCT

*LAN: 好不好 呀 ?
%mor: tag|hao3bu2hao3=okay sfp|ya ?
%gra: 1|0|INCROOT 2|1|SFP 3|1|PUNCT

*CHI: 你 看 我 也 有 一 书 .
%mor: pro|ni3=you v|kan4=look pro|wo3=I adv|ye3=also v|you3=have
num|yi1=one n|shu1=book .
%gra: 1|2|SUBJ 2|0|ROOT 3|5|SUBJ 4|5|JCT 5|2|OBJ 6|7|QUANT 7|2|OBJ
8|2|PUNCT

Table 6 illustrates the number of Luna's morphemes and utterances in both languages between the ages of 3;10 and 4;11, computed by CLAN software. Luna's MLUs are computed by using the formula: $MLUm = \frac{the\ number\ of\ morphemes}{the\ number\ of\ utterances}$ and are presented in the table.

Mandarin				English			
age	morphemes	utterances	MLU	age	morphemes	utterances	MLU
03;10	808	221	3.656	03;10	133	44	3.023
03;11	740	163	4.540	03;11	132	55	2.400
04;00	605	262	2.309	04;00	278	135	2.059
04;01	507	189	2.683	04;01	135	78	1.731
04;02	494	122	4.049	04;02	197	53	3.717
04;03	957	208	4.601	04;03	946	214	4.421
04;04	892	158	5.646	04;04	323	109	2.963
04;05	825	170	4.853	04;05	460	114	4.035
04;06	1042	236	4.415	04;06	253	59	4.288
04;07	720	174	4.138	04;07	365	81	4.506
04;08	856	197	4.345	04;08	634	131	4.84
04;09	915	191	4.791	04;09	327	107	3.056
04;10	611	98	6.235	04;10	913	162	5.636
04;11	957	154	6.214	04;11	637	157	4.057

Table 6- Luna's MLU in Mandarin and English between 03;10 and 04;11.

Figure 2 displays the development of Luna's two languages in terms of MLU between 03;10 and 04;11. Steady MLU increase can be found in both languages, with Mandarin from 3.656 at 03;10 to 6.214 at 04;11, and English from 3.023 at 03;10 to 4.057 at 04;11. From the figure, we can find three obvious gaps where the value of MLU Mandarin is much higher than the value of MLU English (03;11, 04;04 and 04;11). These three periods (03;10-03;11, 04;03-04;04 and 04;10- 04;11) are also the time when Luna's MLU in Mandarin keeps increasing while her MLU in English suddenly drops. Apart from these three periods, the value of MLU in Mandarin is slightly higher than MLU in English between 04;00 and 04;03. The MLUs for both languages during this period are growing at a similar speed. After the gap at 04;04, English and Mandarin become closely matched between 04;05 and 04;09. Luna's MLU in English even develops faster than her MLU in Mandarin, resulting in the value of English MLU surpassing the value of Mandarin MLU between 04;07 and 04;08. Overall, we can see that the value of Mandarin is consistently higher than the value of English over the period with the exception of

04;07 and 04;08. Three major gaps between Mandarin and English can be found in the figure due to the sudden drops of MLU in English.

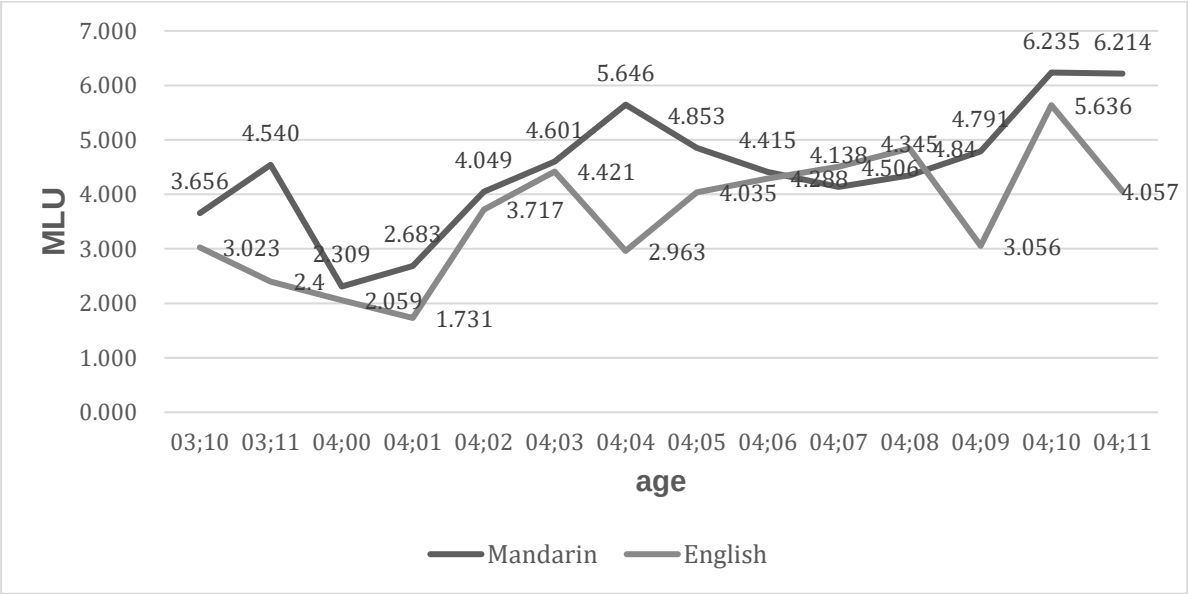

Figure 2- MLU of Luna in Mandarin and English between 03;10 and 04;11.

However, some factors that might inflate MLU values have not been taken into consideration. Firstly, since adult English has inflectional morphology, it might inflate the MLU values in English. But the subject of this study is a 3-4 years old child and inflectional morphology is not yet in place in the child's English, so MLU values in English should not be inflated. On the other hand, sentence-final particles such as ***la***, ***ya*** in Mandarin might inflate the MLU values in Mandarin. In (64) there are two examples of Luna's use of sentence-final particles. These particles appear frequently in Mandarin, even in the one-word stage of children's production. Thus, their appearance should not be regarded as morphosyntactic development. However, as we can see, sentence-final particles are included in the computation of MLUm, we should expect that MLU values in Mandarin presented in the previous figure are higher than Luna's actual MLU values in Mandarin.

(64)

*CHI: 那个 毛毛虫 自己 变 了 个 小 蝴蝶 啦.

na4ge4 mao2mao5chong2 zi4ji3 bian4 le ge4 xiao3 hu2die2 ***la***1

%mor: pro|na4ge4=that n|mao2mao5chong2=caterpillar pro|zi4ji3=self v|bian4=change asp|le cl|ge4 adj|xiao3=small n|hu2die2=butterfly **sfp|la1**.

*CHI: 哎呀 你 怎么 看 不 到 呀？

ai1ya1 ni3 zen3me kan4 bu4 dao4 ***ya***?

%mor: co|ai1ya1=jeez pro|ni3=you adv:wh|zen3me=how v|kan4=look neg|bu4=not v:resc|dao4=arrive **sfp|ya** ?

Therefore, the actual line of MLU in Mandarin should be slightly lower than the original line in Figure 2. I move down the original line for Mandarin slightly and keep the line for English unchanged, so that we can see a clearer picture.

As we can see in Figure 3, MLU values in Mandarin catch up with MLU values in English between 04;00 and 04;03, and the line for Mandarin is no longer higher than the line for English. Instead, the two lines intersect with each other. Furthermore, MLU values in English surpass Mandarin values even more between 04;07 and 04;08, resulting in a small gap between the two lines. Overall, we can see considerable overlap in the MLUs between the two languages from 03;10 to 04;11, except for the three major gaps at 03;11, 04;04 and 04;11, which is present in the previous figure. It is not clear how these gaps are formed or why MLU values in English suddenly drop at these times, but when we look at the whole picture, we can infer that Luna is rather balanced in her two languages between 03;10 and 04;11.

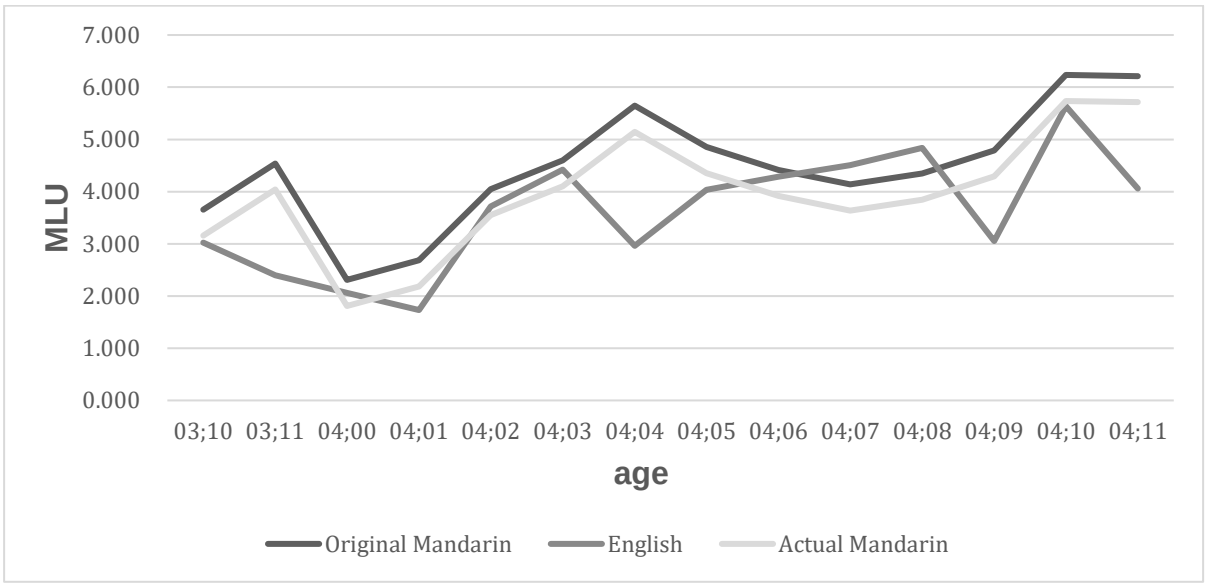

Figure 3- MLU of Luna in Mandarin and English between 03;10 and 04;11.

