

# QUESTIONS AND DISJUNCTION IN CHILD LANGUAGE

BY

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# TABLE OF CONTENTS

THESIS ABSTRACT .....	vii
DECLARATION .....	ix
ACKNOWLEDGEMENT .....	xi

## **CHAPTER 1: QUESTIONS, DISJUNCTION AND ACQUISITION..... 1**

1.1. Introduction.....	3
1.2. Continuity or discontinuity? – Children’s interpretation of yes/no questions with disjunction.....	6
1.3. Children’s scope interpretation in Mandarin questions.....	10
1.3.1. Scope relations in child language.....	12
1.3.2. Scope interpretation in Mandarin questions.....	13
1.4. The emergence of question particles in child Japanese.....	16
References.....	20

## **CHAPTER 2: CONTINUITY OR DISCONTINUITY?.....27**

Abstract.....	29
2.1. Introduction.....	30
2.2. Interpretations of yes/no questions containing disjunction.....	34
2.2.1. Cross-linguistic comparison of yes/no questions: Japanese and English.....	34
2.2.2. Japanese yes/no questions meet disjunction.....	38
2.2.3. Predictions for children’s interpretation of yes/no questions with disjunction.....	40
2.3. Experiment 1: Interpretation of yes/no questions with disjunction in Child Japanese.....	41
2.3.1. Participants.....	42
2.3.2. Types of question stimuli.....	42
2.3.3. Procedure.....	43
2.3.4. Coding.....	45
2.3.5. Results and discussions.....	47
2.4. Yes/no questions with disjunction in Mandarin Chinese.....	50
2.4.1. Two types of YNQs in Mandarin Chinese.....	50
2.4.2. Two Mandarin YNQs meet disjunction.....	53
2.5. Experiment 2: Interpretation of yes/no questions with disjunction in Child Mandarin.....	55
2.5.1. Participants.....	55
2.5.2. Procedures and Types of Question stimuli.....	55
2.5.3. Coding.....	57
2.5.4. Results and discussions.....	57
2.6. General Discussion.....	62
2.7. Conclusion.....	73
References.....	74

## CHAPTER 3: CHILDREN'S SCOPE INTERPRETATIONS IN MANDARIN QUESTIONS: ..... 81

Abstract.....	83
3.1. Introduction.....	84
3.2. Cross-linguistic variation in interpretation of disjunction.....	88
3.2.1. The syntax of scope.....	89
3.2.2. Cross-linguistic variation in scope.....	90
3.3. Children's interpretation of disjunction in negative statements.....	93
3.4. Disjunction in negative questions.....	96
3.5. Experiment.....	100
3.5.1. Experimental design.....	100
3.5.2. Participants.....	102
3.5.3. Procedures.....	103
3.5.4. Materials.....	105
3.5.5. Coding.....	109
3.5.6. Results and discussions.....	111
3.6. General Discussion.....	119
3.7. Conclusion.....	131
References.....	133

## CHAPTER 4: THE EMERGENCE OF QUESTION PARTICLES IN CHILD JAPANESE..... 139

Abstract.....	141
4.1. Introduction.....	142
4.2. Japanese question particles <i>ka</i> and <i>no</i> .....	145
4.3. The emergence of question particles: A corpus study.....	152
4.3.1. Participants.....	152
4.3.2. Findings.....	153
4.4. Proposal for the delayed emergence of Q-particles in wh-questions.....	163
4.5. Some alternative accounts for the delayed emergence of Q-particles.....	168
4.5.1. Usage-based models of language acquisition.....	169
4.5.2. Limited production account.....	170
4.5.3. Frequency account.....	174
4.6. How do children converge on the adult grammar?.....	176
4.6.1. Syntactic movement as a cue for grammar change.....	176
4.6.2. Obligatory Q-particle as a cue for grammar change.....	179
4.7. Concluding remarks.....	180
References.....	182

<b>CHAPTER 5: FINDING INNATE PARAMETERS</b> .....	189
5.1. Summary of the studies.....	191
5.2. Is there an innate parameter in the lexicon?.....	198
5.3. From child language to languages in the world.....	203
5.3.1. The overttness parameter.....	204
5.3.2. The Affixal parameter.....	206
5.3.3. The Focus parameter.....	209
5.3.4. Summary.....	216
References.....	218
<b>APPENDIX: COPY OF ETHICS APPROVAL</b> .....	225



# QUESTIONS AND DISJUNCTION IN CHILD LANGUAGE

## THESIS ABSTRACT

Two major theories stemming from nature vs. nurture debates are available in recent research of child language acquisition. This thesis is aimed at providing some empirical evidence that contributes to the ongoing debate between the two competing models of language acquisition, by investigating children's comprehension and production of questions and those containing disjunction words. The thesis consists of three sets of studies. Chapter 2 presents the cross-linguistic studies investigating children's comprehension of yes/no questions containing disjunction (i.e., *Did John drink coffee or tea?*) in Japanese and Mandarin Chinese. It is argued that the findings from this study are best characterised by the continuity hypothesis offered by nativist models of language acquisition (Crain & Pietroski, 2001, 2002). The second set of studies presented in Chapter 3 investigates children's scope interpretation of negation and disjunction in yes/no questions (i.e., *Did John not drink coffee or tea?*) in Mandarin Chinese. Working within the Parameter-setting framework (Chomsky, 1981), it is proposed that children's interpretation of these questions is determined by the setting of a focus parameter associated with disjunction words. In Chapter 4, we report cross-linguistic similarities in children's production of questions. By analysing three longitudinal child speech corpora, we found that some Japanese-speaking children go through the stage in which question particle *ka* or *no* appear in yes/no questions, but the same question particles do not appear in wh-questions. This stage is analysed to be the same developmental stage in which English-speaking children invert an auxiliary or modal verb in yes/no questions, but not in wh-questions (e.g., Klima & Bellugi, 1966). The closing chapter (Chapter 5) summarises the three sets of the studies, and discuss some issues left open from the previous chapters.





## DECLARATION

I certify that the work in this thesis entitled “**Questions and Disjunction in Child Language**” has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University. I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference number: HE24OCT2008-D06146L&P on 24 October 2008

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Nobuaki Akagi (Student No: 40205363)

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



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# **CHAPTER I**

**QUESTIONS, DISJUNCTION AND ACQUISITION**





## 1.1. Introduction

Children acquire a language in just a short period of time. But how do they do it? This question has been a central area of interest in child language acquisition research for decades. With respect to learnability considerations, there are at least three factors that are needed to be addressed in order to give a solution.<sup>1</sup> One factor is the primary linguistic data (PLD) which is indispensable for a language learner to acquire the local language. Children who acquire English require English sentences as their PLD, while those who acquire Japanese require Japanese sentences as their PLD. A second factor is the right hypothesis space of learning. The hypothesis space that is too wide or too narrow would not guarantee the successful acquisition of language. And, a third factor is the availability of constraints that define the hypothesis space of learning. Current research in child language acquisition have reached the consensus that the Skinnerian model of language acquisition with the view of the children's mind as *tabular rasa* would not succeed in explaining how children acquire language. In other words, there must have some constraints from the start. Taking these three factors into consideration, a viable account of language acquisition should be able to illustrate 1) how children utilize the PLD to learn a language; 2) what is the right hypothesis space of learning; and 3) what kind of constraints restrict the hypothesis space of learning.

Inquires into these three factors have proven divisive, however. The paramount area of debate concerns the question of how rich the PLD is for learning a language. One view assumes that children do not receive sufficient PLD to be able to acquire the abstract and intricate properties that are characteristic of human languages (Chomsky, 1968, 1971,

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<sup>1</sup> With biological considerations, Chomsky (2005) also offers three factors that should be considered in inquiring into language acquisition, which are different from ones listed here. They are: 1) genetic endowment, 2) experience, and 3) principles not specific to the faculty of language. I will discuss these factors more in Chapter 5.

1980). As a solution to the problem of learnability, it is hypothesized that the learner's hypothesis space must be significantly restricted in a certain way, and the restriction is attributed to innately specified linguistic knowledge; namely, a universal grammar.

Contrary to the nativist approach to language acquisition, an alternative view is more optimistic about the role of the PLD, and places greater emphasis on children's abilities of learning. This 'usage-based' view contends that the PLD is rich enough for learning any aspect of language by recruiting only general learning mechanisms (Bates & MacWhinney, 1982, 1989; Bybee, 1985, 2006; Elman, 1996; Goldberg, 1995, 2006; Lewis & Elman, 2001; MacWhinney, 2004; Perfors, Tenenbaum, & Regier, 2011; Reali & Christiansen, 2005; Saffran, Aslin, & Newport, 1996; Tomasello, 2000, 2003). This approach to language acquisition, which Goldberg (2006, p. 10) calls a 'what you see is what you get' approach, implies that the hypothesis space is broader than the hypothesis space assumed by nativists because the hypothesis space is only restricted by constraints that apply to across cognitive domains (Charter & Christiansen, 2009).

The present thesis is aimed at providing some empirical evidence that contributes to the ongoing debate between the two competing models of language acquisition. The focus of the study is children's comprehension and production of questions and/or disjunction words. Questions may be a unique property of human language. Requests for information from a communicative partner are claimed by some researchers to be unique to humans (Jordania, 2006; Premack & Premack, 1983). Likewise, disjunction in human language may also be unique. While disjunction can be used as a logical connective, as it is in logic or mathematics, disjunction is also used to express speaker's uncertainty about a state of affairs, and is used to establish possible outcomes. This usage does not correspond to the usage of disjunction in logic or mathematics. For example, a speaker uses disjunction *or* in "John will drink coffee or tea" because he/she is uncertain about which of the two

beverages John will drink. Therefore, investigating such unique properties to human language may offer insight into what is unique about human language and how unique the acquisition of human language is.

The organization of the thesis is as follows. We start with cross-linguistic studies aimed at adjudicating between the two competing models of language acquisition. These are presented in Chapter 2. There we report experimental findings that lend support to the nativist account. In particular, we argue that the hypothesis space of language learning is restricted in the way that is expected on the Principles and Parameters theory (Chomsky, 1981). The Principles and Parameters theory states that the principles apply universally, delimiting the hypothesis space for language learners, and parameters are invoked to explain some of the variation that appears across languages. In Chapter 3, still working within the Principles and Parameters approach, we investigate children's scope interpretation of negation and disjunction in Mandarin Chinese. This study is significant because it is the first attempt to look at the scope interpretations that are assigned to questions by Mandarin-speaking children. In Chapter 4, we shift our attention to children's productions. This study investigates the acquisition of question particles in Japanese. Although both of the studies in Chapter 3 and in Chapter 4 do not directly address the controversy between the two competing models of language acquisition, the empirical findings obtained from these studies more or less provide empirical support for the nativist account. Lastly, Chapter 5 concludes the thesis. In the remainder of the present chapter, we introduce each of the experimental studies in greater detail.

## **1.2. Continuity or discontinuity? – Children’s interpretation of yes/no questions with disjunction**

The studies in Chapter 2 were designed especially to adjudicate the two competing models of language development we sketched in the previous section. The competing approaches make different predictions about features of child language. These different predictions serve as the basis for the empirical assessment of the competing approaches.

For nativists, the major concern about language acquisition is how children come to know abstract structures, which are not marked on the surface strings of words. This concern leads to the famous argument of the poverty of the stimulus (Chomsky, 1968, 1971, 1980). The conclusion that nativists reach, based on this argument, is that abstract structure is known by children in advance of experience, as part of the innate language faculty, namely the theory of Universal Grammar (UG). For one thing, UG is taken to consist of invariant linguistic principles, i.e., universal properties that are characteristic of all human language. In addition, UG contains parameters, which are used to explain certain aspects of language variation (Chomsky, 1981). Both principles and parameters circumscribe what counts as a possible human language, thereby ensuring that there is continuity between child and adult grammars (Crain, 1991; Crain & Pietroski, 2001, 2002; Hyams, 1986; Pinker, 1984). The development of grammar is viewed as consisting in assigning one of the binary options to each of the finite parameters, based on the primary linguistic data (PLD) (Chomsky, 1981; Crain, 1991; Crain & Pietroski, 2001, 2002).

Given this theoretical assumption, Crain and Pietroski (2001) introduced an interesting prediction about certain features of child language. This prediction is relevant to distinguishing between the two competing approaches. Until children have selected the parameter values that are consistent with the local language, they may adopt parameter

values that are not attested in the target language. Considering the continuity between child and adult language, children's non-adult ('incorrect') parameter settings should be attested in possible human languages, including languages spoken elsewhere around the world. If so, then there is a possibility that children speak a fragment of a 'foreign language' at some early stages of language development. Crain and Pietroski (2001, p. 178) describes this prediction as following:

[I]nnate linguistic principles define a space of possible human languages – a space the child explores, influenced by her environment, until she stabilizes on a grammar equivalent to that of adults in her linguistic community. If this is correct, then at least as an idealization, language acquisition is a process of language change. At any given time children are speaking a possible human language, just not the language spoken around them.

Usage-based models of language acquisition, by contrast, make different predictions about features of child language, including children's non-adult language. Rather than assuming that there is continuity between adult and child language, the usage-based approach contends that children's linguistic knowledge is accrued gradually, using general-purpose learning mechanisms (Bybee, 1985, 2006; Goldberg, 1995, 2006; Tomasello, 2000, 2003). In particular, communicative function (meaning) plays an important role in the process of language development, as communicative function reflects human conceptualization, including action, perception, and communicative intention. Mapping meaning onto form through language use allows a language learner to gradually construct grammatical constructions (Langacker, 1987; Tomasello, 2003).

The usage-based models also predict some features of child language. On this view, children are initially conservative, in the sense that children's language more or less matches the input they receive. From this perspective, children's non-adult language is expected to assume the appearance of a 'pared-down' version of the language spoken by

adults, i.e., with certain elements missing (MacWhinney, 2004; Tomasello, 2000, 2003).

Tomasello (2003, p. 192) characterizes child language as following:

[I]nitially children's constructions are based totally on particular words and phrases (not abstract categories) tied fairly closely to the language they hear ... linguistic abstraction (categories and construction) develop continuously and relatively slowly ... predict[ing] that children will not make so many errors in early language.

So far, we have drawn out two different predictions about child language. One is based on the continuity assumption by the nativist models of language acquisition, and the second is addressed by usage-based models of language acquisition. Taking into consideration the two different predictions, the studies in Chapter 2 investigate how Japanese- and Mandarin-speaking children interpret yes/no questions (YNQs) that contain a disjunction word. In English, a corresponding example would be (1).

(1) Did John drink coffee or tea?

This kind of question yields a different range of interpretations in English, Japanese, and Mandarin. In English, YNQs with disjunction like (1) are ambiguous. One reading yields a YNQ. When the answer is 'Yes', we are informed that John drank either coffee or tea or both. When the answer is 'No', we are informed that John drank neither coffee nor tea. On the alternative interpretation, the question asks which particular one among the alternatives that are mentioned in the disjunction phrase (i.e., coffee and tea) that John drank. On this reading, it is presupposed that John drank either coffee or tea. This second interpretation is known as an alternative question (AltQ).

In contrast to English, the corresponding questions in Japanese only generate a YNQ interpretation, as illustrated in (2). In other words, an AltQ interpretation is not permitted.