4.2 Luna's different question types in English

In this section, I will perform both quantitative and qualitative analyses of the following five question types: *single word*, *declarative*, *yes/no*, *wh-* and *embedded* questions. The proportions of different question types will be calculated and analyzed. Moreover, I will analyze typical examples of Luna's questions in English, especially her non-target like structures.

4.2.1 Single word questions

As is defined in section 3.3.2.1, *single word* questions consist of single words or simple two- or three-word sentences with a question intonation, as in (65) and (66). In addition, following Lightbown and Spada (2013), I included formulaic questions as well when calculating the numbers and the proportion of single word questions. A formulaic question is defined as a question taking the form of a *wh-* word followed by an optional contracted copula and an NP as *What's X*, see example in (67).

(65) cookie ? (Luna 04;04;19)

(66) Snow_white ? (Luna 04;11;06)

(67) What's that? (Luna 03;11;17)

Based on the numbers of *single word* questions and total questions, we can compute the proportions of Luna's single word questions between the ages of 03;10 and 04;11, dividing the number of single word questions by the number of total questions. The results are presented in Table 7. We can see that single word questions appear in most files except for 04;07 and 04;10, and importantly at later stages of acquisition when Luna produces multiword utterances. In total, there are 43 *single word* questions in Luna's data.

age	number (*single word*)	total	proportion	age	number (*single word*)	total	proportion
03;10	2	5	40.00%	04;05	7	28	25.00%
03;11	3	4	75.00%	04;06	1	8	12.50%
04;00	1	4	25.00%	04;07	0	8	0.00%
04;01	4	9	44.40%	04;08	3	15	20.00%
04;02	3	9	33.30%	04;09	4	13	30.77%
04;03	6	28	21.43%	04;10	0	17	0.00%
04;04	2	13	15.38%	04;11	7	20	35.00%

Table 7- The numbers and the proportions of single word questions in Luna's corpus.

Figure 4 illustrates the numbers and the proportions of Luna's *single word* questions over the whole period. The numbers are very small at 04;00, 04;07 and 04;10, leading to sharp decreases in the period of 03;11-04;00, 04;05-04;07 and 04;09-04;10, and three deeps at 04;00, 04;07 and 04;10. Overall, the percentages of Luna's *single word* questions display a decreasing trend with *single word* questions occurring less than 35% of the time after the age of 4;07. The average proportion of Luna's *single word* questions is about 25%.

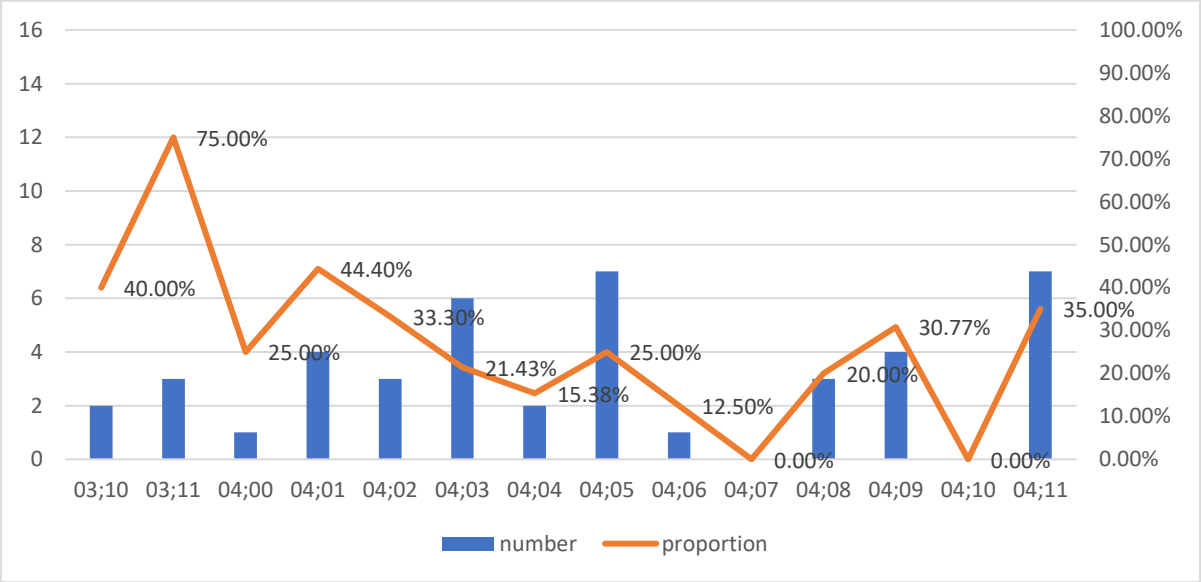

Figure 4- The numbers and percentage of single word questions in Luna's corpus

It should be noted, that the use of *single word* questions should not necessarily be a systematic error, because English-speaking adults use them as well. For example, Luna's interlocutors Sophie and Maggie also used some *single word* questions, illustrated in (68)-(70).

(68) pink? (Sophie, Luna's age 03;11;17)

(69) smallest pig? (Sophie, Luna's age 03;11;17)

(70) the first page? (Maggie, Luna's age 04;10;16)

4.2.2 Declarative questions

Declarative questions appear in Luna's production less frequently than the *single word* questions. Table 2 shows that there are altogether 11 declarative sentences in 7 out of 29 files. Some examples are provided in (71) and (72):

(71) you say this? (Luna 04;00;29)

(72) she's a good guy? (Luna 04;10;16)

Table 8 also shows that declarative sentences occur not only in the earlier files, but also in the later files at the ages of 04;08 and 04;10.

age	number	proportion		age	number	proportion
03;10	0	0%		04;05	3	10.71%
03;11	0	0%		04;06	0	0%
04;00	1	25%		04;07	0	0%
04;01	0	0%		04;08	1	6.66%
04;02	0	0%		04;09	0	0.00%
04;03	1	3.57%		04;10	1	5.88%
04;04	4	30.77%		04;11	0	0.00%

Table 8- The numbers and the proportions of declarative questions in Luna's corpus.

Figure 5 shows that declarative questions appear occasionally in Luna's production and the numbers are very small. The average proportion of declarative questions between the ages of 03;10 and 04;11 is less than 10%.

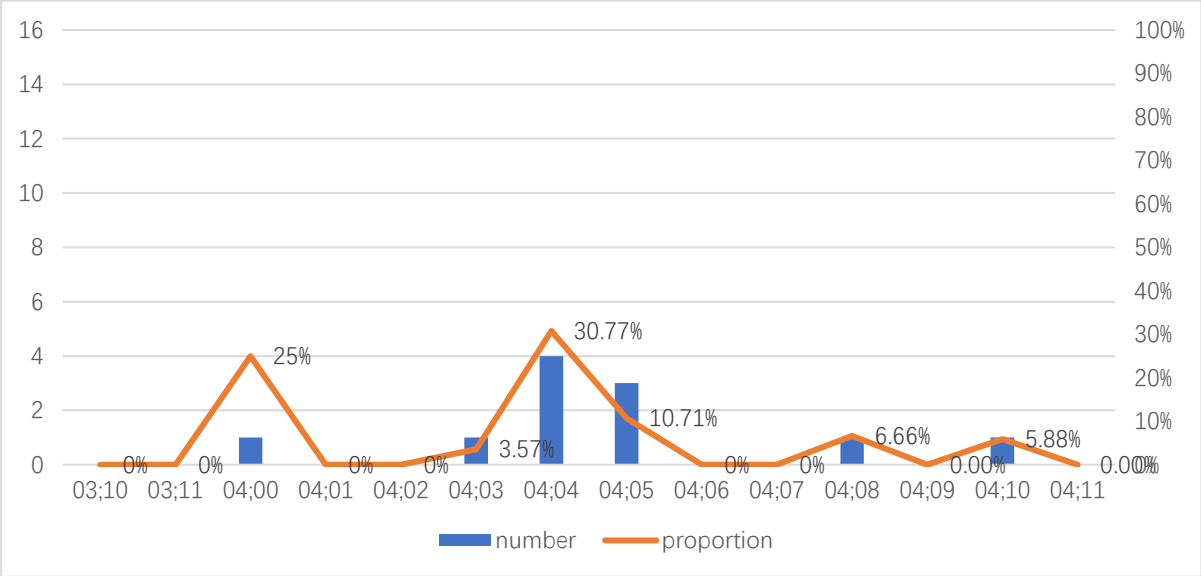

Figure 5- The numbers and percentage of declarative questions in Luna's corpus

Interestingly, two of Luna's declarative questions produced at the age of 04;05 are rather long, and when translated into Mandarin they have exactly the same word order with Mandarin

yes/no questions, illustrated in (73) and (74). It can thus be assumed that they might be a result of cross-linguistic influence from Mandarin and are non-target like in English.

(73) you say Peppa pig and her mummy and her daddy buy something to go to party to eat? (Luna 04;05;09)

ni shuo peiqi xiaozhu he tamama haiyou tababa maile yixiedongxi qu juhui chi? (Mandarin)

'You say Peppa pig and her mummy and her daddy bought something to the party to eat?' (English)

(74) You say buy something to the party eat ? (Luna 04;05;09)

ni shuo mai dongxi qu juhui chi? (Mandarin)

'You say buy something to the party to eat?' (English)

Yet, declarative questions can be also acceptable in English if they express confirmation. Therefore, I searched for the contexts in which the sentences in (73) and (74) were used. From the dialogue between Maggie and Luna in (75), it seems that both long declarative questions were used to ask for verification. Therefore, they may be considered acceptable in English.

(75)

MAG: who would you like to invite to the party ?

MAG: <who should come to the party> [>] ?

CHI: **<you say buy> [<][/] you say buy something to the party eat ?**

MAG: no , I mean +...

CHI: you say +...

MAG: do you want Peppa ?

CHI: **you say Peppa pig and her mummy and her daddy buy something to go to party to eat ?**

MAG: oh , I see .

4.2.3 Yes/no questions

This type of questions is also rather infrequent in Luna's corpus. According to Table 9, they occur 32 times in total. There are only two *yes/no* questions in the first five months of Luna's recordings, with only two questions 'can I say a one Teddy bear too?' at the age of 03;10 and 'do you see them?' at the age of 04;02. Both of them are target-like though. *Yes/no* questions appear more frequently after the age of 04;03.

age	number	proportion		age	number	proportion
03;10	1	20%		04;05	7	25%
03;11	0	0%		04;06	5	62.50%
04;00	0	0%		04;07	1	12.50%
04;01	0	0%		04;08	3	20%
04;02	1	11.10%		04;09	1	7.69%
04;03	6	21.43%		04;10	3	17.65%
04;04	2	15.38%		04;11	2	10.00%

Table 9- The numbers and the proportions of yes/no questions in Luna's corpus.