- (2) John-wa kōhi ka ocha-o nomi-mashi-ta ka?  
John-Top coffee or tea-Acc drink-Polite-Past Q  
YNQ: *'Did John drink coffee or tea, or not?'*

Similarly, the corresponding questions in Mandarin also generate a YNQ interpretation only. However, what is different between Mandarin and Japanese is that the former has two different types of YNQs. One kind is illustrated in (3). The interrogative force of this kind of YNQ is licensed by the question particle *ma*.

- (3) Yuehan he le kafei huozhe/huoshi cha ma?  
John drink Asp coffee or tea Q  
YNQ: *'Did John drink coffee or tea, or not?'*

Another kind of YNQ in Mandarin is called an A-not-A question. This is illustrated in (4). As the example indicates, the question marker is formed by reduplicating *you* 'have' preceding and following the negation word *mei*.

- (4) Yuehan you mei you he kafei huozhe/huoshi cha?  
John have not have drink coffee or tea  
YNQ: *'Did John drink coffee or tea, or not?'*

Given the observed cross-linguistic variation in forming YNQs, it is interesting to examine how Japanese- and Mandarin-speaking children comprehend YNQs with disjunction. Do young Japanese- and Mandarin-speaking children know the interpretive restrictions of their particular language? If so, then children are expected to interpret the questions in (2)-(4) in the same way as adult speakers do. This is the outcome that is predicted by the usage-based approach.

On the other hand, another possibility is that young Japanese- and Mandarin-speaking children will initially assign interpretations to (2) to (4) that differ from the interpretations that are assigned by adults. This is a possible outcome on the nativist approach, but unlikely on the usage-based approach. Because the nativist approach adopts the continuity assumption, any non-adult interpretation assigned by children is expected to be an interpretation that is attested in a possible human language. Since English YNQs have different interpretations from those assigned by adult speakers of Japanese and Mandarin, it is possible that children acquiring Mandarin and/or Japanese will initially assign an interpretation that is available in English, but not in the local language. Such a finding would be in line with the continuity hypothesis and, therefore, would support the nativist approach rather than the usage-based approach.

### **1.3. Children's scope interpretation in Mandarin questions**

The studies in Chapter 3 contribute to the research on children's scope assignment. When sentences contain two (or more) logical expressions, they are potentially ambiguous. The ambiguities that are created are called scope ambiguities. Consider the example in (5).

(5) Every horse didn't jump over the fence.

Sentence (5) is ambiguous, due to the scope relations between the universal quantifier *every*, and the logical connective corresponding to negation, *n't*. On one interpretation, example (5) is true in circumstances in which none of the horses in the conversational context jumped over the fence. When this interpretation is adopted, the universal quantifier *every* is said to take scope over negation. We will call this the *surface scope* interpretation,



as the expression that is structurally ‘higher’ (i.e., *every*) in the surface structure is interpreted as taking scope over the expression that is lower (i.e., *n’t*).

An alternative interpretation is also possible. This interpretation makes the sentence true in circumstances in which some, but not all, of the horses jumped over the fence. In this case, the scope relation between the universal quantifier and negation is reversed; negation *n’t* takes scope over *every*. We call this the *inverse scope* interpretation. Interestingly, the Mandarin counterpart of (5), illustrated in (6), yields only the surface scope interpretation. This shows that scope ambiguities can arise in some languages, but not in others.

- (6) Mei-pi ma dou meiyou tiao guo liba.  
every-CL horse all have.not jump over fence  
*‘Every horse didn’t jump over the fence.’*

A cross-linguistic difference is also observed in sentences with negation and disjunction. To illustrate the difference, consider the English example (7).

- (7) John didn’t drink coffee or tea.

Despite having two logical connectives, disjunction *or* and negation *n’t*, (7) is not ambiguous in English. Example (7) is only true in circumstances in which John drank neither coffee nor tea. However, the Mandarin sentence corresponding to English (7), given in (8), does not have the same meaning. When negative statements contain disjunction in Mandarin, they receive the inverse scope reading. In other words, the meaning of example (8) can be paraphrased as ‘it was coffee or tea that John didn’t drink’ (see Jing, Crain, & Hsu, 2005).

- (8) Yuehan meiyou he kafei huozhe cha.  
 John have.not drink coffee or tea.  
*'It was coffee or tea that John didn't drink.'*

### 1.3.1. Scope relations in child language

Cross-linguistic differences in scope assignments, which we have just shown, have been used to adjudicate the two competing theories of language acquisition (e.g., Crain, Goro, & Thornton, 2006). As the usage-based models of language acquisition assume, if children are conservative and only assign interpretation that they experience in the input, children are expected to interpret sentences in the same way as adults do. The previous studies on children's scope interpretation, however, do not confirm this prediction. For example, we saw that adult speakers of Mandarin only access the surface scope reading of (6), repeated in (9).

- (9) Mei-pi ma dou meiyou tiao guo liba.  
 every-CL horse all have.not jump over fence  
*'Every horse didn't jump over the fence.'*

Zhou and Crain (2009) tested Mandarin-speaking children's interpretation of sentences like (9). They found that Mandarin-speaking children freely access both the surface scope and the inverse scope interpretation, in the same way as English-speaking adults interpret the corresponding English sentence in (5), which is a welcome result for the nativist model of language acquisition, but difficult to explain on the usage-based approach.

Likewise, Jing, et al. (2005) tested Mandarin-speaking children's interpretation of (8), repeated in (10). These researchers also showed the experimental findings lending support to the prediction of the nativist model.

- (10) Yuehan meiyou he kafei huozhe cha.  
John have.not drink coffee or tea.  
Adult: *'It was coffee or tea that John didn't drink.'*  
Child: *'John drank neither coffee nor tea.'*

Earlier, we saw that Mandarin negative sentences with disjunction, such as (10), are only interpreted by adult speakers as having an inverse scope assignment. Mandarin-speaking children, however, tended to adopt the surface scope interpretation of sentences like (10), just as English-speaking adults interpret the corresponding English sentences, as in (7). Therefore, the results of this study, again, pose a challenge to the usage-based model of language acquisition.

### 1.3.2. *Scope interpretation in Mandarin questions*

Given this observation by Jing et al. (2005)'s study, the present study described in Chapter 3 investigated whether the same findings can be held in different linguistic contexts.

Unlike the previous studies, we examined Mandarin-speaking children's scope assignment between negation and disjunction in interrogative contexts. Scope phenomena can be also attested in questions, especially when question sentences contain disjunction and negation (cf. Han & Romero, 2004; Larson, 1985). Consider English question (11), for example. This question is ambiguous between a YNQ interpretation and an AltQ interpretation.

- (11) Did John not drink coffee or tea?  
YNQ: *'Is it the case that John didn't drink coffee or tea?'*  
AltQ: *'Which of the beverages did John not drink, coffee or tea?'*

When disjunctive phrase ‘coffee or tea’ stays under the scope of negation (i.e., the surface scope), it is said to be conveying a YNQ interpretation. In this case, the question is asking whether or not John drank neither coffee nor tea. On the other hand, when the disjunctive phrase takes scope out of negation (i.e., the inverse scope), the question is interpreted as an AltQ (cf. Han & Romero, 2004; Larson, 1985). Therefore, in this case, the question is asking which of the beverages, coffee or tea, John didn’t drink.<sup>2</sup>

Let us now illustrate the Mandarin questions that were used for the study described in Chapter 3. Although English assigns two possible interpretations (i.e., the YNQ and AltQ interpretation) with a single form, Mandarin has a distinct form for each interpretation. To convey an AltQ interpretation in Mandarin, questions are constructed as in (12).

- (12) Yuehan meiyou he kafei *haishi* cha?  
 John not drink coffee or tea  
 AltQ: ‘Which of the beverages did John not drink, coffee or tea?’

Notice that the disjunctive word used in this type of questions (i.e., *haishi*) is different from the one we have shown so far (i.e., *huozhe/huoshi*). It is considered that disjunction *haishi* is only used to ask an AltQ. In question (12), the disjunction word *haishi* takes scope out of negation. This is because questions with *haishi* yield the same interpretation as we saw in the AltQ interpretation derived from English question (11). On the other hand, when the speaker intends to convey a YNQ, the speaker uses question (13). In this type of questions, disjunctive word *huozhe/huoshi* is used, as we saw previously in negative statements with disjunction like (10), repeated in (14).

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<sup>2</sup> If question (11), however, has preposed negation like ‘Didn’t John drink coffee or tea?’, it conveys a YNQ interpretation only. Although it is a very interesting to pursue how children understand this type of questions, we will not be concerned with this in the present study.

- (13) Yuehan meiyou he kafei *huozhe/huoshi* cha ma?  
 John not drink coffee or tea Q  
 YNQ: *'Is it the case that it was coffee or tea that John didn't drink?'*
- (14) Yuehan meiyou he kafei *huozhe/huoshi* cha.  
 John have.not drink coffee or tea.  
*'It was coffee or tea that John didn't drink.'*


One may notice that question (13) and negative statement with disjunction (14) is a minimal pair. The only difference is that question (13) has a sentence-final particle *ma*, which uniquely licenses a YNQ. Therefore, if we turn the interpretation of (14) into a YNQ, we get the interpretation of question (13), corresponding to *'Is it the case that it is coffee or tea that John didn't drink?'* as shown in the gloss below (13). So, when the answer is 'Yes' to this question, we are informed that John didn't drink one of the beverages between coffee and tea, or possibly John drank neither coffee nor tea. But when the answer is 'No', we are informed that John drank both coffee and tea. On this interpretation, disjunction takes scope over negation (i.e., the inverse scope). This is a different scope assignment from the one that is attested on the YNQ interpretation in English question (11). In that case, negation takes over disjunction (i.e., the surface scope).

Given the adult interpretation that is assigned to Mandarin question (12) and (13), in Chapter 3, we asked how Mandarin-speaking children interpret these questions. If children adopt adult-like interpretation in question (12) and (13) (i.e., the inverse scope interpretation), it should be corresponding to the interpretation we just illustrated. However, if children adopt a different interpretation from that of adults, this interpretation corresponds to the scope assignment in which negation takes scope over disjunction (i.e., the surface scope interpretation). In this case, the adopted interpretation is equivalent to the YNQ interpretation derived from English question (11), repeated in (15).

- (15) Did John not drink coffee or tea?  
 YNQ: *'Is it the case that John didn't drink coffee or tea?'*

#### 1.4. The emergence of question particles in child Japanese

Most human languages, if not all, have formal ways to mark questions (Dryer, 2008). In English, an interrogative force is marked by displacing an auxiliary or modal verb from the preverbal position to the presubject position, as illustrated in (16) and (17). This syntactic operation is widely known as subject-auxiliary inversion (SAI).

- (16) Did<sub>i</sub> John t<sub>i</sub> go to the pub yesterday?  


- (17) Where did<sub>i</sub> John t<sub>i</sub> go yesterday?  


Research in the acquisition of questions in English has a long-history. The study began with the work reported in Klima and Bellugi (1966), which was a longitudinal investigation of children's productions, including questions. One of the puzzles that has attracted acquisition researchers for decades is the Klima and Bellugi finding concerning children's performance on SAI. Although SAI is a relatively simple rule – 'move an auxiliary or modal verb to presubject position', children were found to exhibit relatively complex developmental patterns in the acquisition of this rule. For example, there is a developmental stage in which children correctly invert an auxiliary or modal verb in YNQs, as in (18) and (19), but not in wh-questions, as in (20) and (21) (Bellugi, 1971; Cazden, 1970; Klima & Bellugi, 1966; Kuczaj, 1979; Labov & Labov, 1978; Maratsos, Kuczaj, Fox, & Chalkley, 1979; Rowland, 2007; Rowland & Pine, 2000; van Valin, 2002). Note that questions (18) to (21) are produced by children at around the same age.

- (18) Does the kitty stand up?
- (19) Will you help me?
- (20) Where the other Joe will drive?
- (21) What he can ride in? (Klima & Bellugi, 1966)

The puzzles are not limited to this linguistic contrast. SAI is also observed early in questions with some *wh*-words, but late in questions with other *wh*-words (de Villiers, 1991; Labov & Labov, 1978; Stromswold, 1990; Thornton, 2008). For example, children don't invert an auxiliary or modal verb in *why*-questions until long after they have mastery of inversion in questions with the *wh*-words *who*, *what*, and *when* (de Villiers, 1991; Labov & Labov, 1978; Thornton, 2008). Moreover, it has been also found that the rates of children's inversion errors hinge on the types of elements that are moved to presubject position (Rowland, 2007; Santelmann, Berk, Austin, Somashekar, & Lust, 2002). For example, Santelmann et al. (2002) found that the auxiliary *be*, as in the YNQ in (22), and modal verbs, such as *can*, as in (23), are inverted earlier than the copula *be* and the auxiliary *do*, as illustrated in (24) and (25) respectively (e.g., Rowland, 2007; Santelmann, et al., 2002).

- (22) Is Karmit eating a cookie?
- (23) Can Aladdin draw a picture?
- (24) Is Miss Piggy star?
- (25) Does Mickey Mouse open a present?

These findings in the acquisition of English questions invite us to investigate whether similar developmental phenomena are observed in typologically different

languages. This is the purpose of the studies reported in Chapter 4, which investigated the acquisition of questions by Japanese-speaking children. The focus of the studies is on the production of question particles in Japanese-speaking children.

Japanese question constructions are relatively straightforward. In Japanese questions, an interrogative force is licensed by placing question particles *ka* or *no* at the end of a sentence, as illustrated in YNQ (26) and in the *wh*-question in (27). A YNQ is constructed by adding a question particle *ka* or *no* to a declarative sentence. Similarly, the question particle *ka* or *no* is placed at the end of *wh*-question as illustrated in (27). Note that Japanese is a *wh in situ* language so *wh*-word occurs inside the clause.

- (26) John-wa kinoo pabu-ni it-ta *ka/no?*  
John-Top yesterday pub-Loc go-Past Q  
'Did John go to the pub yesterday?'

- (27) John-wa kinoo doko-ni it-ta *ka/no?*  
John-Top yesterday where-Loc go-Past Q  
'What did John go?'

Analysing three longitudinal child-speech corpora, Chapter 4 reports the finding that Japanese-speaking children exhibit a developmental asymmetry between YNQs and *wh*-question. The same asymmetry is found in English-speaking children, who go through a stage at which an auxiliary or modal verb is inverted in YNQs but not in *wh*-questions. The difference is that, in Japanese, children go through the stage in which a question particle *ka* or *no* appears in YNQs, but are absent in *wh*-questions.

In previous English studies, several accounts have been offered for this asymmetric phenomenon. Some researchers have attempted to account for such an asymmetry by adopting syntactic theories (e.g., Radford, 1994; Roeper, 1992; van Valin, 2002). For example, within the generative tradition, it has been argued that English-speaking children



fail to produce correct wh-questions because they fail to apply a syntactic rule (i.e., I-to-C movement) (e.g., Radford, 1994; Roeper, 1992). Alternatively, van Valin (2002) who adopts a Role and Reference Grammar framework argues that an uninverted auxiliary or modal verb in wh-questions is due to incorrect mapping between syntactic and semantic representations.

Other researchers from the usage-based models of language acquisition, on the other hand, argue that the asymmetry in the development of SAI is the consequence of frequency effects associated with the adult input (Rowland, 2007; Rowland & Pine, 2000). On this view, words grouping with higher-frequency in the input are expected to emerge earlier in children's production, as compared with lower-frequency items. As YNQs are more frequent in the input than wh-questions, SAI is expected to occur earlier in children's YNQs than in their wh-questions (Rowland, 2007; Rowland & Pine, 2000). Based on the findings of corpus analyses, it is also discussed which of the approaches, i.e., the syntax-based approach or the usage-based approach, is best fitted in accounting for the Japanese data.

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# **CHAPTER II**

**Continuity or Discontinuity? – Children's Interpretation of  
Yes/no Questions with Disjunction**



## Abstract

Two major theories stemming from nature vs. nurture debates are available in recent research of child language acquisition. The present study is aimed to provide some contribution to the long-standing debates between the two competing theories, by conducting cross-linguistic examinations of children's comprehension of yes/no questions (YNQs) which contain disjunction (i.e., *Did John eat the cake or the pudding?*) in Japanese and Mandarin Chinese. Questions with such constructions offer different interpretive variation across different languages. While both a YNQ interpretation and an alternative question (AltQ) interpretation are available in certain types of YNQs with disjunction like ones in English, only a YNQ interpretation is available in other types like ones in Japanese and Mandarin Chinese. The experimental results showed that children around 4 to 5 years of age tended to interpret Japanese and Mandarin particle YNQs (i.e., YNQs marked by question particle *kana* and *ma* respectively) which contain disjunction as an AltQ despite the fact that such an analysis is unlikely to be attested in adult language. By contrast, children around the same age were less likely to interpret Mandarin A-not-A questions with disjunction as an AltQ, corresponding to adult interpretation. It is concluded that the findings are in line with the continuity assumption offered by nativist models of languages acquisition, and also lend some challenges to usage-based models.

*Keywords: Child language comprehension, Yes/no question, Alternative question,*

*Nativist model, Usage-based model*

## 2.1. Introduction

Within a short period of time, young children acquire a language – a symbolic system producing an infinitive set of linguistic expressions – despite impoverished input available to them. Offering a feasible account of how a language learner overcomes this conundrum known as *Plato's Problem* is one of the challenges of modern acquisition research. One elegant but controversial solution proposed by Chomsky (1981) is to delimit the hypothesis space of learning and attribute this to innately specified linguistic knowledge, manifested as Universal Grammar (UG). According to this proposal, UG is comprised of two components – principles and parameters. The principles are characterized as universal constraints which all human languages conform to. Parameters, on the other hand, provide variation in language, by defining a finite set of points along which human languages can vary. Both principles and parameters circumscribe what counts as a possible human language, thereby ensuring that there is continuity between child and adult grammars (Crain 1991, Crain & Pietroski, 2001, 2002; Hyams, 1986; Pinker, 1984). Under this assumption, language acquisition of specific languages can be characterized as children using the primary linguistic data to select between (binary) parametric options. This permits them to home in on the particular features that distinguish the local language from other languages spoken elsewhere around the globe (Chomsky, 1995).

The nativist view of language development, however, has been challenged by a growing body of researchers who claim that any aspect of grammatical knowledge must be learnable from experience (e.g., Bates & MacWhinney, 1982, 1989; Goldberg, 2003, 2006; Langacker, 1988, 2000; MacWhinney, 2004; Tomasello, 2000, 2003). While nativist models view the process of language acquisition as mapping children's innate UG onto the primary linguistic data, experience-based or usage-based models of language development

characterize language acquisition as a process of learning association between form and semantic/discourse function. For these models, children's main task is to extract an abstract pattern from linguistic forms and associate it with the function instantiated in the input. This simple but seemingly endless process is further facilitated by other domain-general cognitive abilities, such as joint attention, analogy, categorization, social and cultural learning, and intention reading (Tomasello, 2000, 2003). Putting these mechanisms all together, a language is claimed to emerge based solely on experience.

Each model predicts different linguistic behaviors that children demonstrate during the course of language development. Since the Principles and Parameters theory of UG views language development as a process of setting parameter values to match those that are operative in the language of the community, it leaves open the possibility that, at some point in time, children may adopt parameter values that are not attested in the local language but ones that are manifested in other languages. That is to say, children might speak a fragment of a 'foreign language' during language development.

It has been argued that one such example is the lack of obligatory inversion in the *why*-questions produced by English-speaking children. This is illustrated in (1) (Thornton, 2008; also see Crain, Goro, & Thornton (2006) for a review).

- (1)      Why you are going in that one?

English-speaking adults obligatorily invert an auxiliary in all *wh*-questions, but some children persist in using non-inverted *why*-questions like (1), long after the mastery of auxiliary inversion in questions with other *wh*-words such as *what*, *who*, *where*, *etc* (e.g., Labov & Labov, 1978, Rowland & Pine, 2000; Thornton, 2008). Thornton (2008) compares this asymmetry in children's *wh*-questions to the same asymmetry observed in

adult Italian. In Italian, *perché* (why)-questions do not require obligatory inversion of auxiliary, as opposed to other wh-questions which do require obligatory inversion. Based on this similarity between child English and adult Italian, she proposed that the non-adult stage of *why*-questions in child English can be viewed as evidence that children undergo a stage in which the relevant parameter is set with the value corresponding to that of adult Italian.

Another piece of evidence suggests that English-speaking children sometimes speak a fragment of a dialect of German (Thornton, 1990, 1995). It has been reported that some English-speaking children produce long-distance wh-questions like (2) in which *who* appears both in the initial position of the main clause and the embedded clause. Although the medial-wh construction is not produced by English adults, this construction is used in some dialects of German, as illustrated in (3) (McDaniel, Chiu, & Maxfield, 1995). On the basis of this and other cross-linguistic data, Thornton argues that children may adopt the relevant parameter value that corresponds to a dialect of German.

(2)      Who do you think who is in the box?

(3)      Wer glaubst du wer nach Hause geht?  
            '*Who do you think who goes home?*'

Despite evidence of such non-adult performance by children, usage-based models, by contrast, contend that children's linguistic behavior is conservative. The claim is that children's linguistic competence matches the input, though it may be a 'pared-down' version that is missing certain elements (MacWhinney, 2004; Tomasello, 2000, 2003). On this view, in the early stage of language development, children keep track of lexically-based exemplars appeared simple and frequently observed in the input, and store them as

their linguistic knowledge. This strategy of language learning is known as lexical-based learning or item-based learning.

After around age three, these stored exemplars are gradually generalized to create more abstract and complex representations, so called a frame or a schema, which children can exploit to generate novel sentences (Tomasello, 2000, 2003). Although most of the time conservative learning can ensure children to avoid the linguistic behaviors that deviate from the input (MacWhinney, 2004), in a few cases children are found to produce non-adult structures in this developmental stage. According to this model, such ‘errors’ come from overgeneralizations due to ‘cut and paste’ errors. Thus, children’s non-adult production of a non-inverted auxiliary in *why*-questions as in (1) is considered to be overgeneralizations formed by the erroneous concatenation of *why* and a declarative sentence ‘*you are going in that one*’ (Rowland & Pine, 2000; but see Thornton, 2008 for critics of this analysis). Likewise, the production of a medial-wh in (2) is considered as the erroneous concatenation of two direct questions *who do you think* and *who is in the box* (Dabrowska, Rowland, & Theakston, 2009). Since these kinds of erroneous behaviors are considered as ‘trivial’ phenomena occurring only with low-frequency items, the expectation is that children purge them using mechanisms such as statistical learning, exemplified by indirect (or implicit) negative evidence, entrenchment, pre-emption, competition (McWhinney, 2004; Goldberg, 2006), by semantic/discourse function (Ambridge, Pine, & Rowland, 2011), or by direct parental feedback such as direct negative evidence (Bohannon, MacWhinney, & Snow, 1990; Chouinard & Clark, 2003; Saxton, 2000; Tomasello, 2003) (but see Bowerman (1986), Braine (1971), Brown & Hanlon (1970), Marcus (1993), McNeill (1966), Morgan & Travis (1989), and Pinker (1989) for a different conclusion).

The main goal of this study is to provide a contribution to the ongoing debate between the two main models of language acquisition by conducting some new empirical investigations. We set out to investigate children's comprehension of yes/no-questions (YNQs) containing disjunction in Japanese and Mandarin Chinese. These questions are of interest because they give rise to different interpretations from their English counterpart (i.e., *Did John eat the pudding or the cake?*). This cross-linguistic variation invites the nativist models to speculate that children may not initially assign the same interpretations as adults do. On the other hand, if we take the usage-based assumption that language acquisition is a process of form-function pairings, then there is reason to expect that children's interpretation of YNQs with disjunction will initially be conservative. Therefore, our experimental studies can inform us which of the models can better explain our experimental outcomes. In the next section, we compare English YNQs and Japanese YNQs with regards to form and function, and then illustrate available interpretations of YNQs with disjunction in the two languages.

## **2.2. Interpretations of yes/no questions containing disjunction**

### *2.2.1. Cross-linguistic comparison of yes/no questions: Japanese and English*

Most human languages, if not all, have formal ways to mark questions (Dryer, 2008). Probably, the most common way is by prosodic cues (i.e., rising or falling intonation) (Bolinger, 1980). Interrogation can also be conveyed by morpho-lexical items, such as adding an interrogative particle or clitic to a declarative sentence. The other way of marking an interrogative, although less common, is a change in word order.



English and Japanese employ different strategies to mark questions. Consider the English YNQ in (4a) and the Japanese YNQ in (5a) as compared with the corresponding declarative sentences in (4b) and (5b) respectively.

- (4)      a. Will John laugh?  
             b. John will laugh.
- (5)      a. John-wa warau-darou *ka*?  
                 John-Top laugh-will    Q  
                 ‘Will John laugh?’
- b. John-wa warau-darou.  
                 John-Top laugh-will  
                 ‘John will laugh.’

In English, the interrogative force of a sentence is licensed by a different word order from that of a declarative sentence. In questions, an auxiliary verb is displaced to the sentence initial position, a movement commonly termed subject-auxiliary inversion. On the other hand, Japanese YNQs are licensed by placing the question particle *ka/kana* at the end of a declarative sentence as shown in (5a).

Cross-linguistic variation is not limited to how question structures encode illocutionary force in the grammar. The two languages also differ in the range of information structures available in YNQs. Consider the following English YNQs.

- (6)      a. Is [JOHN]<sub>F</sub> leaving for Sydney tomorrow?  
             b. Is John leaving for [SYDNEY]<sub>F</sub> tomorrow?  
             c. Is John leaving for Sydney [TOMORROW]<sub>F</sub>?

As demonstrated in (6a-c), English YNQs permit prosodic stress on an argument (as represented by capital letters) to mark the focus of question. Following Lambrecht (1994), let us call such a type of focus *argument focus*. For convenience, the focus domain is represented by the square brackets with the small letter ‘F’. Thus, in the case of (6a-c), the focus domain corresponds to the prosodically stressed element. According to the theory of information structure, a question can be partitioned into two components – focus and background, (Bäuerle, 1979; Kiefer, 1980; Lambrecht, 1994). On uttering (6a) for example, a questioner is querying about whether the person who is leaving for Sydney tomorrow is John or someone else; that is, the focus of question falls on the subject argument. The question takes for granted that someone is leaving for Sydney tomorrow. This component is the background or presupposition. Examples (6b) and (6c) can likewise be partitioned into focus and background.

In addition, English YNQs can also be constructed without prosodic stress as in (7).

(7) [Is John leaving for Sydney tomorrow]<sub>F</sub>?

Without prosodic stress, the questioner simply wants to know whether or not the event of John’s leaving for Sydney tomorrow will happen in the future. In this case, no background assumptions arise and the focus of question in (7) is construed as an entire proposition (Krifka, 2001). Let us call this type of focus *propositional focus*, and we represent it with square brackets with the small letter ‘F’ scoping over the entire sentence.

Unlike English YNQs which permit a range of focus assignments, Japanese YNQs with the question particle *ka/kana* are acceptable only when the focus of the question is

propositional focus; that is, argument focus is not permitted. This is as illustrated in (8a-d) (Masuoka, 1989; cf Kuno, 1980).<sup>1</sup>

- (8) a. John<sub>i</sub>-wa [<sub>t<sub>i</sub></sub> ashita Sydney-ni iki-masu]<sub>F</sub> *ka*?  
           John-Top tomorrow Sydney-Loc leave-Polite Q  
           ‘Is John leaving for Sydney tomorrow?’
- b. \*[JOHN-GA]<sub>F</sub> ashita Sydney-ni iki-masu *ka*?
- c. \*John-wa [ASHITA]<sub>F</sub> Sydney-ni iki-masu *ka*?
- d. \*John-wa ashita [SYDNEY-NI]<sub>F</sub> iki-masu *ka*?

Note that the topicalized subject *John-wa* in (8a) is excluded from the domain of propositional focus. Here we simply adopt the assumption that the subject *John* originates from the subject position within the propositional phrase but moves out of it when topicalized (Rizzi, 1997).<sup>2</sup>

In order to construct argument focus in YNQs, Japanese employs a cleft-like structure, and places stress on the focussing constituent, see (9a-c). In many cases, the copula and question particle *ka* can be left out and replaced by rising intonation like (10) (Kuno, 1980). That is to say, in Japanese the distinction between argument focus and propositional focus is manifested by different forms.

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<sup>1</sup> Contrary to Masuoka (1989), Kuno (1980) stipulates that focus (in his term ‘scope’) of question particle *ka* fall on a property immediately left to *ka*. Since Japanese is SOV language, the focused element is usually a verb, i.e., SO[V]<sub>F</sub>-*ka*. Despite the difference in theoretical analyses, what is important for the current argument is that the focus of *ka* cannot be assigned to arguments.

<sup>2</sup> According to the theory of information structure (Lambrecht, 1994), (8a) can be characterized as predicate focus instead of propositional focus as it is partitioned into topic and comment. Despite the alternative view, throughout this paper we follow the assumption that the focus of question induced by YNQs with particle *ka/kana* is propositional focus. Again, this theoretical preference however does not affect the thrust of the present study.

- (9) a. [JOHN-GA]<sub>F</sub> ashita Sydney-ni iku no desu *ka*?  
 John-Nom tomorrow Sydney-Loc leave Comp Copula.Polite Q  
*'Is it John who is leaving for Sydney tomorrow?'*
- b. John-wa [ASHITA]<sub>F</sub> Sydney-ni iku no desu *ka* (iku no *kana*)?
- c. John-wa ashita [SYDNEY-NI]<sub>F</sub> iku no desu *ka* (iku no *kana*)?
- (10) a. [JOHN-GA]<sub>F</sub> ashita Sydney-ni iku no ~~desu~~ *ka* ㄣ?  
 John-Nom tomorrow Sydney-Loc leave Comp ~~Copula.Polite~~ Q
- b. John-wa [ASHITA]<sub>F</sub> Sydney-ni iku no ㄣ?
- c. John-wa ashita [SYDNEY-NI]<sub>F</sub> iku no ㄣ?