Some other examples of Luna's *yes/no questions* are shown in (76)-(78).

(76) is that Bubu? (Luna 04;03;07)

(77) did we have apple sauce? (Luna 04;05;09)

(78) can I see the next page? (Luna 04;10;16)

Out of Luna's 32 *yes/no* questions, only 2 questions are found to be non-target-like. These questions are presented in (79) and (80). In both questions we can see the fronting of the copular *be*, which is followed by the subject and a modal verb in (79) and a frozen unanalyzed form *she's* in (80). Thus, in both sentences, the fronted element is followed by a declarative sentence in its statement form. Although Luna made two mistakes with *yes/no* questions, these errors cannot be considered systematic. They rather show that it is natural for children to fall back on old patterns when they are using other new elements in their language (Lightbown and Spada, 2013). Given the low frequency of ungrammatical *yes/no* questions (2/32, 6.25%), it can be concluded that Luna has acquired *yes/no* questions before the end of recording period.

(79) <is she> [<] [/] is she can hear Ariel sound? (Luna 04;06;26)

(80) is she's a good guy? (Luna 04;10;16)

Figure 6 shows that the proportion of *yes/no* questions increases steadily after the age of 4;02, reaching around 60% at the age of 04;06. Then it falls back to 12.5% and remains below 20% of the time for the remaining five months. The average proportion of *yes/no* questions between the ages of 03;10 and 04;11 is around 15%.

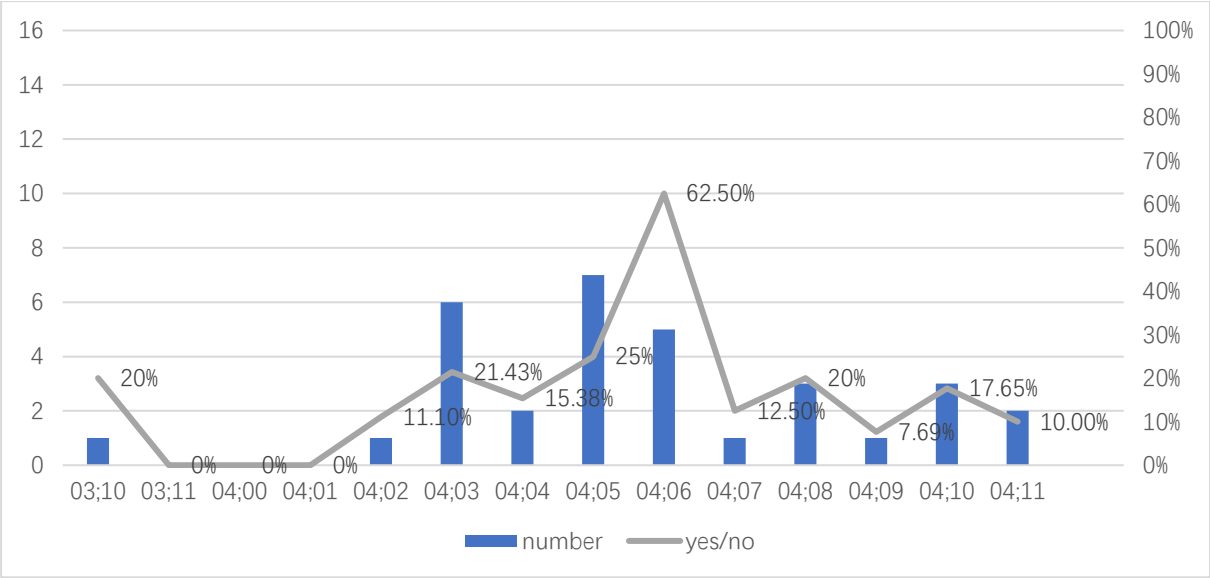

Figure 6- The numbers and percentage of yes/no questions in Luna's corpus

4.2.4 Wh- questions

Luna's *wh-* questions consist of formulaic questions (e.g., *What's X?*) and non-formulaic questions. Since the formulaic ones have been included in *single word* questions, this section will include non-formulaic *wh-* questions only. Table 10 presents the numbers and the percentages of Luna's *wh-* questions. We can find that *wh-* questions are produced in all files and they are 59 in total.

age	number	proportion		age	number	proportion
03;10	1	20.00%		04;05	6	21.43%
03;11	1	25.00%		04;06	1	12.50%
04;00	2	50.00%		04;07	4	50.00%
04;01	4	44.44%		04;08	6	40.00%
04;02	3	33.30%		04;09	5	38.46%
04;03	13	46.43%		04;10	7	41.18%
04;04	4	30.77%		04;11	2	10%

Table 10- The numbers and the proportions of wh- questions in Luna's corpus.

Figure 7 illustrates the numbers and the percentages of Luna's *wh-* questions. From the figure, we can see that *wh*-questions appear in all files and the percentages of *wh-* questions of the time range from 10% to 50%. Overall, the average proportion for *wh*-questions is around 30%.

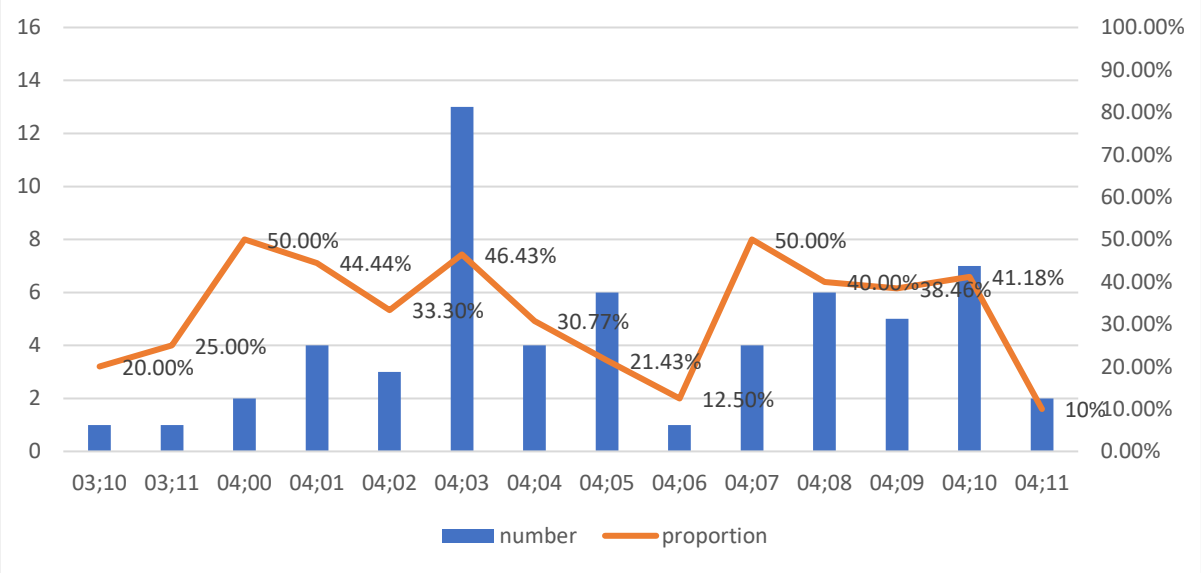

Figure 7- The numbers and the percentage of wh- questions in Luna's corpus

Based on the studies in the background section, we know that *wh-in-situ* questions might appear in Luna's data. In total, five instances of *wh-in-situ* are found in Luna's recordings between the ages of 4;02 and 4;08. These are illustrated in the examples in (81)-(83). The question 'you say what?' occurred three times in three different files.

(81) look, he is doing what? (Luna 04;02;04)

(82) you say what? (Luna 04;04;25)

(Luna 04;05;09)

(Luna 04;08;21)

(83) can we what? (Luna 04;08;21)

Since echo questions also have *wh-in-situ* structures and are allowed in English, it is necessary to check the contexts of the five *wh-in-situ* questions. The context for the question *look, he is doing what?* is provided in (84). It is clear that despite the fact, that the interlocutor

Sophie used the target-like word order, namely 'What is he doing?', Luna still left *what* in-situ and used non-target-like word order in her question. Since the question is not a variant of the interlocutor's previous utterance, it cannot be considered an echo question. Therefore, the question in (81) is an example of non-target like *wh-in-situ* structure, and it may be caused by cross-linguistic influence from Mandarin.

(84)

SOP: what is he doing?
CHI: can't run away, because a big snowman like can't go away fast.
SOP: ah, okay [/] okay .
SOP: oh next page.
CHI: **look he's doing what?**
SOP: what a scary xxx .
SOP: and who [/] who's this guy? (Luna 04;02;04)

The question 'you say what?' appeared three times in the contexts presented in (85)-(87). In all of them Luna asked for clarification. Therefore, all three can be considered to be echo questions and target-like in English.

(85)

MAG: so who would you like to invite?
CHI: **you say what?**
MAG: who would you like to invite to the party?
MAG: do you remember Kitty? (Luna 04;04;25)

(86)

MAG: so who would you like to invite to the party?
CHI: **you say what?**
MAG: who would you like to invite to the party?
MAG: <who should come to the party> [>]?
CHI: you say buy something to the party eat? (Luna 04;05;09)

(87)

MAG: can you do spell?

MAG: can you?
MAG: can you protect your family?
CHI: **you say what?**
MAG: oh, is it warm?
MAG: is it warm ?
CHI: no. (Luna 04;08;21)

The context for the last *wh-in-situ* question, 'can we what?', is provided in (88). It is clear that this question is a variant of the interlocutor's question, which is 'can we do it next time?'. The child asked the question for clarification. Therefore, the question is an echo question and target-like in English.

(88)
MAG: <can we can we> [/] can we do it next time?
CHI: **can we what?**
MAG: can we &ah +..?
CHI: **can we what?**
MAG: <can we> [/] can we look at Rapunzel next time? (Luna 04;08;21)

To conclude, there is only one *wh-in-situ* question that is not an echo question and non-target like in Luna's corpus.

Before the age of 04;08, Luna's acquisition of *wh*-questions seems to remain in Stage III where the fronting of the *wh*-words takes place without inversion. Examples of such non-target-like questions are provided in (89)-(93).