### 2.2.2. Japanese yes/no questions meet disjunction

Interestingly, the types of information structure available in YNQs seem to predict possible interpretations of YNQs which contain disjunction. English YNQs with disjunction allow two different interpretations. One reading corresponds to the YNQ as in (11a) in which the focus of the question corresponds to a proposition (or a sentence). On the other interpretation, namely the alternative question (AltQ), the focus of the question is the argument which here consists of coordinated nouns. The AltQ reading sometimes hinges on the pragmatic context, and it is characteristically associated with a prosodic break, and with focus stress being placed on the disjuncts as illustrated in (11b).

- (11) a. [Did John eat the pudding or the cake]<sub>F</sub>?  
 YNQ: *'Is it true that John ate the pudding or the cake?'*
- b. Did John eat [the PUDDING or the CAKE]<sub>F</sub>?  
 AltQ: *'Which dessert did John eat, the pudding or the cake?'*

The Japanese counterpart to the English example (11) as shown in (12), on the other hand, is uniquely interpreted as a YNQ. The AltQ interpretation is not permitted in

questions of this kind, regardless of changes in pragmatic context or the presence of prosodic stress. This is due to the focus of Japanese *ka*-YNQs being restricted to a proposition.

- (12) John<sub>i</sub>-wa [t<sub>i</sub> purin ka keki-o tabe-mashi-ta]<sub>F</sub> *ka*?  
 John-Top purin or keki-o eat-Polite-Past Q  
 YNQ: *'Is it true that John ate the pudding or the cake?'*  
 AltQ: \**'Which desserts did John eat, the pudding or the cake?'*

Moreover, the same interpretive restriction is also observed in an embedded YNQ. While the embedded clause of (13a) in English is ambiguous between an embedded YNQ and an embedded AltQ, the Japanese embedded YNQ in (13b) is uniquely interpreted as a YNQ. Therefore, there is no evidence anywhere in adult Japanese that the surface form of YNQs with disjunction conveys an AltQ meaning.<sup>3</sup>

- (13) a. John knows whether Mary ate the pudding or the cake.  
 YNQ: *'John knows whether or not Mary ate the pudding or the cake.'*  
 AltQ: *'John knows which of the desserts, the pudding or the cake, Mary ate.'*
- b. John-wa [Mary-ga purin ka keki-o tabe-ta *ka*] shitteiru.  
 John-Top [Ichiro-Nom pudding or cake-Acc eat-Past Q] know  
 YNQ: *'John knows whether or not Mary ate the pudding or the cake.'*  
 AltQ: \**'John knows which of the desserts, the pudding or the cake, Mary ate.'*

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<sup>3</sup> The interpretive restriction is also applied to YNQs forming a cleft-like construction as in (i), even though the disjunctive phrase, *purin ka keiki-o* (the pudding or the case), is narrowly focused with prosodic stress.

- (i) John-wa [purin KA keki-o]<sub>F</sub> tabe-ta *no* ~~desu~~ *ka*?  
 John-Top pudding or cake-Acc eat-Past Comp Copula.Polite Q  
*'Whether or not the desert that John ate is pudding or cake?'*

Although it is worth theoretically pursuing an answer to the question of why such an interpretation is prohibited in these questions, it is not within the scope of the present study. We leave this issue for future research.

In order to pose an AltQ in Japanese, two separate YNQs are required, and these are often separated by another lexical form of disjunction, *soretomo* as in (14). In many cases, *soretomo* is optional. This suggests that the two ambiguous readings of English YNQs with disjunction are distinguishable by different surface forms in Japanese.

- (14) John-wa purin-o tabe-mashi-ta *ka* ***soretomo*** (*pro*) keki-o  
 tabe-mashi-ta *ka*?  
 John-Top pudding-Acc eat-polite-Past Q or (*pro*) cake-Acc  
 eat-Polite-Past Q  
 ‘Did John eat the pudding or did (*pro*) eat the cake?’

### 2.2.3. Predictions for children’s interpretation of yes/no questions with disjunction

We have seen that both Japanese and English form YNQs with disjunction, and that English permits an interpretation for such YNQs which is impossible in Japanese. Given such cross-linguistic variation, one relevant research question is whether Japanese-speaking children interpret YNQs with disjunction in the same way as Japanese-speaking adults; that is, as having only the YNQ reading. Nativist and usage-based theories make different predictions for children’s comprehension of such questions. Nativist accounts, given certain assumptions about the continuity hypothesis, could explain the fact that Japanese-speaking children initially differ from adults in the assignment of interpretations to YNQs with disjunction. If this difference is one that is attested in other languages, but not attested in the input – i.e., an AltQ interpretation, then this finding would be in line with the continuity hypothesis.

By contrast, usage-based accounts make the prediction that Japanese children start with the same interpretation as adults for YNQs with disjunction. This prediction follows because children adopt only linguistic forms and functions that are attested in the input. On such an analysis, Japanese-speaking children should quickly learn that *ka/kana*-YNQs with

disjunction are associated only with the YNQ interpretation and that AltQs are realized by the appearance of two full YNQs, optionally conjoined with *soretomo*.

### 2.3. Experiment 1: Interpretation of yes/no questions with disjunction in Child Japanese

The following experiment investigates how Japanese-speaking children comprehend YNQs with disjunction like (12). To investigate children's interpretations, we collected and analysed children's responses to such questions. The questions permit a range of possible answers, as shown in (15) below, some of which are appropriate only for the YNQ reading and others only for the AltQ reading.

- (15) John<sub>i</sub>-wa [t<sub>i</sub> purin ka keki-o tabe-mashi-ta]<sub>F</sub> *ka?*  
 John-Top purin or keki-o eat-Polite-Past Q  
*'Did John eat the pudding or the cake?'*
- a. Hai/Iie,  
*'Yes/No'*
- b. (*pro*) tabe-mashi-ta / tabe-ma-sendeshi-ta  
 eat-Polite-Past / eat-Polite-Neg-Past  
*'(pro) ate/didn't eat'*
- c. Purin!  
*'The pudding!'*

An answer like 'Yes' or 'No', as shown in (15a) is acceptable for a YNQ but not for an AltQ, and (15b) likewise. In contrast, an answer with a single NP 'the pudding', as in (15c) is acceptable for an AltQ but not for a YNQ. Thus, we measured the proportion of these 'identifying' types of children's responses and used them as an index for identifying how children interpreted questions.

### 2.3.1. *Participants*

Forty monolingual Japanese-speaking children (15 boys and 25 girls) participated in the experiments. The children ranged in age from 4;7 to 6;5 (mean = 5;7). All of the children were recruited at Ibaraki University Kindergarten in Mito, Japan. Twenty native Japanese-speaking adults were also recruited as control subjects. They were either undergraduates or students at the English Learning Centre at Macquarie University in Sydney Australia. We only selected adult subjects who had been raised in Japan at least until the end of secondary education.

### 2.3.2. *Types of question stimuli*

The child subjects were partitioned into two groups, each with twenty children. One was the experimental group which ranged in age from 4;9 to 6;5 (mean = 5;7). The other was a control group which ranged in age from 4;7 to 6;5 (mean = 5;6). The experimental group received four target YNQs with disjunction, as in (16), while the control group received four AltQs (i.e., ‘YNQ+*soretomo*+YNQ’), as in (17).

- (16) Butasan-wa ninjin ka piiman-o tabe-ta kana?  
Mr. Pig-Top carrot or pepper-Acc eat-Past Q  
*‘Did Mr. Pig eat the carrot or the pepper?’*

- (17) Butasan-wa ninjin-o tabe-ta kana, soretomo piiman-o tabe-ta kana?  
Mr. Pig-Top carrot-Acc eat-Past Q, or pepper-Acc eat-Past Q  
*‘Did Mr. Pig eat the carrot, or (did Mr. Pig) eat the pepper?’*

As control items, both groups were also presented with four simple YNQs without disjunction and four wh-questions, as illustrated in (18) and (19).



- (18) Butasan-wa ninjin-o tabe-ta kana?  
 Mr. Pig-Top carrot-Acc eat-Past Q  
*'Did Mr. Pig eat the carrot?'*
- (19) Butasan-wa nani-o tabe-ta kana?  
 Mr. Pig-Top what-Acc eat-Past Q  
*'What did Mr. Pig eat?'*

The purpose of these control questions was to determine how children responded to YNQs without disjunction and to questions asking for information about an argument noun phrase. These responses served as a baseline for comparison with the target questions. Thus, each child subject answered a total of twelve questions. These were presented in a pseudo-random order. For the adult control group, there were four each of (a) YNQs with disjunction, (b) AltQs, and (c) YNQs without disjunction. These were pseudo-randomly ordered and presented in one session.

Note that, instead of *ka* which normally occurs as a polite form, a different question particle *kana* was used in the questions presented to participants. Use of a less polite form with the particle *kana* is more pragmatically natural in the dialog between children and an experimenter.<sup>4</sup> This was not expected to have any impact on the experimental outcomes.

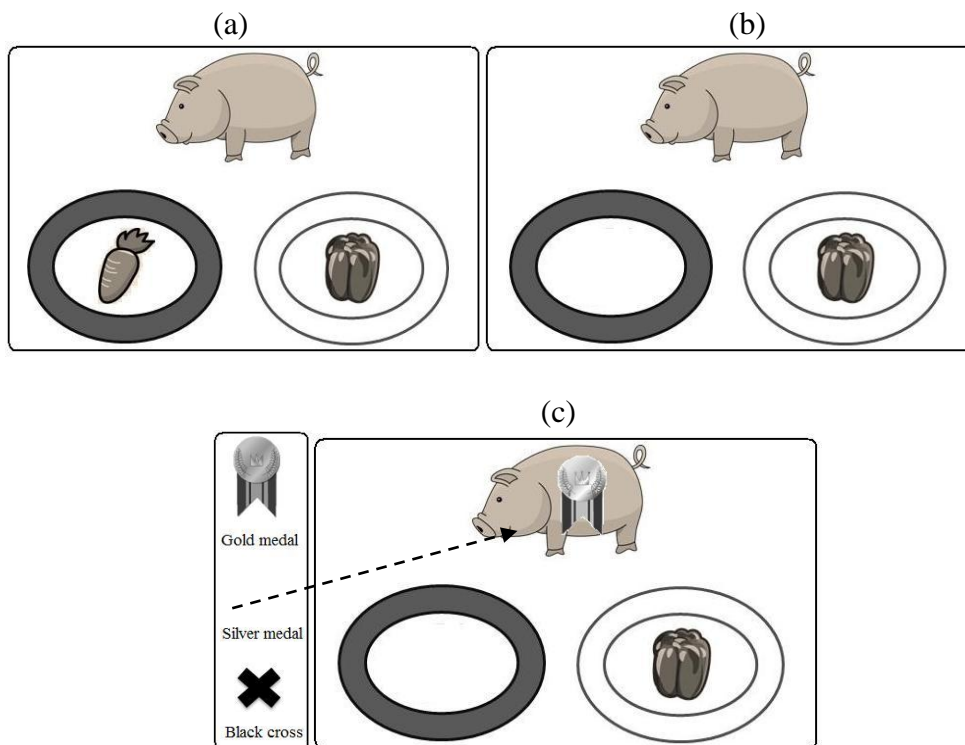
### 2.3.3. Procedure

We modified the version of the Truth Value Judgment task (Crain & Thornton, 1998) designed by Goro and Akiba (2004) to use in our experiment. In the experimental task, a child subject watched fifteen short vignettes of animals participating in an 'eating game', which was demonstrated by an experimenter with pictures and paper-made objects. In each

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<sup>4</sup> The question particles *ka* and *kana* are different in the response they expect from the hearer. While questions with *ka* directly require a response from an interlocutor, questions with *kana* are considered to be monologue questions, which in many occasions invites an interlocutor to provide a response (see Matsugu, 2005). For this reason, particle *ka* often appears along with a polite form while particle *kana* along with a plain form of the Japanese verb.

vignette, an animal considers eating two types of vegetables that they do not like (Figure 1-a: Mr. Pig tries to eat a carrot and a pepper). After the attempt by each animal (Figure 1-b: Mr. Pig emptied the plate with the carrot but left the pepper on the plate), children were asked to give a reward to the animal based on its performance. If an animal ate both types of vegetables, the child subject was instructed to give it a gold medal. If the animal could only bring itself to eat one of the vegetables, the child was instructed to give it a silver medal. If an animal refused to eat any vegetables, the child was instructed to give it a black cross (Figure 1-c: Mr. Pig received a silver medal). The purpose of the reward-system was to engage children in the task, and to make it felicitous to ask questions about what had happened in the vignette.



**Figure 1:** Example scenes in the vignettes given to subjects.

The first three vignettes were warm-up trials to introduce the rules of the reward-system that would be employed in the main session of the experiment. Children were not

asked any questions during the warm-up trials. In the remaining twelve vignettes, once an animal had received a reward from the child, a question was posed to the child. The question was presented by a puppet played by a second experimenter. The puppet watched the vignettes alongside the children, and then asked them a question, using either a target question or a control question in a conversationally natural manner. Four YNQs with disjunction and four AltQs were asked in the silver medal condition. Two of the four YNQs without disjunction were presented in the gold medal condition, and two YNQs without disjunction were presented in the black cross condition. Two of the four wh-questions were presented in the gold medal condition, and two wh-questions were presented in the silver medal condition. Children were tested individually in a quiet room separated from their classroom. Children's verbal and gestural responses, such as pointing, nodding, or shaking of the head were recorded by the second experimenter. The adult control subjects were tested using the same procedures, except that they were not asked to reward the various animals, and they were asked questions posed by the experimenter without using a puppet.

#### 2.3.4. *Coding*

Children's verbal and gestural responses were categorized into four response types. The first response type was those responses that could only be derived from a YNQ (YN). Responses in which children said 'Yes' or 'No' or produced only a verb, as in (19b), were considered to be responses of this kind. In addition, gestural responses like nodding and shaking head were considered to fall into this category. The second type was a simple noun phrase answer (NP). Answers with a single noun phrase like "*Ninjin!* (Carrot!)" are acceptable only for AltQs. Instead of verbalizing the name of a vegetable, if children just pointed to the correct vegetable as their response, this gestural response was included in

this category as well. The third response type was those responses that were acceptable answers for either a YNQ or for an AltQ. We call this response type ‘Unidentifiable’ because these responses could not be used to tease apart children’s interpretations. Sentential answers which do not require a subject like “(pro) *ninjin tabe-ta!* ((pro) Ate a carrot!)” were counted as falling in this category.<sup>5</sup> Other answers were also categorized as Unidentifiable, including ones in which the child exhaustively listed those vegetables the animal ate and those he did not; for example, an answer like “*ninjin tabe-ta kedo piman tabe-nakat-ta!* (Ate a carrot but didn’t eat a pepper)”. Finally, the fourth type gathered together all remaining other kinds of answers (Other). This included children’s incorrect answers. For example, suppose that Mr. Pig ate a carrot, but not a pepper, and the child was asked “Did Mr. Pig eat the carrot or the pepper?” If a child answered ‘No’, then this response was coded as ‘Other’. Such answers suggest that the child had misunderstood the question, or did not understand the meaning of disjunction. Table 1 summarizes example answers of each response type.