(89) why he can't go outside? (Luna 03;10;15)

(90) why you sing about it? (Luna 04;00;29)

(91) where you are? (Luna 04;03;07)

(92) no, how they get in? (Luna 04;06;26)

(93) <how you do that> [<]? (Luna 04;07;10)

However, after the age of 04;08 inversion has been constantly found in Luna's *wh*-questions. Thus, all questions produced after the age of 4;08 are target-like. They are presented in (94)-(97). Therefore, it can be concluded that Luna acquired *wh*-questions at around the age of 04;08. At that time, Luna's MLU in English is around 4.1 (average MLU for the ages of 04;07-04;09), indicating that Luna is in Stage V (MLU 3.74-4.1) according to Brown's (1973) sequence of five stages. Since monolingual English-speaking children also stabilize or acquire *wh*- questions in Stage V, it is inferred that Luna's development is not delayed in terms of *wh*-questions.

(94) what should we do now? (Luna 04;09;04)

(95) okay, my dad what are you doing? (Luna 04;09;04)

(96) how do you gonna [: going to] do that anyway? (Luna 04;10;16)

(97) <where is Spider_man going> [<] ? (Luna 04;10;16)

4.2.5 Embedded questions

Table 11 shows that embedded questions appear in nearly all files but rather infrequently before the age of 04;05. In total, Luna produced 36 embedded questions.

age	number	proportion		age	number	proportion
03;10	1	20%		04;05	5	17.86%
03;11	0	0%		04;06	1	12.50%
04;00	0	0%		04;07	3	37.50%
04;01	1	11.10%		04;08	2	13.33%
04;02	2	22.20%		04;09	3	23.08%
04;03	2	7.14%		04;10	6	35.29%
04;04	1	7.69%		04;11	9	45.00%

Table 11- The numbers and the percentage of embedded questions in Luna's corpus.

Figure 8 presents the numbers and the percentages of embedded questions. The line of embedded questions starts at 20%, but falls to 0% between the ages of 03;11 and 04;00, which could be due to the overall low number of questions produced during that time. From the figure, it is clear that Luna's use of *embedded* questions has been constantly increasing over the period.

The average percentage of embedded questions is around 20%.

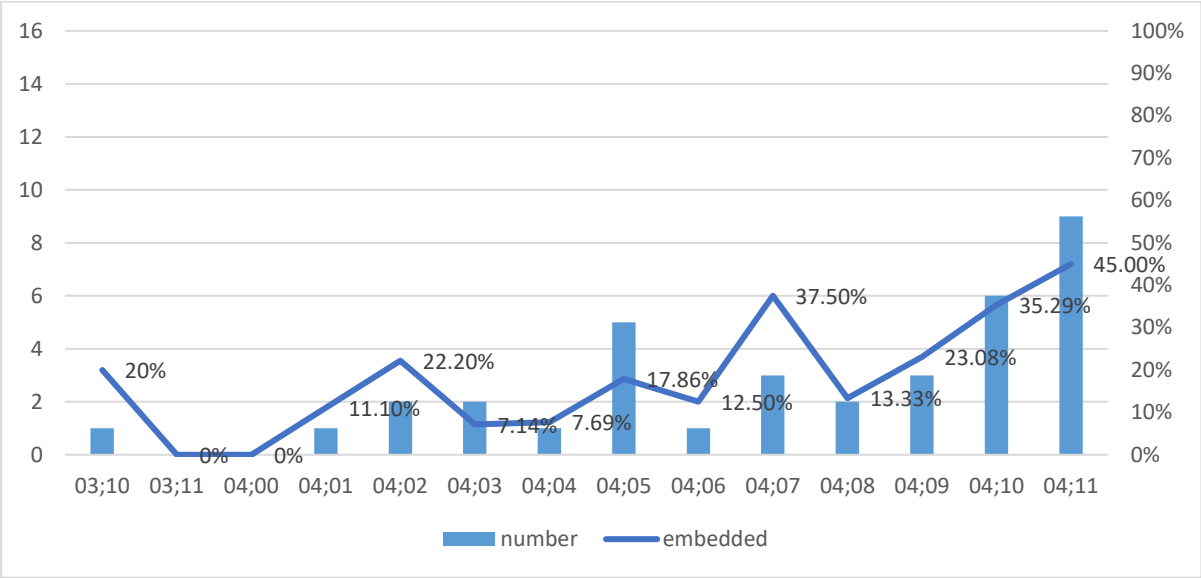

Figure 8- The numbers and the percentage of embedded questions in Luna's corpus

It is also important to consider the grammaticality of Luna's *embedded* questions. Throughout the whole period, Luna has produced both targe-like and non-target-like *embedded* questions. I excluded the questions where the inversion is not required in making embedded questions. For example, in (98) the word order of the original interrogative is 'how to do talk', which is the same as the word order of the embedded question 'baby don't know how to do talk'. I also excluded the questions where it is difficult to decide whether the word order was target-like or not. For example, in (99) the grammatical sentence would be 'I don't know what he is doing.', but Luna omitted the auxiliary *is.* When such questions were excluded, there were 14 embedded questions in total, illustrated in Table 12.

(98) baby don't know how to do talk. (Luna 03;10;15)

(99) I don't know what he doing. (Luna 04;01;28)

Table 12 shows that the majority of Luna's *embedded* questions are non-target like: 11/14 (78%). It can thus be concluded that during the period of 03;10-04;11, Luna was still acquiring *embedded* questions.

	040204	040307	040419	040523	040710	040904	041016	041106	total
target-like	1	0	0	0	1	0	0	1	3

total	1	2	1	2	1	1	2	4	14
percentage	100%	0%	0%	0%	100%	0%	0%	25%	21.4%

Table 12- The accuracy with embedded questions in Luna's corpus.

The structure in (100) shows that Luna can use target-like word order. However, in (101) Luna's embedded question shows subject-auxiliary inversion just as in main clause questions, which is non-target like. It is difficult to say that these non-target like questions are caused by cross-linguistic influence from Mandarin, since both English and Mandarin have no inversion in embedded questions, and according to Lightbown & Spada (2013) monolingual children also go through a stage where they overgeneralize the inverted form that would be correct for simple questions and produce sentences as in (101).

(100) I don't know what they are doing. (Luna 4;02;04)
(101) I don't know who is that. (Luna 4;03;07)
(102) Ask him why can't he go out. (Luna 4;03;07)

To sum up, Luna has acquired four types of English questions: *single word*, *declarative, yes/no* and *wh-* questions (acquired at around the age of 04;08, MLU at around 4.1), and has not acquired embedded questions by the end of the period (age 04;11). It should be noted that Luna might produce some rather long declarative sentences that adults would normally not use, and make some mistakes with *yes/no* questions, but the number of these mistakes is always below three. In Yip & Matthews's study (2007), they take at least three attestations of non-target like structures in the same individual at the same stage of development as systematic transfer or cross-linguistic influence, because an example that does not constitute systematic influence would be episodic code-mixing where two languages interact in performance, but not necessarily at the level of competence. Therefore, Luna's mistakes in declarative and *yes/no* questions should not be considered as systematic.

In addition, there is little evidence of cross-linguistic influence from Mandarin in Luna's acquisition of English questions. Questions that might be influenced are main clause *yes/no* questions and *wh-* questions, because as introduced in section 2.1, English and Mandarin have different structures in these types of questions. English has subject-auxiliary inversion while Mandarin does not, and English has *wh-* movement when forming *wh-* questions while Mandarin has no overt *wh-* movement. Since there are only two *yes/no* questions without inversion and one non-echo *wh-in-situ* structure in Luna's data, the number is not enough to be

considered as systematic error. Thus, the non-target-like structures should not be taken as evidences of cross-linguistic influence from Mandarin.

4.3 Luna's Mandarin questions

As presented in section 2.1, Mandarin and English have different structures in the main clause *yes/no* questions and *wh*- questions. Since the direction of cross-linguistic influence can be bilateral, it is also necessary to analyze Luna's *yes/no* questions and *wh*- questions in Mandarin, so that we can find if there is any influence from Luna's English on Mandarin questions.

4.3.1 Yes/no questions

Luna's Mandarin *yes/no* questions consist of two forms: the declarative form and the A-not-A form, which is formed by attaching a negative form not-A to the original verb A and adding a question mark at the end of the sentence. These questions appear rather frequently in Luna's Mandarin files, compared with its English counterpart. Table 13 presents the numbers and the proportions of Mandarin *yes/no* questions produced by Luna between the ages of 03;10 and 04;11. She started to use *yes/no questions* in the first two months of recording but the numbers are very small. Then the questions began to appear more frequently from 04;00 to 04;06, before the number of *yes/no* questions drops. In total, Luna produced 46 *yes/no* questions in Mandarin between 03;10 and 04;11.

age	number	proportion		age	number	proportion
03;10	1	7.14%		04;05	7	53.85%
03;11	1	11.11%		04;06	4	20.00%
04;00	4	36.36%		04;07	1	9.09%
04;01	2	25.00%		04;08	3	18.75%
04;02	4	57.14%		04;09	5	35.71%
04;03	8	26.67%		04;10	0	0.00%
04;04	5	41.67%		04;11	1	10.00%

Table 13- The numbers and percentage of yes/no questions in Luna's Mandarin corpus.

Some examples of Luna's *yes/no* questions are shown in (103)-(104).

(103) na shi hao wangzi ma ?

That is good prince SFP?

Is that a good prince? (Luna Mandarin 04;04;19)

(104) ni zhi buzhidao ya ?

You know not-know SFP?

Do you know or not? (Luna Mandarin 04;06;13)

(105) shi bushi huai de ?

Is not-is bad SFP?

Is (he) bad or not? (Luna Mandarin 04;04;19)

It should be noted that the question in (105) has null subject, which is common in Mandarin. However, it is difficult for us to judge whether Luna inversed the order of the subject *he* and the verb *is* in these questions. Therefore, I exclude questions that have null subject when analyzing Luna's *yes/no* questions. Out of Luna's 46 *yes/no* questions, 10 questions are found to have null subject. I checked the remaining 36 *yes/no* questions, and found that all questions are formed by declarative word order without inversion, as in (103) and (104). It means that these questions are all target-like in Mandarin and there is no evidence of cross-linguistic influence from English to Mandarin.

Figure 9 shows that the pattern of *yes/no* questions in Mandarin is similar to that of English. The proportion of *yes/no* questions increases in the first few months, reaching the peak 57% at the age of 4;02. Then it started to fall back with some fluctuations for the remaining nine months. The average proportion of *yes/no* questions in Mandarin is around 25%, which is 10% higher than that of English. The probable reason is that declarative questions are categorized into a separate group in English, which makes up 10% of total questions, while they are included in *yes/no* questions in Mandarin because declarative questions are exactly one grammatical form of *yes/no* questions in Mandarin.