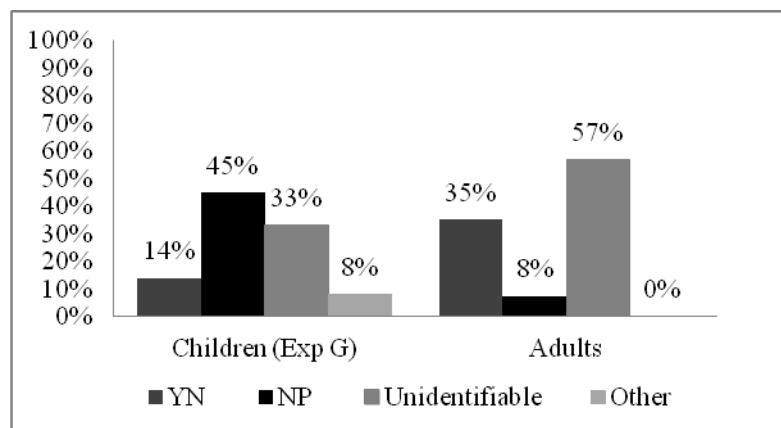
**Table 1:** Examples of possible answers for each response type.

YN	NP	Unidentifiable	Other
<u>Verbal</u> <ul style="list-style-type: none"> <li>• “Yes/No.”</li> <li>• “Yes, he ate.”</li> <li>• “No, he didn’t eat.”</li> <li>• “(He) ate.”</li> <li>• “(He) didn’t eat.”</li> </ul>	<u>Verbal</u> <ul style="list-style-type: none"> <li>• “Carrot!”</li> </ul> <u>Gestural</u> <ul style="list-style-type: none"> <li>• Pointing an correct object</li> </ul>	<u>Verbal</u> <ul style="list-style-type: none"> <li>• “(He) ate the carrot.”</li> <li>• “Only ate the carrot.”</li> <li>• “(He) ate the carrot but not the pepper.”</li> </ul>	Any response which is not categorized in the other three response types.
<u>Gestural</u> <ul style="list-style-type: none"> <li>• Nodding</li> <li>• Shaking head</li> </ul>			

<sup>5</sup> Although in English, prosodic stress may play a greater role to indicate whether a sentential answer is derived from the YNQ interpretation or the AltQ interpretation, it is not clear in Japanese. To make our analysis conservative, we categorized all sentential answers as Unidentifiable.

### 2.3.5. Results and discussions

Let us first compare children's and adults' responses to YNQs containing disjunction. The critical response type is the NP response. If children, like adults, disallow an AltQ interpretation, then no significant difference is anticipated in their proportion of NP responses. As illustrated in Figure 2, the results show that 45% (36/80) of children's responses were NP responses, and that this was considerably higher than the proportion of NP responses by adults (8%, 6/80). A non-parametric test (Mann-Whitney test) revealed a statistical significance between the two groups ( $Z = 3.4, p = .001$ ). The data suggest, therefore, that an AltQ interpretation of YNQs with disjunction is accessible to some children. A statistical significance was also obtained in YN responses between the two groups ( $Z = 2.3, p < .05$ ). The remaining two response types, in contrast, showed no significance (Unidentifiable:  $Z = .69, p > .05$ ; Other:  $Z = .13, p > .05$ ).



**Figure 2:** Proportions of different response types for YNQs with disjunction for children and adults

One might question whether the 8% NP responses given by adult subjects disproves the claim made earlier that NP responses to YNQs with disjunction are ungrammatical for adults. In our view, it is more likely that these responses can be attributed to noise. Recall that for adult subjects, interpretations of target questions and AltQs were tested in the same experimental session. A closer look at the two adult subjects who produced NP response

reveals that their first response to YNQs with disjunction was a YN response, but then they shifted to an NP response for the remaining three trials, i.e., once they had encountered the AltQ control trials. Thus, for the two adult subjects who produced NP responses, there were six unanticipated answers. Given that both YNQ interpretations and AltQ interpretations were tested within the same session, it seems reasonable to suppose that these NP responses were due to carry-over effects from the AltQ control trials.

The same carry-over effects were not possible in the children's data because the two interpretations were tested in separate groups of children. However, as an additional check, children's responses were also analyzed to see whether or not YN responses and NP responses appeared together. Table 2 shows the number of child subjects who produced the different combinations of YN and NP responses. This does not mean that children didn't produce Unidentifiable responses or Other responses. In fact, such responses did co-occur with NP responses for some children.

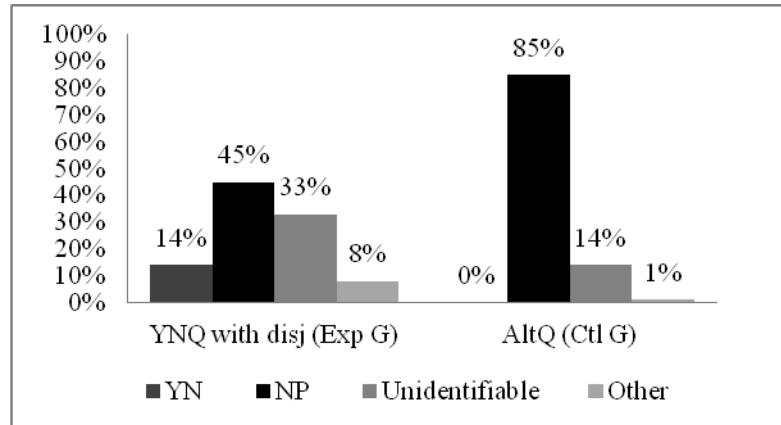
**Table 2:** Children's response patterns of YN and NP in yes/no questions with disjunction

Response Type	✓ YN	× YN	✓ YN	× YN
Presence: ✓	× NP	✓ NP	✓ NP	× NP
Absence: ×				
Number of Subjects	2	11	2	5

The data from this analysis show that only two out of twenty children interspersed YN and NP responses (i.e., the third column), and eleven children produced NP, but never YN responses (i.e., the second column). That is, the majority of NP answers came from children who never produced YN answers. This leads us to conclude that NP responses were not given randomly by our child participants.

The control group of children who were tested on AltQs answered predominantly with NP answers (85% (68/80)) but they never produced YN responses (see Figure 3). This

suggests that children had no problem interpreting ‘YNQ+*soretomo*+YNQ’ as an AltQ, despite the length of the question.



**Figure 3:** Proportion of children’s response types in YNQs with disjunction and AltQs

Children’s responses to YNQs without disjunction, and to wh-questions, show a skewed distribution. In YNQs without disjunction, YN responses almost reached ceiling in both the experimental and control groups (96%, 77/80 and 94%, 75/80 respectively). Similarly, almost all of the responses to wh-questions for both groups were NP responses (experimental group: 92%, 74/80; control group: 97%, 78/80). It is clear that the control questions exhibited a strong tendency to elicit one particular response type from children. Therefore, it is reasonable to interpret children’s different proportions of YN and NP responses to YNQs with disjunction as due to the presence of disjunction. The fact that disjunction appeared in the question made both the YNQ interpretation and the AltQ interpretation available to children.

In sum, the experimental findings indicate that the large proportion of NP responses to YNQs with disjunction by Japanese-speaking children at around age five were associated with the AltQ interpretation, which is a valid interpretation in languages such as English, but an interpretation that is not possible for adult speakers of Japanese. Since the results are compatible with the nativist prediction, we take our findings as supporting

evidence for the continuity hypothesis. This also suggests that the prediction by the usage-based accounts does not lend itself to an explanation of our data because this model does not anticipate linguistic behaviour which is not consistent with the input.

If the children's non-adult performance observed in this experiment is truly dictated by UG as proposed, then it is predicted that the same behaviour should be cross-linguistically manifested. However, it is also unknown for us to what extent the present finding can be generalized across other languages because YNQs vary cross-linguistically in how they mark questions and how they mark focus. In order to pursue the inquiry, we extend our investigation to another typologically different language – Mandarin Chinese. Mandarin Chinese has two types of YNQs that are distinct in form and function. In the next section, these two types of Mandarin YNQs and their differences are introduced.

## 2.4. Yes/no questions with disjunction in Mandarin Chinese

### 2.4.1. Two types of YNQs in Mandarin Chinese

As just mentioned, Mandarin Chinese has two distinct ways to construct YNQs. One way of forming a YNQ is to place a question particle *ma* in the sentence final position as illustrated in (20b).

- |      |  |               |
|------|--|---------------|
| (20) | <p>a. Yuehan xiao le.<br/>John laugh Asp<br/>'John laughed.'</p>               | (Declarative) |
|      | <p>b. Yuehan xiao le <i>ma</i>?<br/>John laugh Asp Q<br/>'Did John laugh?'</p> | (Question)    |

Mandarin Chinese, in addition, has another frequently used YNQ structure known as an A-not-A question in the Chinese linguistic literature. In this question, certain types of



lexical categories are reduplicated, with a negation word *bu* or *mei* in-between. (21a-f) are instances of reduplication of a verb, auxiliary verb, copula, adjective<sup>6</sup>, and adverb respectively. However, it is important to note that reduplication of a noun is ungrammatical as illustrated in (21g).

- (21) a. Yuehan **chi-bu-chi** danggao?  
 John eat-not-eat cake  
*'Does John eat cake?'*
- b. Yuehan **you-mei-you** chi danggao?  
 John have-not-have eat cake  
*'Has John eaten cake?'*
- c. Yuehan **shi-bu-shi** xueshen?  
 John is-not-is student  
*'Is John a student?'*
- d. Yuehan de lian **hong-bu-hong**?  
 John Gen face red not red  
*'Is John's face red?'*
- e. Yuehan **chang-bu-chang** chi danggao?  
 John often-not-often eat cake  
*'Does John often eat cake?'*
- g. \*Yuehan chi le **danggao-mei/bu-danggao**?  
 John eat Asp cake-not-cake  
*'Did John eat cake?'*

The two types of YNQs also differ in their information structure. Like English YNQs, Mandarin *ma*-YNQs allow both argument focus and propositional focus depending on the presence or absence of prosodic stress, as illustrated in (22) and (23) respectively (Schaffar & Chen, 2001).

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<sup>6</sup> Note that only a predicate adjective is possible for a reduplication. It is ungrammatical to reduplicate an attributive adjective.

- (22) a. [YUEHAN]<sub>F</sub> mintian qu Xini *ma*?  
 b. Yuehan [MINTIAN]<sub>F</sub> qu Xini *ma*?  
 c. Yuehan mintian qu [XINI]<sub>F</sub> *ma*?  
 John tomorrow go Sydney Q  
*'Is John leaving for Sydney tomorrow?'*

- (23) [Yuehan mintian qu Xini]<sub>F</sub> *ma*?

The focus of A-not-A questions, on the other hand, is placed on the entire phrase headed by the reduplicated element. (24) demonstrates the focus domain of each example in (21). For instance, the focus domain in (24a) is the entire verb phrase headed by verb *qu* (go).

- (24) a. Yuehan mintina [<sub>VP</sub> *qu-bu-qu* xini]<sub>F</sub>?  
 John tomorrow go-not-go Sydney  
*'Is John leaving for Sydney tomorrow?'*  
 b. Yuehan [<sub>AuxP</sub> *you-mei-you* chi danggao]<sub>F</sub>?  
 John have-not-have eat cake  
*'Has John eaten cake?'*  
 c. Yuehan [<sub>VP</sub> *shi-bu-shi* xueshen]<sub>F</sub>?  
 John is-not-is student  
*'Is John a student?'*  
 d. Yuehan de lian [<sub>AdjP</sub> *hong-bu-hong*]<sub>F</sub>?  
 John Gen face red not red?  
*'Is John's face red?'*  
 e. Yuehan [<sub>AdvP</sub> *chang-bu-chang* chi danggao]<sub>F</sub>?  
 John often-not-often eat cake  
*'Does John often eat cake?'*

Unlike the propositional focus of Japanese *ka/kana*-YNQs, the focus domain of these A-not-A questions is the predicate of a sentence (Shaffar & Chen, 2001). In this case, the subject of a sentence is the background and the predicate of a sentence is the focus

element (Lambrecht, 1994). It is important to note that, like Japanese *ka/kana*-YNQs, argument focus is not permitted in these types of questions either.

#### 2.4.2. Two Mandarin YNQs meet disjunction

When Mandarin *ma*-YNQs contain disjunction *huoshi/huozhe/huozheshi*<sup>7</sup> as in (25), they are mostly judged as YNQs. However, according to some native speakers of Mandarin we have consulted with, the judgments were not as clear-cut as those in Japanese *ka/kana*-YNQs with disjunction.<sup>8</sup> For these Mandarin speakers, although less favourable, *ma*-YNQs with disjunction can be interpreted as if a questioner is asking an AltQ.

- (25) Yuehan chi le danggao *huoshi/huozhe/huozheshi* bingan *ma*?  
John eat Asp cake or cookie Q  
YNQ: 'Is it true that John ate the pudding or the cake?'  
AltQ: ?? 'Which desserts did John eat, the pudding or the cake?'

As noted, the certain speakers' judgement on (25) seems to go against our earlier claim proposing that the available types of information structures in YNQs determine the possible interpretations of YNQs with disjunction. On this analysis, *ma*-YNQs containing disjunction are expected to yield both an AltQ reading and an YNQ reading because no focus restriction is posed in *ma*-YNQs, just as in English YNQs. One way to account for this exception is to attribute the restriction to a different mechanism. We will elaborate this issue later on in the experimental section.

By contrast, A-not-A questions with disjunction like (26) are strictly interpreted only as YNQs by adult speakers of Mandarin, due to the restriction of focus assignment.

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<sup>7</sup> *Huoshi* (或是) and *huozhe* (或者) can be considered as simplification of *huozheshi* (或者是). Although there is no significant difference in meaning among these three disjunctions, it may have a subtle difference in degree of formality, or dialectal difference.

<sup>8</sup> This claim is also supported by our experimental results which will be demonstrated in a later section.

Since argument focus is not permitted in this type of questions, an AltQ reading should not be generated.

- (26) a. Yuehan [<sub>AuxP</sub> **you-mei-you** chi danggao **huoshi/huozhe/huozheshi** bingan]<sub>F</sub>?  
 John have-not-have eat cake or cookies  
 YNQ: *Is it true that John ate cake or cookies?*  
 AltQ: *\*Which desserts did John eat, cake or cookies?*
- b. Yuehan [<sub>AdvP</sub> **chang-bu-chang** chi danggao **huoshi/huozhe/huozheshi** bingan]<sub>F</sub>?  
 John often-not-often eat cake or cookies  
 YNQ: *Is it true that John often eats cake or cookies?*  
 AltQ: *\*Which desserts does John often eat, cake or cookies?*

Mandarin Chinese, like Japanese, also has a unique way to express an AltQ as in

(27). Mandarin has another disjunction word, *haishi*, to define a question as an AltQ.

Unlike Japanese *soretomo*-questions which only permit sentential coordination, the coordination by *haishi* can be cross-categorical; it coordinates nouns as in (27) or adjectives, adverbs, clauses, etc.