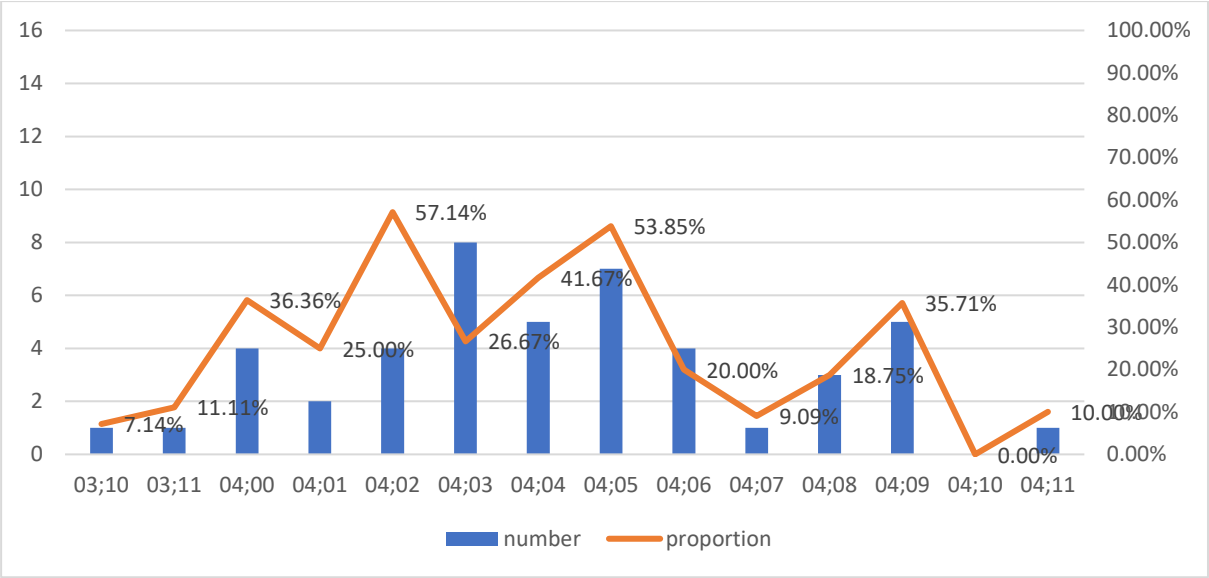

Figure 9- The numbers and percentage of yes/no questions in Luna's Mandarin corpus.

4.3.2 Wh- questions

Table 14 presents the numbers and the percentages of Luna's *wh*- questions in Mandarin. Frozen phrases such as *zenme gao de* "How it works?" are excluded since they are learned as chunks. It is clear in Table 14 that *wh*- questions are produced from the very beginning and are present in almost all files except for 04;10. In total, there are 57 *wh*- questions in Luna's Mandarin files between 03;10 and 04;11.

age	number	proportion		age	number	proportion
03;10	6	42.86%		04;05	3	23.08%
03;11	3	33.33%		04;06	4	20.00%
04;00	3	27.27%		04;07	7	63.63%
04;01	3	37.50%		04;08	4	25.00%
04;02	1	14.29%		04;09	3	21.43%
04;03	15	50.00%		04;10	0	0.00%
04;04	4	33.33%		04;11	1	10.00%

Table 14- The numbers and percentage of wh- questions in Luna's Mandarin corpus.

(106) and (107) are examples of Luna's *wh*- questions in Mandarin.

(106) ni shuo shenme ?

You say what?

What do you say? (Luna Mandarin 03;11;12)

(107) zenme shi zhongwen?

How come (it) is Chinese?

How come is it Chinese? (Luna Mandarin 04;04;19)

Like *yes/no* questions, Luna's *wh-* questions in Mandarin have null subject as well. Out of Luna's 57 *wh-* questions in Mandarin, 7 questions have null subject. For example, the pronominal subject *it* is omitted in (107). We cannot judge whether Luna used inversion of the subject and the auxiliary in these questions, since the subjects are absent. However, the remaining 50 *wh-* questions which have overt subjects are all formed by declarative word order without inversion and no *wh-* movement is found in these questions. It means that all 50 *wh-* questions are target-like and there is no evidence showing cross-linguistic influence from English to Mandarin.

Figure 10 illustrates the numbers and the percentages of Luna's *wh-* questions in Mandarin. Similar to *wh-* questions in English, the line of *wh-* questions in Mandarin has two peaks at the age of 04;03 and 04;07. This is likely due to that fact that Luna was more talkative in these recordings and asked more *wh-* questions, regardless of the language. However, the percentage of *wh-* questions drops sharply from 63.63% at 04;07 to less than 10% at 04;11. It can be explained by Luna's increasing use of embedded questions, since many *wh-* questions are found to be included in another question, such as *ni zhidao ma* (Do you know?) in the later files. Overall, the average proportion for *wh-*questions in Mandarin is around 29%, very close to the average proportion of that in English.

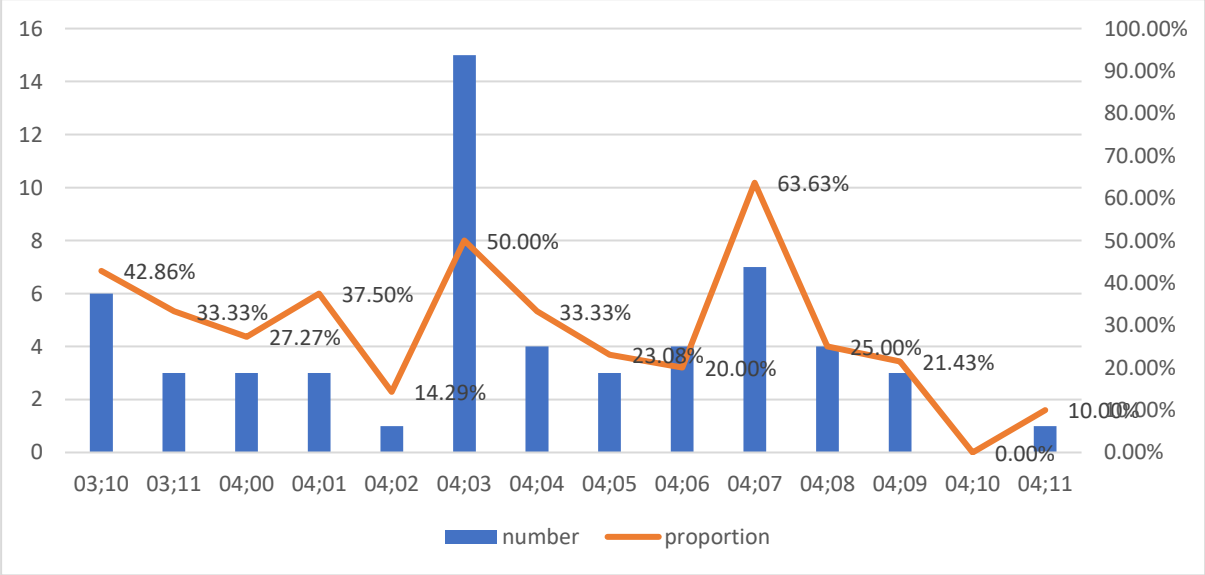

Figure 10- The numbers and percentage of wh- questions in Luna's Mandarin corpus.

To sum up, Luna's *yes/no* questions and *wh*- questions in Mandarin are all target-like. There is no evidence showing cross-linguistic influence from Luna's English to Mandarin.

5 Discussion

In this section, I will summarize my major findings and address the research questions separately that I proposed in section 3. I will also discuss the results in relation to the previous studies and acknowledge the limitations of my research.

5.1 Major findings and implications

In this study, I investigated the English-Mandarin bilingual child Luna's corpus, which is obtained from CHILDS database. I selected 28 recordings in English and Mandarin (14 recordings in each language) between the ages of 03;10 and 04;11. As part of my investigation, I computed MLU values in both languages by using CLAN program based on the transcripts selected for analysis. I also searched for all English questions produced by Luna and categorized them into different question types. Then I conducted both qualitative analysis of the data, i.e. analyzing non-target-like structures and comparing them with both adult English and Mandarin, as well as quantitative analysis, i.e. calculating the proportion of different question types and the frequencies of non-target-like structures, of these questions. In order to investigate the cross-linguistic effects from English to Mandarin, I also searched for Luna's *yes/no* questions and *wh*- questions in Mandarin, because these question types have different word order patterns in Mandarin and English and may thus be an area where cross-linguistic influence can occur.

My investigation includes three major findings: 1) Luna's MLU patterns in English and Mandarin show that her language grows steadily and rather similarly in both languages. Thus, she seems to be rather balanced in both languages between the ages of 03;10 and 04;11. 2) Luna has acquired *single word, declarative, yes/no* and *wh*- questions by the end of the examination period, the age of 04;11, but she was still acquiring embedded questions by the age of 04;11. 3) There is little evidence showing cross-linguistic influence from Mandarin in Luna's acquisition of *wh*- questions in English or influence from English in her acquisition of *wh*- questions in Mandarin.

In the following paragraphs, I will discuss the implications of these findings and address the research questions separately.

RQ1: What are the characteristics of Luna's language development in terms of MLU in the two languages between the ages of 3;10-4;11? Are there signs of languages dominance?

Luna's MLU results indicate that both her English and Mandarin develop steadily from 03;10 to 04;11, with MLU in English rising from 3.023 at the age of 03;10 to 5.636 at the age of 04;10, and MLU in Mandarin from 3.656 at 03;10 to 6.235 at 04;10. Within a year, Luna's MLU in English has increased 2.613 units and her MLU in Mandarin has increased 2.579 units, indicating that both languages develop at similar rates during the period of investigation. However, the MLU values in English and Mandarin do not always increase monotonically, there are also drops in the process of development. For example, the MLU value in English decreases from 4.421 at the age of 04;03 to 2.963 at the age of 04;04, and from 4.84 at 04;08 to 3.056 at 04;09. The MLU value in Mandarin drops from 4.54 at 03;11 to 2.309 at 04;00, and from 5.646 at 04;04 to 4.138 at 04;07. Both languages have experienced two major drops between the ages of 03;10 and 04;11, and the drops in English and Mandarin did not occur synchronously. This could be caused by Luna's temporary dominance in one language over the other, but it could also be due to some other reasons. For example, it is possible that Luna was simply less talkative on those occasions which may have resulted in fewer utterances. It should be noted that MLU drops can be also found in monolingual children's development. For example, Figure 11 from Brown (1973) demonstrates that MLU drops occurred in the data of three monolingual English children.