- (27) Yuehan chi le danggao **haishi** bingan?  
 John eat Asp cake or cookie  
 YNQ: *\*Is it true that John ate the pudding or the cake?*  
 AltQ: *Which desserts did John eat, the pudding or the cake?*

Given a brief description of the two different types of Mandarin YNQs and those containing disjunction, the second experiment explored interpretation of such questions in Mandarin-speaking children by adopting the same experimental tasks in Experiment 1. The aim of this experiment is to examine whether the results from Experiment 1 can be generalized across other languages and across different types of YNQs. As witnessed in

Experiment 1, Japanese-speaking children entertain an AltQ interpretation in *ka/kana*-YNQs with disjunction despite the absence of its analysis in the primary linguistic data. This finding allows us to speculate that UG enforces children having such a reading against experience. If so, it is predicted that Mandarin children exhibit the same linguistic behaviours as the ones observed in Japanese children.

## **2.5. Experiment 2: Interpretation of yes/no questions with disjunction in Child Mandarin**

### *2.5.1. Participants*

Thirty-two monolingual Mandarin-speaking children (14 boys and 18 girls), ranging in age from 3;11 to 5;11 (mean = 5;0), participated in the experiment. They were recruited at National Taiwan University Kindergarten and at Wesley Kindergarten in Taipei, Taiwan. Thirteen adult native speakers of Mandarin Chinese served as a control group and were recruited by word of mouth in Sydney Australia. To avoid a dialectal difference which may have an impact on experimental outcomes, we selected those adults who had lived in Taiwan at least until the end of secondary education.

### *2.5.2. Procedures and Types of Question stimuli*

The experimental procedure was identical to that of Experiment 1. The child subjects were divided into two groups with 16 children each. One group (age range = 3;11 to 5;10, mean age = 4;11) was given *ma*-questions with disjunction like (28a) and the other comparison group (age range = 4;3 to 5;11, mean age = 5;0) was given A-not-A questions with disjunction like (28b). Each child subject encountered four target questions asked in the

silver medal condition; the condition in which an animal ate one type of vegetables but left the other uneaten.

- (28) a. xiaozhu chi le hongroubuo **huoshi** qingjiao **ma**?  
Mr. Pig eat Asp carrot or pepper Q  
'Did Mr. Pig eat the carrot or the pepper?'
- b. xiaozhu **you-mei-you** chi hongroubuo **huoshi** qingjiao ?  
Mr. Pig have-not-have eat carrot or pepper  
'Did Mr. Pig eat the carrot or the pepper?'

In addition, as filler questions, the child subjects in both groups were also given simple *ma*-questions without disjunction as exemplified in (29). The filler questions were aimed at introducing the remaining medal conditions; two filler questions were asked in the gold medal condition in which two types of vegetables were eaten, and the other two were asked in the black cross condition in which both types of vegetables were left uneaten. A total of eight questions were pseudo-randomly ordered and presented to the child subjects.

- (29) Xiaozhu chi le hongroubuo **ma**?  
Little Pig eat Asp carrot Q  
'Did Little Pig eat the carrot?'

Note that in Mandarin experiments AltQs and wh-questions were not tested as control items. This is because: 1) we knew from our pilot studies that Mandarin-speaking children tended to respond to AltQs and wh-questions with NP responses like Japanese-speaking children, and 2) we wanted to ensure that NP responses in target questions were not a carry-over effect from these control items.

For the adult control group, each subject was asked to respond to four each of (a) *ma*-questions with disjunction, (b) A-not-A questions with disjunction, and (c) filler questions. These were pseudo-randomly ordered and presented in one session. Like Experiment 1, the adult subjects were not asked to reward the animals, and they were asked questions posed by the experimenter without using a puppet.

### 2.5.3. Coding

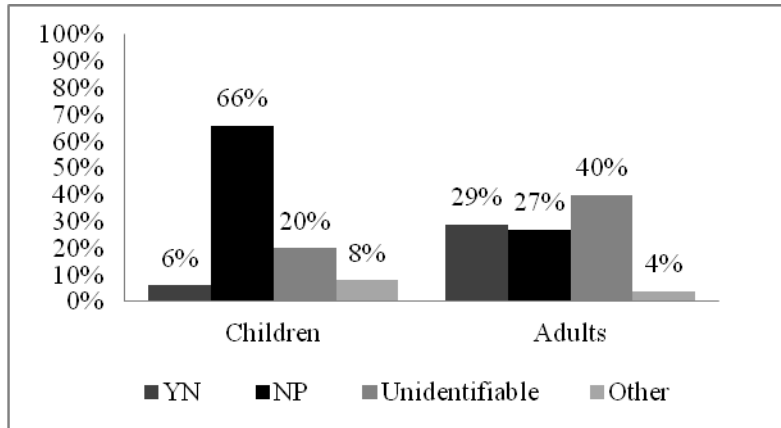
The same coding system established in Experiment 1 was adopted for the analysis. However, one additional note needs to be addressed. Unlike responses to Japanese *ka/kana*-YNQs and Mandarin *ma*-YNQs, ‘Yes’ or ‘No’ responses to A-not-A questions are dispreferred. Rather, A-not-A questions like (28b) require a response with an auxiliary verb or a full sentence as illustrated in (30a) and (30b) respectively. If children utter the former, it is categorized as a YN response, and if the latter, an Unidentifiable response.

- (30)    xiaozhu you-mei-you    chi hongroubuo huoshi qingjiao ?  
           Mr. Pig have-not-have eat carrot            or    pepper  
           ‘Did Mr. Pig eat the carrot or the pepper?’
- a. you/mei you.  
           Have/Not have  
           ‘Did/Did not’
- b. (ta) chi le    hongroubuo.  
           he eat Asp carrot  
           ‘He ate the carrot.’

### 2.5.4. Results and discussions

As Figure 4 shows, in *ma*-YNQs with disjunction, children’s responses were predominantly NP responses – 66% (42/64) of the time. Their response patterns in these questions resembled those in Japanese *ka/kana*-YNQ with disjunction shown in Figure 2.

A non-parametric Pearson's chi-square test with significant level  $\alpha = .05$  showed no statistical significance to reject our null hypothesis – the two question types are homogenous ( $\chi^2(3) = 7.03, p = .07$ ). Furthermore, like the Japanese results, the NP responses between children and adults showed a significant difference (Mann-Whitney test:  $Z = -2.289, p < .05$ ).



**Figure 4:** Proportions of different response types for *ma*-YNQs with disjunction for children and adults

Additionally, we also analysed individual response patterns, as we conducted in Experiment 1, to examine whether the resemblance occurs in this analysis as well (see Table 4). In *ma*-YNQs with disjunction, the children who produced NP responses never produced YN responses except for one subject showing mixed responses of YN and NP (i.e., the third column). Considering this fact, it indicates that NP responses were not given randomly by any children. It is therefore evident that this analysis also supports the cross-linguistic resemblance between Mandarin *ma*-YNQs with disjunction and Japanese *ka/kana*-YNQs with disjunction.

**Table 3:** Children's response patterns of YN and NP in *ma*-questions with disjunction

Response Type	✓ YN	× YN	✓ YN	× YN
Presence: ✓	× NP	✓ NP	✓ NP	× NP
Absence: ×				
Number of subject	1	12	1	2

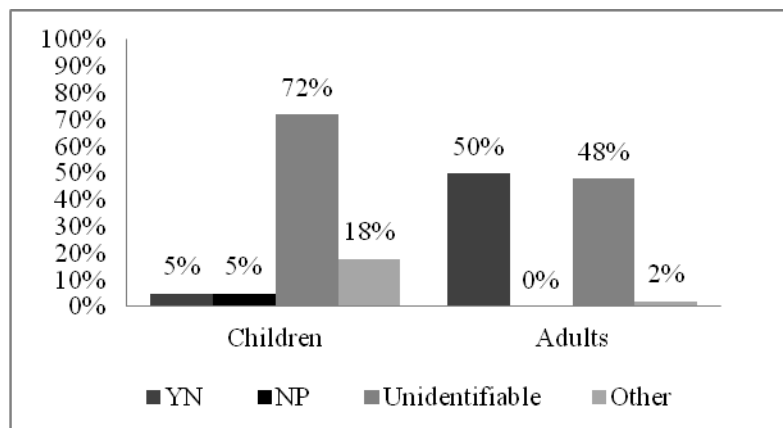


There is one finding that deserves a discussion, however. Earlier we stated that adult native speakers of Mandarin were likely to interpret *ma*-YNQs with disjunction as a YNQ, but this tendency was not as clear-cut as one observed in the Japanese counterpart. The results from the adult controls seem to support this claim. The proportion of NP responses by Mandarin-speaking adult controls was higher than that of the Japanese adult controls (Mandarin adults: 27% (14/52); Japanese adults: 8% (6/80)). Notably, three Mandarin-speaking adults consistently produced NP responses for all of the target questions, which appear different from the response patterns of Japanese adult controls who produced NP responses due to carry-over effects.

These results suggest that both the YNQ interpretation and the AltQ interpretation are potential interpretations for *ma*-YNQs with disjunction. Then, why is the YNQ interpretation preferred in such a form of questions? One possibility is that conversational implicatures may play a role here. According to Grice (1975), a hearer should infer that the questioner chose a *ma*-YNQ with disjunction over the alternative form, i.e., *haishi*-questions like (27) for a reason. If the hearer expects that a speaker is conversationally cooperative in accordance with the Maxim of Manner – ‘avoid ambiguity’, it invites the hearer to conclude that the questioner chose a *ma*-YNQ with disjunction to uniquely express a YNQ meaning. If this is the case, our findings suggest that for the children and adults who answered with NP responses, pragmatic inference was not processed, possibly due to a specific context that was introduced in the experiment task. If so, the difference between children’s and adults’ NP responses can be explained by the difference in vulnerability of their pragmatic processing. This explanation is not unreasonable to stipulate if considering a great deal of studies showing children’s vulnerability in similar sorts of pragmatic inference like scalar implicature (e.g., Chierchia et al., 2001; Noveck, 2001; Papafragou, 2006; Papafragou & Musolino, 2003). However, this pragmatic account

is speculative and still leaves open the possibility for an alternative account. More research is required for explaining the child-adult mismatch in interpretation of *ma*-YNQs with disjunction.

Turning to children's performance on A-not-A questions with disjunction, the proportion of NP responses, by contrast, was only 5% (3/64), indicating that an AltQ interpretation was not accessible in A-not-A questions with disjunction (see Figure 5).



**Figure 5:** Proportions of different response types for A-not-A questions with disjunction for children and adults

However, although we obtained a different distribution for children and adults in responding to A-not-A questions with disjunction as indicated in Figure 5, we need to be cautious about interpreting the results. While most of the adult responses to A-not-A questions were categorized as either YN or Unidentifiable as predicted, the proportion of the children's YN responses (5%, 3/64) was significantly lower than that of adults (50%, 26/52) (Mann-Whitney test:  $Z = -2.665$ ,  $p < .05$ ). Notably, the majority of children's responses (72%, 46/64) were categorized as Unidentifiable.

In order to further analyse this result, we took a closer look at the Unidentifiable responses. It was found that 33 out of the 46 Unidentifiable responses (equivalent to 51% of the total number of responses) formed an exhaustive expression, as illustrated in (31a-b), and the remaining 13 responses consisted of a full sentence. These answers contrasted with

those of adults showing a reverse pattern (Exhaustive response: 4/25, Full Sentence response: 21/25).

- (31) a. xiaozhu you chi hongroubuo, meiyou chi qingjiao.  
Little. Pig have eat carrot not.have eat pepper  
'Little. Pig had eaten the carrot, (but) had not eaten the pepper.'
- b. xiaozhu **zhi** chi le hongroubuo.  
Little Pig only eat Asp carrot  
'Little. Pig only ate the carrot.'

Given the unpredictably high proportion of exhaustive responses, it is necessary to ensure that this type of response was not attributed to difficulties in comprehension of the target questions because of a lack of semantic knowledge of crucial elements; such as the disjunction word *huoshi* or an A-not-A question itself. The former possibility is immediately ruled out by the fact that many children produced NP responses in *ma*-YNQs with *huoshi*. If they did not understand the lexical meaning of *huoshi* as disjunction, they should not have interpreted such a form of questions as an AltQ and thus should not have produced such a high proportion of NP responses. The latter possibility can be also ruled out by well-reported evidence that A-not-A questions emerge in child Mandarin from around age three (e.g., Lee, 1982), which invites us to suppose that the 5-year-old child subjects in our experiment were unlikely to have a problem in comprehension of A-not-A questions.

It is also necessary to note that although the exhaustive responses may be an acceptable response for both a YNQ and an AltQ, it is unlikely that these responses were derived from the AltQ interpretation. If the AltQ interpretation is truly accessible in A-not-A questions with disjunction, children should have produced more NP responses as evident in *ma*-YNQs with disjunction. Unfortunately, at the present time, it is unknown for us what

underlying mechanisms make the exhaustive responses more salient in children's responses, but the results clearly suggest that our child subjects hardly ever interpreted A-not-A questions with disjunction as an AltQ.

In sum, we have observed a close similarity between Mandarin *ma*-YNQs with disjunction and Japanese *ka/kana*-YNQs with disjunction; both questions were likely to be interpreted as AltQs. Contrary to these types of questions, Mandarin A-not-A questions with disjunction strictly prohibit an AltQ interpretation in both children and adults. The cross-linguistic generalization was, therefore, only partially observed. What do the findings from the Mandarin experiment imply for the two models of language development? We will discuss this in the next section.

## **2.6. General Discussion**

The present study investigated children's comprehension of YNQs containing disjunction by investigating how they responded to different types of questions. We began by exploring comprehension of questions with disjunction in Japanese-speaking children. The results revealed that children around age five were likely to produce NP responses, suggesting that they entertained an AltQ interpretation which is not attested in the adult language. In Experiment 2, similar responses were also confirmed in one of the two types of YNQs with disjunction in Mandarin Chinese. Mandarin-speaking children around the same age as the Japanese child subjects in Experiment 1 tended to interpret *ma*-YNQs with disjunction as an AltQ, despite the fact that such an interpretation is less likely to be adopted by adult Mandarin speakers. Given the fact that children's linguistic behaviour was distinct from that of adults in the same language community, but was similar across

languages, the experimental findings are taken to be evidence supporting the continuity hypothesis offered by nativist models of language development.

There is, however, a methodological issue to consider before discussing the theoretical implications of the experimental findings. One might question whether children's responses to questions are reliable enough to identify their interpretations of questions. By considering recent acquisition research highlighting the fact that variations in pragmatic context can yield different sets of findings (e.g., Crain & Thornton, 1998), it is reasonable to think that children's NP responses to the target questions were due to the salience of this answer in the specific context that was introduced in the experimental tasks, rather than being a true reflection of children's linguistic knowledge. Furthermore, it has also been argued that children's responses to questions are susceptible to various pragmatic factors, such as discourse and perceptual information (Salomo et al., 2011), complexity of pragmatic information (Ryder & Leinonen, 2003) and situation settings, i.e., natural discourse setting vs. test setting (Grosse & Tomasello, in press).

In response to this question, the findings from Mandarin A-not-A questions with disjunction provide an important contribution. Using the same methodology; that is with pragmatic context held constant, Mandarin-speaking children showed distinct patterns of behaviour in *ma*-YNQs with disjunction and A-not-A questions with disjunction. While NP responses were salient in the former type of question, such a response type was infrequent in A-not-A questions (66% vs. 5%). This suggests that the pragmatic context introduced in our experiments was not dictating the children's responses. Rather, children's answers reflected how they were interpreting the question.

Let us now turn to a discussion of our experimental findings from the perspective of the two competing theories of language development. The findings from the Japanese experiment pose several challenges to usage-based accounts, on the assumption that the

form-function pairing is the core mechanism of language acquisition. Unlike English YNQs with disjunction in which one form permits two possible interpretations, in Japanese, each interpretation has a unique form. If the form-function pairings were being exploited, it is anticipated that children should not commit to an interpretation that is not attested in the input. This prediction, however, was not supported since Japanese-speaking children entertained a non-adult interpretation of Japanese *ka/kana*-YNQs.

Critics may point out, however, that this learning scenario misses the essence of usage-based accounts which can predict children's non-adult-like behaviours in low-frequency items. This prediction has been held not only in children's production studies (e.g., Rowland & Pine, 2000; Rowland, 2007), but also in comprehension studies (e.g., Matthews, Lieven Theakston, & Tomasello, 2009). In fact, our corpus analyses suggest that Japanese YNQs with disjunction seems to be less frequently observed in child-directed speech. We conducted a corpus analysis on Japanese naturalistic speech data extracted from the CHILDES database (MacWhinney, 2000), consisted of four longitudinal corpora, Arika, Asato, Nanami, and Tomito from the MiiPro (Miyata & Nisisawa, 2009, 2010; Nisisawa & Miyata, 2009, 2010). For each corpus, the CLAN program was used to count the number of utterances of (i) questions; (ii) *ka*-YNQs; (iii) *kana*-YNQs; (iv) *ka*-YNQs with disjunction; and (v) *kana*-YNQs with disjunction. Note that cleft-like structures of YNQs with *ka/kana* particle were excluded for the categories of (ii) to (v). We also excluded *ka/kana*-YNQs containing matrix negation since this type of question normally involves different discourse use, in which a questioner presupposes he will obtain a particular answer from a respondent, much like in English tag questions. As Table 4 shows, only one instance was found for *ka*-YNQs with disjunction and two instances for *kana*-YNQs with disjunction. Compared with those without disjunction, it is clear that *ka/kana*-YNQs with disjunction are infrequent.

**Table 4:** The number of utterances of *ka/kana*-YNQs and those with disjunction in child directed speech

Corpus	Age	Question	<i>Ka</i> -YNQ?	<i>Kana</i> -YNQ?	<i>Ka</i> -YNQ+disj	<i>Kana</i> -YNQ+disj
Arika	3;0-5;0	11,292	379	297	0	0
Asato	3;0-5;0	4,247	152	90	1	1
Nanami	2;11-5;0	5,360	287	120	0	0
Tomito	2;11-5;1	4,137	71	94	0	1

The lack of relevant input is also observed in Mandarin Chinese. A corpus analysis conducted on adult Mandarin speech also suggests that both *ma*-YNQs with disjunction and A-not-A questions with disjunction are rarely attested.<sup>9</sup> For example, we found a total of 638 cases of the disjunction words *huoshi/huozhe/huozheshi* out of 575,500 spoken words extracted from the Academia Sinica Balanced Corpus of Modern Chinese (Academia Sinica Computing Center, 1997), and only one instance was embedded in a YNQ (but without a *ma* particle) and two instances were embedded in A-not-A questions.

<sup>10</sup> Although it is hard to know exactly how much data is sufficient for learning just based on a limited set of corpus data, let us suppose such questions are low-frequency items.

However, this assumption in turn gives rise to the question of why Mandarin-speaking children behaved differently to the two types of questions despite the fact that they are both equally rare. In other words, what factor other than frequency could influence

<sup>9</sup> Unfortunately, we were unable to obtain a child-directed speech corpus in Mandarin Chinese spoken in Taiwan, which contains a sufficient amount of data for analyses. Thus, we used naturalistic speech data in adult conversations, instead.

<sup>10</sup> The followings are the instances extracted from the corpus.

- i. A: ni hui xiang yao kandao haishi jiejin ziji de ouxiang?  
你會想要看到或是接近自己的偶像?  
'Do you want to see or come closer to your idol?'
- ii. A: you-mei-you gege jiejie huoshi bieren de gege jiejie you qiao guo jia de?  
有沒有哥哥姐姐或是別人的哥哥姐姐有蹺過家的?  
'Have (your) brothers and sisters, or other ones' brothers and sisters run away from home?'
- iii. A: you-mei-you shenme chenggong huozhe shibai de jingyan?  
有沒有什麼成功或者失敗的經驗?  
'Do you have some experience of success or failure?'

children to treat them differently? Perhaps, a conceivable solution for the usage-based account is to attribute the factor to generalization mechanisms.

So let us consider a possible explanation by usage-based models assuming that children's comprehension of YNQs with disjunction is generated based on prior generalized knowledge. According to a variant of usage-based models, children avail themselves of information structure to form generalizations (Goldberg, 1995, 2003, 2006). Recall that information structure in prototypical YNQs (i.e., YNQs without disjunction) varies depending on the language. If children are capable of generalizing patterns of information structure from prototypical YNQs which are simpler and more frequently observed in the input, and if children exploit this generalization in their comprehension of YNQs with disjunction, the results from Mandarin experiments are predicted. As mentioned earlier, *ma*-YNQs permit argument focus, but A-not-A questions do not. These facts lead us to anticipate the experimental outcome showing an AltQ interpretation in the former questions, but not in the latter. Furthermore, this analysis can also account for the child-adult mismatch in *ma*-YNQs with disjunction by characterizing it as an overgeneralization.

A problem still remains for this account however. It contradicts the Japanese data, suggesting that Japanese-speaking children do not rely on such a generalization strategy to determine interpretation of *ka/kana*-YNQs with disjunction. If the same strategy were exploited, an AltQ interpretation shouldn't be manifested in child Japanese because argument focus is absent in adult *ka/kana*-YNQs.

Even though we hypothetically assume that the non-adult performance in Japanese-speaking children involves a different scenario of overgeneralizations, a challenge still remains for the usage-based account: what is the alternative scenario in the Japanese case?



The one possibility that comes to mind is the fact that the question particle *ka/kana* also appears in *wh*-questions as exemplified in (32a-c).

- (32) a. John-wa [nani-o]<sub>F</sub> tabe-ta *ka/kana*?  
 John-Top what-Acc eat-Past Q  
 ‘What did John eat?’
- b. [dare-ga]<sub>F</sub> keki-o tabe-ta *ka/kana*?  
 who-Nom cake-Acc eat-Past Q  
 ‘Who ate the cake?’
- c. John-wa [doko-de]<sub>F</sub> keki-o tabe-ta *ka/kana*?  
 John-Top where-Loc cake-Acc eat-Past Q  
 ‘Where did John eat the cake?’

In these *wh*-questions, the focus of the question is narrowly assigned on the argument marked by a *wh*-word (Kiefer, 1980; Lambrecht, 1994), in contrast with the propositional focus of YNQs. With such questions as positive evidence, children may simply overgeneralize and assume that any type of question appearing with particle *ka/kana* permits argument focus, which consequently evokes a non-adult interpretation, i.e., an AltQ interpretation. However, this overgeneralization explanation is unlikely because the input also unambiguously indicates that argument focus appears only in association with *wh*-words. That is to say, this association could be easily entrenched so that it is unlikely to be exploited in comprehension of YNQs with disjunction which do not contain any *wh*-word.

Contrary to usage-based models, the prediction of nativist models is in line with the experimental results. The nativist assumption tolerates non-adult linguistic behaviour by children, in particular behaviour that is not attested in the local language but attested in other languages. One issue, however, remains unsolved for the nativist accounts as well. If UG permits children to take an AltQ interpretation against experience in Japanese *ka/kana*-

YNQs with disjunction and Mandarin *ma*-YNQs with disjunction, why was such an interpretation not evoked in Mandarin A-not-A questions with disjunction? And how could these results be accounted for in the Principles and Parameters theory?

As a starting point to crack this puzzle, let us first propose a relevant parameter defining interpretive variation in YNQs with disjunction. To do so, we also need to introduce one theoretical proposal about how the interrogative force of a sentence is encoded in the grammar. According to this analysis, the interrogative force of a sentence is manifested by the presence of an abstract Q-morpheme (henceforce Q) that licenses the question (Baker, 1970; Bresnan, 1970; Chomsky, 1995; Katz & Postal, 1964). Although, this Q may or may not be explicitly pronounced in a language, it contributes to distinguishing the surface form of YNQs from the corresponding declarative sentences. For example, it has been argued that the subject-auxiliary inversion in English is triggered by the presence of this Q (Chomsky, 1995), even though it is not pronounced. On the other hand, Q is overtly pronounced in Japanese YNQs and Mandarin YNQs. The question particle *ka/kana* (Nishigauchi, 1990) is argued to be the overt realization of the Q and the question particle *ma* (Cheng, 1991) and the ‘A-not-A’ form (Huang, 1991) are the corresponding realizations in Mandarin Chinese.

Given this assumption, it is proposed that the parametric variation may lie in the Q. By comparing Qs across different types of YNQs and across different languages, we notice that some Qs carry the additional function defining the focus of question whereas some do not. For example, in A-not-A questions, the reduplicated element marks the sentence as a question and at the same time assigns the focus of the question to the phrase headed by the reduplicated element. Likewise, in Japanese, the question particle *ka* is situated in the modifier position of a sentence (i.e., the sentence final position) to mark the question and also defines the focus of the question on its complement, namely the entire sentence (or

proposition). On the other hand, subject-auxiliary inversion in English YNQs and the Mandarin question particle *ma* do not contribute to defining the focus of a question at all. Rather the determination of the focus of question hinges on external properties such as prosodic stress, contextual salience, and so forth. Let us take this as a parameter and represent the parameter values as  $Q_{[+Foc(us)]}$  for the former type of question and  $Q_{[-Foc]}$  for the latter type. (33a-c) summarizes the structural position of  $Q_{[\pm Foc]}$  in A-not-A questions, *ka/kana*-YNQs, and *ma*-YNQs respectively:

- |      |  |                        |
|------|--|------------------------|
| (33) | a. $[_{XP} \text{ Subject } [_{X} Q_{[+Foc]} [_{YP} \dots ]_F]]$ | (A-not-A question)     |
|      | b. $[_C Q_{[+Foc]} [_{IP} \dots ]_F]$                            | ( <i>ka/kana</i> -YNQ) |
|      | c. $[_C Q_{[-Foc]} [_{IP} \dots ]]$                              | ( <i>ma</i> -YNQ)      |

In (33a), the  $Q$  is located in the head of  $X$ , immediately below the subject, and  $YP$  represents the complement of the  $Q$ . It is argued that this  $Q$  is realized by reduplicating the maximally projected head in the complement (Huang, 1991). For Japanese-*ka/kana*-YNQs, the  $Q_{[+Foc]}$  is situated in the head of complementizer ( $C$ ) as in (33b) and realized by the question particle *ka/kana*. Similarly, the  $Q$  with a  $[-Foc]$  value in Mandarin *ma*-YNQs is also located in the head of  $C$ . The question particle *ma* in Mandarin *ma*-YNQs is the realization of  $Q_{[-Foc]}$ .

Adopting this parameter, the experimental findings suggest that the Mandarin-speaking children who participated in our experiment set the parameter to the correct value,  $Q_{[+Foc]}$ , for A-not-A questions, so that the focus of the question is restricted to the  $YP$  (i.e., an auxiliary phrase in the case of our experiment), thereby prohibiting an AltQ reading. However for the Japanese-speaking children who produced NP responses, the parameter value was still mis-set as  $Q_{[-Foc]}$ , which is identical to (33c) corresponding to Mandarin *ma*-

YNQs. This is in fact supported by our experimental results, suggesting a resemblance between children's response patterns in Japanese *ka/kana*-YNQs with disjunction and Mandarin *ma*-YNQs with disjunction.

Then, why do children at around the same age of five correctly set the parameter value for Mandarin A-not-A questions but not for Japanese *ka/kana*-YNQs? As the continuity hypothesis permits that children may initially assign an incorrect value in both types of questions, we propose that this discrepancy is due to the difference in speed of transition to a correct parameter value. In other words, even though the initial value is set with an incorrect one, i.e.,  $Q_{[-Foc]}$ , for both Mandarin A-not-A questions and Japanese *ka/kana*-YNQs, re-setting the value for the former questions is easier and immediate.<sup>11</sup>

Supposing that the parameter is initially mis-set as  $Q_{[-Foc]}$  in A-not-A questions. With this parameter value, prior to experience children are led to expect that various types of focus assignment are permitted. Such a condition invites a learnability problem because the adult input is always an acceptable interpretive option for children; that is, they never observe evidence that would trigger a change in parameter value. Fortunately for A-not-A questions, this learnability problem can be easily circumvented. In such questions, children can appreciate the input showing a tight correlation between form and function, which clearly informs them as to what element within the sentence is being focused. For example, when a form exhibits a reduplicated verb, children also notice from its meaning that focus of the question is assigned to the verb phrase; if a reduplicated adverb, the focus of the question is on the adverbial phrase; if a reduplicated predicate adjective, the focus of the

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<sup>11</sup> Within the Principles and Parameters framework, the question of how the initial value is set is still a subject of debates. One argument maintains that each parameter has a dedicated default value (Chomsky, 2004), while the other suggests that an initial parameter value is set unspecified; more precisely, in the initial stage, children are led to analyse all possible grammar constrained by UG (Yang, 2002). Although we want to take a neutral position with respect to this controversy, the experimental findings suggest that  $Q_{[+Foc]}$  should not be set as a default value, otherwise, children would not have shown non-adult interpretations in Japanese *ka/kana*-YNQs with disjunction. This also indicates that all children or at least some children, depending on the proposed theories, have to go through an experience of parameter changes in these types of questions.

question is on the adjective phrase, and so forth. Given such a clear form-function correlation as positive evidence, children can easily learn from the input that the reduplicated element carries focus function and thus re-set the parameter to the value with a focus function, namely  $Q_{[+Foc]}$ .

On the other hand, let's assume the same mis-set scenario in Japanese-speaking children who initially have the value of  $Q_{[-Foc]}$ . This condition also evokes the same learnability problem. However, unlike the case of A-not-A questions, Japanese-speaking children cannot appreciate the form-function correlation that could bring about a quick change of parameter settings. This is because the question particle *ka/kana* which plays the role of Q rigidly stays in the same position (i.e., the head of C), regardless of the type of information structure that the  $Q_{[-Foc]}$  value permits. In the absence of the apparent correlation, children thus need to rely on an alternative strategy to overcome the learnability problem. One such strategy, it is proposed, is to make use of indirect negative evidence (e.g., Chomsky, 1981; Thornton, 2008). If this strategy is indeed adopted by children, a certain course of development is anticipated. Initially, Japanese-speaking children undergo a latent stage in which  $Q_{[-Foc]}$  is considered as a correct value because the propositional focus displayed in the input is one of the acceptable interpretive options permitted by the current parameter setting. We speculate that our child subjects who produced NP responses were still in this stage. At some point in development, children become aware that the propositional focus is the only focus pattern observed in the input. They further notice that the propositional focus matches the structural position of Q (i.e., *ka/kana* particle) being in the modifier position of a sentence. Once children incorporate these facts, it eventually brings the parameter change from  $Q_{[-Foc]}$  to  $Q_{[+Foc]}$ . If indirect negative evidence is exploited in such a way, it is reasonable to anticipate that children spend a prolonged period of time to arrive at the correct parameter setting.