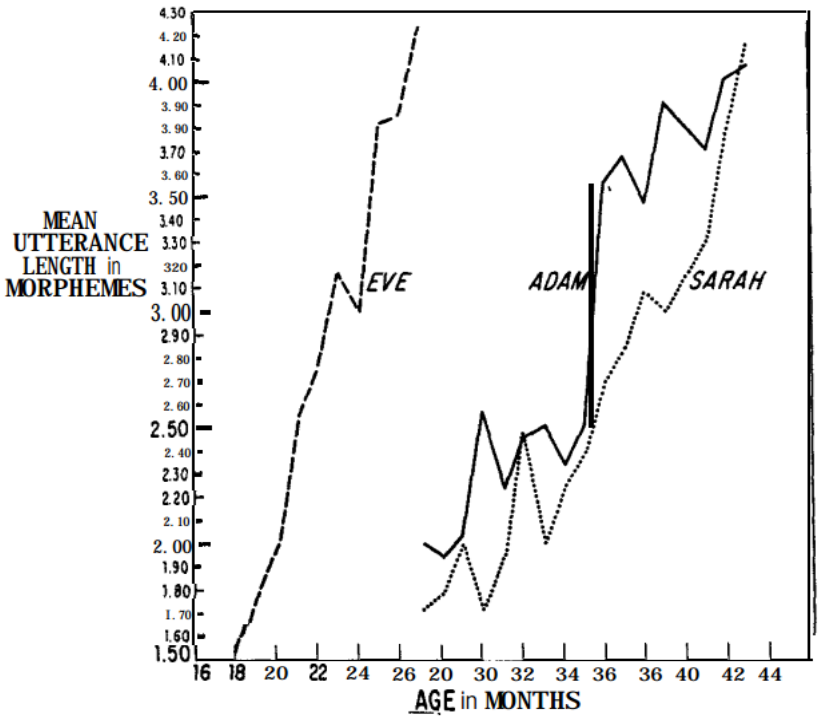

Figure 11 - MLU and chronological age for three monolingual English children from Brown (1973)

One major goal of this study was to investigate whether there is cross-linguistic influence between Luna's English and Mandarin. Since many studies have reported cross-linguistic influence from a dominant to a less dominant language (Gawlitzek- Maiwald & Tracy, 1996; Hulk and van der Linden, 1996; Döpke,1997; Yip & Matthews, 2000), it was necessary to measure Luna's language dominance. Among several measures of early language development such as Upper Bound (length of the longest utterance in a given sample), Multi-word (or morpheme) Utterances (percentage of utterances containing more than one word/morpheme) and so on, MLU is considered by Yip and Matthews (2006) as the most objective indicator of a child's linguistic development, and hence of language dominance. Their earlier study from 2000 also shows a close correlation between the occurrences of *wh-in-situ* structures and the bilingual child Timmy's dominance in Cantonese over English in terms of MLU patterns. Therefore, I believed that Luna's MLU results can be used to measure her language dominance. Luna's results show that there is considerable overlap in the MLUs between her English and Mandarin, suggesting that Luna is rather balanced in the two languages between 3;10 and 4;11. This supports Döpke's findings (1992) that the amount of input plays a major role in determining language dominance, since Luna received considerable amount of exposure to both languages in early childhood. In this study, I chose MLUm to measure Luna's language dominance, which solves the problem when using MLUw to measure dominance, that Chinese language, both Mandarin and Cantonese, is not a perfect isolating language. However, another inflationary factor, sentence final particles in Mandarin, is not resolved by MLUm. I adjusted the MLU values in Mandarin but it is not clear how much Luna's MLU in Mandarin is inflated. The limitation of this study is that Luna's MLU pattern in Mandarin is an estimated line, instead of an accurate line based on the MLU values that exclude the influence of sentence final particles.

Since the main initial focus of my investigation was the acquisition of questions in English at early stages, I have studied the stages of acquisition of questions. This was necessary because previous research conducted by Yip and Matthews (2000) has compared the bilingual child Timmy's development with monolingual development to ascertain the degree of similarity and difference, and thus to determine whether there is cross-linguistic influence. Therefore, I studied Luna's different stages of the acquisition of English questions to see how Luna's development corresponds to that of monolingual English-speaking children studied in the seminal works on child language development, e.g. Brown (1973). Although the primary focus of this study was English questions, as my research progressed, it was not enough to only study

Luna's English questions. Since cross-linguistic influence can be bilateral and it is not clear which of the Luna's two languages is the dominant one, it was necessary to investigate Luna's Mandarin questions to determine whether there is influence from English. The results of Luna's acquisition of English and Mandarin questions are discussed below in relation to each research question.

RQ2: What question types does Luna produce in English between the ages of 3;10 and 4;11? What question types has she acquired?

Luna produced five types of English questions in total between the ages of 3;10 and 4;11. They are *single word*, *declarative*, *yes/no*, *wh-* and *embedded* questions. During the period, Luna produced 43 single word questions and all of them are considered target-like, because English-speaking adults produce single word questions as well. Declarative questions were produced only 7 times by Luna. Although there are two rather long declarative sentences, they are also considered target-like, because according to the context, they were used to express confirmation and it is acceptable in English. *Yes/no* questions occur 32 times in total and 2 questions were found to be non-target-like. However, given that the number of non-target-like questions is less than 3 and the frequency of such questions is only 6.25%, it is considered that Luna has acquired *yes/no* questions before the start of the recording. Luna produced 34 *wh*-questions in total. Before the age of 04;08, 9 out of 42 (21.43%) *wh*-questions are non-inverted, but all 14 *wh*-questions produced after the age of 04;08 are target-like. It is therefore inferred that *wh*-questions were acquired at around the age of 04;08. Her MLU value at the time is around 4.1, indicating Luna was in Stage V (MLU 3.75-4.5) according to Brown's (1973) sequence of five stages. Since monolingual children also stabilizes inversion in Stage V, Luna seems to acquire *wh*-questions similar to monolinguals. Embedded questions occurred 36 times in total, but only 14 embedded questions were produced with auxiliary verb and can be used to judge grammaticality. Eleven out of 14 (78.57%) embedded questions were found to be non-target-like. It is thus concluded Luna has not acquired embedded questions by the end of the recording. Overall, Luna acquired *single word*, *declarative* and *yes/no* questions first, followed by *wh*-questions which was acquired at around the age of 04;08. By the end of the recording, Luna was still acquiring *embedded* questions. The acquisition order of English questions by Luna is in line with the sequence of five stages proposed by Brown (1973). As Luna's English develops, her use of complex structures increases such as her production of *embedded* questions, rising from an average of 10% in the first two months to an average of 40% in the last two months, while the use of *single word* questions decreases, falling from an average of 57.5% in

the first two months to an average of 17.5% in the last two months This is illustrated in Figure 12. Luna's early production of *embedded* questions also shows that the start of the acquisition of higher stage structures does not wait until the child completes the acquisition of lower stage questions. Instead, a child may start acquiring more complex questions even before he or she completes the acquisition of simpler questions. The limitation here is that the number of each type of English questions is no more than 50, which is relatively low. This is especially the case for *embedded* questions. The average number of *embedded* questions in each file is less than two, and the number of target-like *embedded* questions in each file is either one or zero, which means the accuracy of target-like embedded questions in Luna's files is either 0% or 100%. Therefore, the data is not sufficient to prove Luna has not acquired embedded questions by the end of the recording.

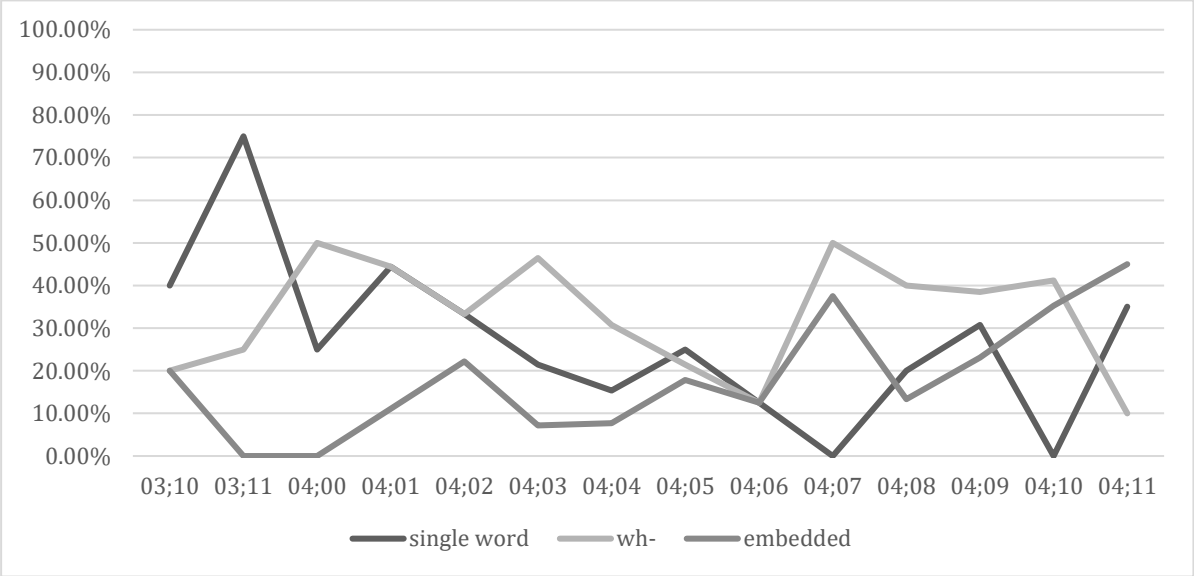

Figure 12 - The percentages of different question types in Luna's corpus.

Finally, I will discuss the results in relation to RQ3 and RQ4 and the two main hypotheses that I investigated in the present study.

RQ3: Is there evidence of cross-linguistic influence from Mandarin in the acquisition of *wh*-questions in English? If yes, can the observed pattern be explained by her overall language development in terms of MLU?

RQ4: Is there evidence of cross-linguistic influence from English in the acquisition of *wh*-questions in Mandarin? If yes, can the observed pattern be explained by her overall language development in terms of MLU?

The Separate Development Hypothesis proposed by De Houwer (1990, 2005) holds that when the two languages are acquired very early in life each language develops separately. In contrast, the Interdependent Development Hypothesis (Döpke 2000; Hulk and Müller 2000; Paradis and Genesee 1996; Yip and Matthews 2007) argues that bilinguals' two languages can influence each other and that the weaker language is more vulnerable to cross-linguistic influence from the dominant language. As a result, bilingual's language development in the weaker language can be delayed or there can be some qualitative changes. To study the hypotheses, I paid special attention to Luna's *yes/no* questions and *wh*-questions in English and Mandarin, because these types of questions have different word orders, described in Section 2.1, and thus are more vulnerable to influence. English has subject-auxiliary inversion in both types of questions, while Mandarin does not. In addition, English has *wh*-movement, while Mandarin has no overt movement. Peng's (1998) study show that the frequency of *wh-in-situ* structure in monolingual English-speaking child Eve's files (Brown 1973) is 1.1%, aged 01;08-02;00, and the two instances of *wh-in-situ* questions are echo questions. Stromswold (1995) also found that, apart from echo questions, there are no clear examples of *wh-in-situ* structures in twelve monolingual English-speaking children in the CHILDES database. Therefore, if non-echo *wh-in-situ* questions appear more frequently than monolingual children, it can be considered systematic and thus the evidence of cross-linguistic influence from Mandarin. I also investigated Luna's *wh*-questions in Mandarin to see if there is evidence of *wh*-movement and subject-auxiliary inversion which are found in English.

Luna's results show that only one *wh*-question in English is in-situ, which is not enough to be considered as systematic. It means that there is little evidence showing cross-linguistic influence from Mandarin in Luna's acquisition of *wh*-questions in English. In addition, all *wh*-questions in Mandarin are in-situ with no overt *wh*-movement, meaning there is no evidence of cross-linguistic influence from English to Mandarin. Thus, Luna's use of question structures in English and Mandarin supports the Separate Development Hypothesis proposed by Houwer (1990, 2005) which argues that is when the two languages are acquired very early in life, each language develops separately without interaction. These results can also be interpreted as evidence against the Interdependent Development Hypothesis (Döpke 2000; Hulk and Müller 2000; Paradis and Genesee 1996; Yip and Matthews 2007), because there is no interaction

between Luna's English and Mandarin in the acquisition of *wh-* or yes/no questions during the period of development investigated in the present study. These results are in contrast to the results in Yip and Matthews (2000) who studied a Cantonese-English bilingual child Timmy. In their study, the percentage of *wh-in-situ* questions in Timmy's English was as much as 67.6%. At the same time, a follow up study by Yip and Matthews study (2007) showed that there is considerable amount of variation among Cantonese-English bilinguals and the use of *wh-in-situ* questions can be low in other children. Timmy, Sophie, Alicia and Lywelyn, who are Cantonese dominant children, produced *wh-in-situ* questions rather frequently, ranging from 31.2% to 92.3%. However, there were only 2 *what-in-situ* questions found in Kathryn and Charlotte's data, with the percentage of 13.3% and 25% separately. Thus, the data from Luna analyzed during a short period of language development may not be sufficient to make a reliable conclusion about CL effects in the acquisition of word order in question, especially given that Luna appears to be balanced in her two languages during that time. I come back to this issue in the next section.

5.2 Study Limitations

The study has several limitations that could have affected the results in important ways.

1. The subject of present study is one English-Mandarin bilingual child. This number is not sufficient, since previous studies have shown that there is individual variation in the acquisition of questions among child bilinguals. For example, in Yip and Matthew's study (2007) of six bilingual Cantonese-English children, all six children produced *wh-in-situ* questions to varying degrees. Timmy, Sophie, Alicia and Lywelyn, who are Cantonese dominant children, produced *wh-in-situ* questions rather frequently, ranging from 31.2% to 92.3%. However, there are only 2 *what-in-situ* questions found in Kathryn and Charlotte's data, with the percentage of 13.3% and 25% separately. Although both Luna's MLU development and the acquisition of *wh*-questions show that Luna's English and Mandarin develop separately without interaction, it would be more convincing to include more English-Mandarin children in the study.

2. The study is also limited to a short period of development between the age of 03;10 and 04;11. Thus, the data is very restricted in scope. This is especially the case in addressing RQ2. Out of five question types produced by Luna, three types, *single word*, *declarative* and *yes/no* questions are found to have been acquired before the start of the recording. It is not clear when exactly they were acquired, so it is not possible to

compare the development of these types of questions with monolingual English-speaking children. In addition, the number of *embedded* questions produced by Luna during the period is very low, with an average of two *embedded* questions per file. It is thus impossible to say whether Luna has acquired *embedded* questions by the end of the studied period of development. Although the order of Luna's acquisition of different questions types and the development of *wh*-questions are in line with monolingual English children's development, the study would be more comprehensive if I could include data from earlier and later stages of development.

In conclusion, despite the limitations of individual difference and lack of data on Luna's acquisition of different question types, Luna's acquisition of questions in English and Mandarin suggests that the two languages develop separately without interaction, supporting the Separate Development Hypothesis. However, the results of this study cannot refute the Interdependent Development Hypothesis, because the data is limited in scope. Therefore, future research is needed to study more English-Mandarin children who have varying proficiency in the two languages and who can be studied for a longer period of time (at early and later stages of acquisition).

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Appendix

Luna’s English questions between the ages of 03;10 and 04;11

031015

*CHI: why he can't go outside ?

*CHI: <baby can't> [<] [//] <baby how to> [//] baby don't know how to do talk .

031022

*CHI: like on my ear ?

*CHI: can I say her have a one Teddy_bear too ?

031117

*CHI: why?

*CHI: why?

*CHI: what's that ?

*CHI: what happened to mummy's shirt ?

040029

*CHI: this?

*CHI: you say this ?

*CHI: who calling me again ?

*CHI: why you sing about it ?

040107

*CHI: no?

*CHI: who is that ?

040128

*CHI: why?

*CHI: why?

*CHI: why?

*CHI: what is that ?

*CHI: who say no to me too ?

*CHI: what happened to Elsa here ?

*CHI: what is that ?

*CHI: I don't know what he doing .

040204

*CHI: why?

*CHI: not a Let_it_go ?

*CHI: do you see them ?

*CHI: what's that ?

*CHI: hey , who [//] what her name call ?

*CHI: Look, he is doing what.

*CHI: hey , where is you go ?

*CHI: I don't know what they are doing .

*CHI: I don't know what he doing now .

040300

*CHI: <Elsa , come here> [>] ?

*CHI: <where's Elsa> [>] ?

*CHI: <what's that called> [<] ?

*CHI: why we have four Elsa ?

*CHI: <Elsa , where are you> [>] ?

040307

*CHI: what happy_birthday

*CHI: ee , that's Olaf like me ?

*CHI: *CHI: is that Bubu?

*CHI: is that Sasa ?

*CHI: do you wanna [: want to] see that really funny things ?

*CHI: do you wanna [: want to] see another one funny ?

*CHI: do you wanna [: want to] see my [x 4] beautiful dance ?

*CHI: <do you wanna [: want to] see my toys> [<] ?

*CHI: where's the radio ?

*CHI: hey , who's that ?

*CHI: who's that ?

*CHI: where you are ?

*CHI: ew , who play in the mud ?

*CHI: <who's birthday again> [<] ?

*CHI: and look , aya , <oh, what is that> [>] ?

*CHI: <what is that , a marshmallow> [>] ?

*CHI: where is it ?

*CHI: where are you ?

*CHI: who is that ?

*CHI: and who is that ?

*CHI: who is happy_birthday .

*CHI: <I don't know who is that> [>] .

*CHI: I don't know who is that .

040419

*CHI: cookie ?

*CHI: we where's Hello_Kitty's daddy and grandpa and grandma ?

*CHI: no , where is George ?

*CHI: I wanna [: want to] see what's in there .

040425

*CHI: and [/] and the baby is boy ?

*CHI: she's a girl ?

*CHI: everybody can sit right here too ?

*CHI: everybody can sit right here too ?

*CHI: Do_you_wanna_built_a_snowman [=! sings] ?

*CHI: do anybody need to go potty ?

*CHI: you say what ?

*CHI: <why they only> [//] why they have name ?

*CHI: who is that ?

040509

*CHI: all right?

*CHI: <you say buy> [<][/] you say buy something to the party eat ?

*CHI: you say Peppa pig and her mummy and her daddy buy something to go to party to eat ?

*CHI: did we have apple sauce ?

*CHI: so do you want see this ?

*CHI: you say what ?

*CHI: okay , I will show it to you how to play all right , this way .

040516

*CHI: what?

*CHI: horse?

*CHI: all rihgt?

*CHI: ah , you know ?

*CHI: yes , do you wanna [: want to] see it ?

*CHI: do you wanna [: want to] see it ?

*CHI: why this not coming out ?

*CHI: who is this ?

*CHI: hey , where are you ?

*CHI: I know how to write my baby name .

*CHI: <yes , I need> [//] yes , I know how to use it .

040523

*CHI: what?

*CHI: all right?

*CHI: some [>] ?

*CHI: <is that> [/] is that baby boy's baby ?

*CHI: can we open again ?

*CHI: <can we open the really big> [<] ?

*CHI: why you looks like a monster , go like this ?

*CHI: <who is that> [<] ?

*CHI: let me ask who is that ?

*CHI: so I don't know who is that .

040613

*CHI: is she a bad guy ?

040626

*CHI: but how?

*CHI: <is she> [<] [/] is she can hear Ariel sound ?

*CHI: do you know I go to school and then I made a mermaid too ?

*CHI: can I see a sleeping beauty ?

*CHI: <can I see the> [/] can I see the book ?

*CHI: no , how they get in ?

*CHI: do you know I go to school and then I made a mermaid too ?

040710

*CHI: <do you> [/] do you know Benjamin know Ursula ?

*CHI: <how you do that> [<] ?

*CHI: <what is> [/] what is it ?

*CHI: where is the Magic_school_bus books ?

*CHI: and then what is that book ?

*CHI: <I don't know> [<] how to kill her .

*CHI: unh , I know who kill the bad guy .

*CHI: me [/] me either , I don't know what it's called .

040807

*CHI: <a bunny> [<] ?

*CHI: yeah , she [//] and do you know she's like this ?

*CHI: <wanna [: want to] this Snow_White> [>] ?

*CHI: how about I just draw <on the> [//] on [/] on the table , and you go on the table .

*CHI: who is it ?

*CHI: <what is this guy> [<] ?

040821

*CHI: see?

*CHI: all right?

*CHI: you mean the [/] the Eric ?

*CHI: can you see it ?

*CHI: how about we draw mermaid ?

*CHI: you say what ?

*CHI: can we what ?

*CHI: but I don't know how to read it .

*CHI: I don't wanna [: want to] say English <in house> [>] .

040904

*CHI: like Star_Wars books ?

*CHI: Jedi ?

*CHI: what ?

*CHI: <do you> [/] do you have a lot of Star_Wars book ?

*CHI: okay , how about you skip a book out of here ?

*CHI: who is going up the stairs ?

*CHI: what should we do now ?

*CHI: okay , my dad what are you doing ?

*CHI: I don't know , but I know who's that guy .

*CHI: I don't know how to do that .

*CHI: she's [//] <I know who is> [/] I know who is in Star_wars .

040918

*CHI: <where where> [/] where ?

*CHI: anyway , what is that ?

041016

*CHI: she's a good guy ?

*CHI: now can I see the same page ?

*CHI: can I see the next page ?

*CHI: is she's a good guy ?

*CHI: then how do I gonna [: going to] go in the ocean , silly ?

*CHI: then how do I gonna [: going to] have a tail ?

*CHI: I [//] because how do I gonna [: going to] have a tail ?

*CHI: how do you gonna [: going to] do that anyway ?

*CHI: who [<] is that guy ?

*CHI: where are the Jedi ?

*CHI: ah , who is Jedi then ?

*CHI: I know who is that , Ursula .

*CHI: I don't know what is gonna [: going to] to happen next .

*CHI: I don't know who is the Jedi .

*CHI: I know how to spell Star_wars .

*CHI: I know how to spell I'm an a Jedi .

*CHI: <let me see how> [//] let me think how do I'm gonna [: going to] to spell dog .

041106

*CHI: McDonalds ?

*CHI: ready [<] ?

*CHI: shupple [: shuffle][*] what ?

*CHI: Snow_white ?

*CHI: <beauty and the beast> [<] ?

*CHI: something the beast [=! laughs] ?

*CHI: mermaid [<] ?

*CHI: can you just do Peter_pan and don't do the rest of it ?

*CHI: but can I see the next one ?

*CHI: <where is Spider_man going> [<] ?

*CHI: <what is Peter_pan> [>] ?

*CHI: <it's look at> [//] it's just look at guess what is the next book .

*CHI: <but I just don't know what is the name of it> [>] .

*CHI: can I see what book it is ?

*CHI: <but do you know> [<] one of my friend has that book ?

*CHI: I know what book is next.

*CHI: <I don't know where the Spider_man going> [>] .

*CHI: but do you know I [/] I know one of the book , all_hands_on_desk [: deck][*] .

*CHI: but [/] but do you know one day I went to McDonald , and I got something was so funny .

*CHI: but do you know one day the prince cut off her wings .

Luna’s yes/no and wh- questions in Mandarin between the ages of 03;10 and 04;11

031013

*CHI: 哎呀 你 怎么 看 不 到 呀 ?

*CHI: 哪 一 个 是 Anna@s Elsa@s ?

*CHI: <你 在 干 什么> [>] ?

*CHI: 这 都 是 在 哪里 ?

*CHI: 那 这 是 在 哪里 放 的 ?

*CHI: 那 在 哪儿 ?

*CHI: 是 假 的 还是 真 的 ?

031112

*CHI: 嘿 , 谁 放 马甲 了 ?

*CHI: 嘿 , 谁 放 马甲 <在 我 旁边> [//] 在 我 后边 啦 ?

*CHI: 你 说 什么 ?

*CHI: 我 [x 4] 想 要 见 米老鼠 , 是 不 是 不 在 ?

040022

*CHI: 对 滴 , 给 这个 蛇 穿 吗 ?

*CHI: 这个 是 麦子 阿姨 给 我 的 吗 ?

*CHI: <那 是> [/] 那 是 那些 小 动物 包 着 礼物 然后 送 给 它 了 吗 ?

*CHI: xxx 谁 能 救 它 ?

*CHI: 啊 , 是 要 哪个 呢 ?

*CHI: 蛋糕 去 哪儿 了 ?

040105

*CHI: 妈妈 那 [/] 那 女 的 人 好 高 的 那 人 是 老师 吗 ?

*CHI: 对 , 然后 [/] 然后 她 的 名字 是 什么 ?

*CHI: 它们 [/] 它们 [//] 它 [//] 我 想 要 这个 , 这个 有 没 有 讲 过 ?

*CHI: <这 是 什么> [<] ?

040215

*CHI: <待会儿 你 可以> [<] 再 给 我 这 几 个 吗 ?

*CHI: Sophia@s:eng 姐姐 生病 了 , 她 去 看 医生 吗 ?

*CHI: 人 也 是 吗 ?

*CHI: <人 也 冻 住 了 吗> [<] ?

*CHI: 她 换 裙子 , 怎么 换 裙子 了 ?

040321

*CHI: 她们 都 在 哪儿 ?

*CHI: 为什么 姐姐们 都 在 学校 里 呀 ?

*CHI: 我 怎么 听 到 有 人 说话 ?

*CHI: +, 可是 被子 怎么 像 我 姥姥 姥爷 的 被子 ?

*CHI: 它 怎么 这么 吵 呀 ?

*CHI: 嘿 我 怎么 听 到 有 人 呼噜 [/] 呼噜 的 ?

*CHI: &na 诶 我 怎么 能 在 镜子 里面 看到 床 ?

*CHI: 对 , 我 咋 能 在 那个 镜子 里 看到 爸爸 妈妈 [>] 的 床 ?

*CHI: <他 是 小 baby@s:eng 吗> [>] ?

*CHI: 他 自己 出去 玩 吗 ?

*CHI: 你 想 看 吗 ?

*CHI: 哎呀 怎么 坏 了 ?

*CHI: 你 想 看 吗 ?

*CHI: 哎呀 怎么 又 坏 来 坏 去 ?

*CHI: <哎呀 我 小 妹妹 去 哪儿 了> [<] ?

*CHI: 谁 抱 走 她 了 ?

*CHI: 别 打 个 死 结 对不对 ?

*CHI: 诶 [<] 你 看 我 干 啥 呢 ?

*CHI: 因为 弟弟 也 想 看 吗 ?

*CHI: Sophia@s:eng 姐姐 和 另 [/] 另外 一 个 姐姐 都 去 哪儿 了 呀 ?

*CHI: 嗯 , 想 , 可是 她们 在 哪儿 呀 ?

040419

*CHI: 啊 怎么 是 中文 ?

*CHI: 对 , 那 是 好 王子 吗 ?

*CHI: 啊 Anna@s:eng 是 不 是 有 一点点 矮 呀 ?

*CHI: <是 坏 的 吗> [<] ?

*CHI: 是 不 是 坏 的 ?

*CHI: 为什么 危险 呀 ?

*CHI: 你 怎么 冻 [//] <都 冻 起 来 了> [>] ?

*CHI: 可 她 为 啥 把 那些 人 <给 冰> [//] 给 冻 起 来 了 ?

*CHI: <她 就是 想> [<] [/] 她 就是 想 把 那些 房子 给 冻 起 来 吗 ?

040509

*CHI: 你 想 看 一 看 吗 ?

*CHI: 他 是 坏 的 吗 ?

*CHI: 为什么 [/] 为什么 这个 爸爸 对 Ariel@s 很 不 好 呀 ?

*CHI: 他 就 会 淹 死 了 吗 ?

*CHI: 他 是 好 的 吗 ?

*CHI: 是 坏 的 吗 ?

*CHI: 怎么 有 人 跟 我 说话 ?

*CHI: 做 得 起 来 吗 ?

*CHI: 王子 爱 她 了 吗 ?

*CHI: 为什么 Anna@s 头 朝 下 了 ?

040613

*CHI: 现在 好 了 吗 , 可以 现在 搞 了 吗 ?

*CHI: 你 给 我 把 cheese_stick@s:eng 给 放 哪儿 了 ?

*CHI: 忙 什么 东西 呀 ?

*CHI: 你 知 不 知道 呀 ?

*CHI: 对 , 这个 到底 是 怎么 回事儿 呀 ?

*CHI: 我们 就 看 书 吧 好不好 哇 ?

*CHI: 他 [<] 是 坏 的 吗 ?

*CHI: 哎 [<] 那儿 也 有 啊 ?

040724

*CHI: 可是 Cinderella@s:eng 是 什么 东西 呀 ?

*CHI: 可是 [/] 可是 Belle@s:eng 是 谁 ?

*CHI: <为什么 你 说 这 小> [<] 王子 呀 哈 ?

*CHI: 她 干 啥 呢 ?

*CHI: 她 到底 要 干 啥 呢 美人鱼 呀 ?

*CHI: 那个 美人鱼 怎么 莫名其妙 的 ?

*CHI: 是 鳗鱼 吗 ?

*CHI: <为什么 我 没> [<] 有 看到 那个 [>] 美人鱼 的 爸爸 跟 那个 坏人 一起 打架 呀 ?

040821

*CHI: <啊 你 现在 怎么 变 得> [<][//] 你 现在 怎么 变 白色 啦 ?

*CHI: 可 我们 家 有 没 有 那 动画片 ?

*CHI: 你 喜 不 喜欢 每 一 个 ?

*CHI: 他们 现在 害怕 吗 ?

*CHI: 这 是 谁 的 ?

*CHI: 那个 Sophia@s 去 哪儿 了 ?

*CHI: 你 怎么 忘 来 <忘 去 的> [>] ?

040918

*CHI: 嗯 , 你 说 什么 ?

*CHI: 那 你 应该 干 啥 ?

*CHI: 妈 , 可以 摸 吗 ?

*CHI: 妈妈 , 如果 这个 指甲油 干 了 , 我 可 不 可以 摸 ?

*CHI: 妈咪 你 有 没 有 ?

*CHI: <你 知道 吗> [<] ?

*CHI: <你 知道 吗> [>] ?

*CHI: 妈咪 , 有 一 个 字 是 什么 呀 ?

041106

*CHI: 你 跟 我 说 Halloween@s 吗 ?

*CHI: whoa@s , 怎么 跳 到 我 手 上 了 ?