This parametric account can also explain the case of Mandarin *ma*-YNQs with disjunction. In this type of question, the correct parameter value is  $Q_{[-Foc]}$  in the adult language since the question particle *ma* does not carry a focus function. If the parameter is initially set with an incorrect value, i.e.,  $Q_{[+Foc]}$ , children need to re-set the value to  $Q_{[-Foc]}$ . This task seems relatively easy for children because they just need to witness *ma*-YNQs having a various range of focus patterns. And of course, if the initial value is set as  $Q_{[-Foc]}$ , no parameter re-setting is required. In order to adopt an adult-like interpretation, however, children are further required to disfavour the AltQ interpretation by other mechanisms. If this mechanism is pragmatically driven as we proposed earlier, the non-adult interpretation is attributed to children's vulnerability of pragmatic processing and not to a mis-set parameter.

As the reader may notice, this proposed account depends much on learning form-function associations in order to change a parameter setting. What distinguishes this account from the usage-based one is that by setting  $Q_{[-Foc]}$  as the initial parameter value, children's linguistic knowledge is pre-programmed to accommodate various types of information structure as a valid interpretation, just like adult English. And we argue that this *a priori* knowledge may initially put Japanese-speaking children at a disadvantage compared to Mandarin-speaking children who can be rescued by learning form-function associations. If such a discrepancy were observed across the board in a broader range of human languages, it would lend strong support to the existence of *a priori* linguistic knowledge, thereby to the theory of UG.

## 2.7. Conclusion

The present study provided another piece of evidence to show that children display linguistic behaviour that is not attested in the community language but attested in other possible human languages. This evidence corresponds to the continuity hypothesis which states that child language differs from that of adults, in ways that adult languages differ from each other. At the same time, the findings also pose several challenges to the usage-based models. Firstly, children were not conservative as the usage-based models predicts. Secondly, we have questioned whether or not the non-adult linguistic behaviours manifested in our experiments can be explained by overgeneralizations. Then, it was demonstrated that the experimental results can be better explained by invoking the Principles and Parameters theory. By defining a parameter (i.e.,  $Q_{[\pm\text{Foc}]}$ ) contributing to interpretive variation of YNQs with disjunction across different languages, the non-adult performance by Japanese-speaking children was construed as mis-setting such a parameter value. It is also argued that the incorrect parameter value that children initially begin with consequently causes a delay in acquiring the adult value. Despite the fact that the Principles and Parameter account nicely accounts for our experimental findings, further investigations are required to ensure that our proposed account can be generalized to a broader range of human languages. We leave this task for future research.

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# **CHAPTER III**

**CHILDREN'S SCOPE INTERPRETATIONS IN MANDARIN  
QUESTIONS:  
THE CASE OF NEGATION AND DISJUNCTION**





## Abstract

Previous investigations of Mandarin-speaking children's interpretation of scope relations in negative statements with disjunction (i.e., 'John didn't drink tea or coffee') has revealed that children prefer to adopt a non-adult scope interpretation (Jing, Crain, & Hsu, 2005). This paper investigates whether Mandarin-speaking children demonstrate the same scope preference in questions like 'Did John not drink tea or coffee?' In English, this type of question is ambiguous; it can be interpreted as a yes/no question (YNQ) or as an alternative question (AltQ). Each interpretation has a different scope relation between negation and disjunction. Although English assigns two possible interpretations to a single form, Mandarin Chinese has a distinct form for each interpretation. YNQs contain a disjunction word *huozhe* or *huoshi*. AltQs contain a different disjunction word, *haishi*. In an experiment testing three- to five-year-old Mandarin-speaking children, it was found that children's performance depended on the particular lexical items used for disjunction. Whereas children showed an adult-like scope interpretation in negative questions with *haishi* and negative questions with *huoshi*, they performed differently from adults in negative questions with *huozhe*, just as was found in negative statements with disjunction. Possible accounts for this interpretive asymmetry are offered within the Principles-and-Parameters approach of language acquisition (Chomsky, 1981).

*Keywords: Scope interpretation, Disjunction in questions, Focus, Child language comprehension*

### 3.1. Introduction

Disjunction in human language has received an enormous amount of attention from researchers in different disciplines, such as philosophy, linguistics, and psychology, and the field of child language acquisition is no exception. A number of acquisition studies have recently investigated children's interpretation of disjunction in various types of linguistic contexts across different languages (Goro & Akiba, 2004; Gualmini & Crain, 2005; Minai, Goro, & Crain, 2006; Notley, Zhou, Jensen, & Crain, 2011; Su & Crain, 2009; Su, Zhou, & Crain, 2011). On one hand, some of these studies have shown that in certain linguistic contexts, both children and adults interpret disjunction in a particular way, regardless of their local language (Gualmini & Crain, 2005; Minai, et al., 2006; Su & Crain, 2009; Su, et al., 2011). On the other hand, other studies have revealed that children adhere to one particular interpretation of disjunction despite the cross-linguistic variation that is observed in adult languages (Goro & Akiba, 2004; Jing, et al., 2005; Notley, et al., 2011).

Cross-linguistic variation in the interpretation of disjunction is especially observed in sentences containing two or more logical expressions. To illustrate this further, consider English (1) and Mandarin Chinese (2) in which disjunction appears in a sentence containing another logical operator 'not':

- (1) John didn't drink tea or coffee.  
*'John drank neither tea nor coffee'*
- (2) Yuehan meiyou he cha *huozhe*/*huoshi* kafei.  
John not drink tea or coffee.  
*'It was tea or coffee that John didn't drink (but I (= the speaker) don't know which one).'*

English (1) is judged to be a true sentence only in the circumstance in which John drank neither tea nor coffee. Mandarin (2) with disjunction *huozhe* or *huoshi*,<sup>1</sup> by contrast, normally generates a different interpretation. It is often analysed as expressing the speaker's uncertainty about which of the beverages that John didn't drink, so the interpretation further invites the implicature '*but I (as the speaker) don't know which one*'. Under this interpretation, the sentence can be true even in the circumstance in which only one of the beverages was consumed by the subject 'John'. This interpretive asymmetry is often captured by a difference in scope assignment. It is argued that in the interpretation of (1), negation takes scope over disjunction (for shorthand: *not* > *or*), whereas in (2), the relation is reversed: disjunction takes scope over negation (*or* > *not*). Interestingly, what previous acquisition studies have found is that children are likely to interpret such sentences in the same way as they are interpreted in English, despite the fact that their local language may not exhibit the same scope interpretation. That is to say, even though Mandarin-speaking children encounter the language input that exhibits the non-English-like interpretation, they tended to adopt the English-like interpretation (Jing, et al., 2005).

Despite the intriguing findings of children's interpretation of disjunction in statements like (1) and (2), few (if any) studies have examined children's interpretation of disjunction in different speech acts, such as in interrogatives. In natural discourse, disjunction appears in interrogatives as frequently as in statements. What brings our attention to this type of speech act is that questions containing disjunction also demonstrate cross-linguistic variation across language and such variation can be described by

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<sup>1</sup> As far as we are aware of, the two forms of disjunction, *huozhe* and *huoshi*, are almost identical in usage, but they are used in different dialects of Mandarin Chinese. The former is frequently used in Beijing Mandarin but the latter in Taiwanese Mandarin.

differences in scope. To exemplify this, let us turn (1) into a question as given in (3).<sup>2</sup> The interesting property of questions like (3) is that they yield two possible interpretations. One is a YNQ interpretation and the other is an alternative question (AltQ) interpretation.

(3) Did John not drink tea or coffee?

YNQ: *'Is it the case that John didn't drink tea or coffee?'* (not > or)

AltQ: *'Which of the beverages did John not drink, tea or coffee?'* (or > not)

On the YNQ interpretation, the question is requesting information about whether the propositional content (i.e., *John didn't drink tea or coffee*) is true or false. When the answer is 'Yes', we are informed that John drank neither coffee nor tea. When the answer is 'No', we are informed that John drank either tea or coffee or both. On the AltQ interpretation, the question asks which particular one, among the alternatives (i.e., tea or coffee), John did not drink. On the YNQ interpretation, it is considered that disjunction is under the scope of negation (*not > or*). On the other hand, disjunction takes scope out of negation on the AltQ interpretation (*or > not*). That is, two scope assignments are possible in English questions like (3).

Taking a look at languages other than English, however, the corresponding questions do not necessarily have the same range of interpretations. In Mandarin Chinese, each of these interpretations is associated with a different lexical item for disjunction. When the speaker intends to convey a YNQ, the speaker uses a question like (4). In this type of questions, disjunction word *huozhe/huoshi* is used, as we saw previously in negative statements with disjunction like (2), repeated in (5).

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<sup>2</sup> There is another form of a negative YNQ with disjunction, in which negation is preposed to the front as in (i). We put this type of questions aside for considerations in this study.

(i) Didn't John drink coffee or tea?

- (4) Yuehan meiyou he cha *huozhe/huoshi* kafei ma?  
 John not drink tea or coffee Q  
 YNQ: *'Is it the case that it was tea or coffee that John didn't drink?'*  
 (or > not)
- (5) Yuehan meiyou he cha *huozhe/huoshi* kafei.  
 John not drink tea or coffee  
*'It was tea or coffee that John didn't drink.'*  
 (or > not)

One may notice that question (4) and negative statement with disjunction (5) is a minimal pair. The only difference is that question (4) has a sentence-final particle *ma*, which uniquely licenses a YNQ. Therefore, if we turn the interpretation (5) into a YNQ, we get the interpretation of question (4).<sup>3</sup> Although both English (3) and Mandarin (4) can be interpreted as a YNQ, they differ in the scope relation between negation and disjunction. On the YNQ interpretation of English (3), negation takes scope over disjunction (*not* > *or*). However, in Mandarin (4), disjunction takes scope over negation (*or* > *not*).

To convey an AltQ, on the other hand, a different disjunction word *haishi* is used, as illustrated in (6). Here, we have the same interpretation as the AltQ interpretation in English (3). Therefore, the scope relation between negation and disjunction is identical to the AltQ interpretation in English (3). That is to say, disjunction takes scope over negation (*or* > *not*).

- (6) Yuehan meiyou he cha *haishi* kafei?  
 John not drink tea or coffee  
 AltQ: *'Which of the beverages did John not drink, tea or coffee?'* (or > not)

Given the cross-linguistic variation, we could ask whether Mandarin-speaking children are able to interpret (4) or (6) in the same way as adults do, or whether they start out with one specific scope interpretation, as found in previous studies examining

<sup>3</sup> The interpretation *'but I don't know which one'* does not arise in question (4), as it is no longer a statement.

children's interpretation of disjunction in negative statements. The present study is, therefore, designed to find out some answers to these research questions by conducting experiments with three- to five-year-old Mandarin Chinese-speaking children.

The overview of the present paper is following. We first introduce our assumptions about disjunction and the concept of scope that we adopt throughout this paper. This assumption leads us to consider that the interpretive variation of disjunction is attributed to the variation in parameters as proposed in the Principles and Parameters theory of Universal Grammar (Goro, 2007; Goro & Akiba, 2004; Jing, et al., 2005). This is followed by the reviews of some previous studies investigating children's interpretation of disjunction in negative statements. We, then, shift our discussion to questions containing disjunction in order to address our research objectives, and follow this with the presentation of experiments testing children's interpretations of Mandarin disjunction *haishi* and *huozhe/huoshi* in question sentences.

### **3.2. Cross-linguistic variation in interpretation of disjunction**

According to classical logic, disjunction is assigned the truth conditions of inclusive-*or*, such that a statement of the form 'A *or* B' is true in three circumstances: if only 'A' is true; if only 'B' is true; and if both 'A' and 'B' are true. When the form 'A *or* B' with these truth conditions is negated, it would be true only in the circumstance in which both 'A' and 'B' is not true, conforming to one of de Morgan's law given in (7).

$$(7) \quad \neg(A \vee B) \Rightarrow \neg A \wedge \neg B$$

Disjunction in some languages like English seems to be compatible with this law. Let us, for example, consider the English examples in (8).

- (8) John didn't drink tea or coffee.

The negative sentence (8) is considered as a true sentence only in the circumstance in which John drank neither coffee nor tea. This truth conditions conform to the law in (7).<sup>4</sup>

Not every language, however, exhibits the same analysis. As exemplified in (2), disjunction in languages like Mandarin Chinese is interpreted differently from that of English in certain contexts. This interpretive difference can be accounted for by the notion of 'scope'. Before showing some specific examples, let us briefly introduce how scope is represented in syntactic structures.

### 3.2.1. *The syntax of scope*

In the generative framework of linguistics, sentences are hierarchical syntactic objects (Chomsky, 1957). So if there are two elements in a sentence, one has to dominate the other and is said to 'have scope over' the other element. In theories of generative syntax, an element only has scope over another element if it (asymmetrically) *c-commands* it. C-

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<sup>4</sup> One may argue that the interpretation of the positive sentence (8), shown in (i), does not follow the truth conditions of *or* in logic.

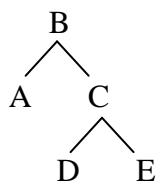
- (i) John drank tea or coffee.

This is because one who hears (i) would probably interpret it as expressing that John drank some tea or he drank some coffee, but not both, which does not include the last of the described truth conditions (i.e., both 'A' and 'B' is true). In fact, if this person is in a position to know that John drank both beverages, they would disagree with the statement in (i), and would respond 'No, he drank both.' However, this so-called exclusive interpretation of disjunction is not part of the meaning of disjunction. According to the pragmatic account of exclusive interpretation of disjunction (e.g., Horn, 1972), the circumstance in which both disjuncts are true is excluded by a pragmatic implicature. On this view, principles of cooperation require language users to align the information strength of the expressions they use with their state of knowledge (Grice, 1975). So, if a speaker knows that John drank both kinds of beverages, he/she is expected to use most appropriate alternative expression *and*, instead of *or*. The use of the 'weaker' statement with *or* in (i) creates an inference in the minds of hearers, that the possibility of John drinking both tea and coffee is excluded from consideration.

command is an abstract hierarchical relationship that holds between two elements in a sentence representation, and is defined as follows:

- (9)  $x$  c-commands  $y$  iff:
- i)  $x \neq y$ ,
  - ii) neither  $x$  dominates  $y$  nor  $y$  dominates  $x$ .
  - iii) the first branching node that dominates  $x$  also dominates  $y$ .

- (10) Syntax tree



According to the definition (9), node A in syntactic tree (10) c-commands node C, D, and E, but not B. Given this definition of c-command, scope is defined as following (cf. Haim & Kratzer, 1998).

- (11) *If an operator  $\alpha$  asymmetrically c-commands another operator  $\beta$ ,  $\alpha$  takes scope over  $\beta$ .*

Thus, in the tree (10), node D and E is in the scope of node A.

### 3.2.2. Cross-linguistic variation in scope

Let us now consider the examples shown earlier in (1) and (2) repeated in (12) for English, (13) for Mandarin Chinese, together with the corresponding sentence in Japanese in (14).

- (12) John didn't drink tea or coffee.  
*'John drank neither tea nor coffee.'* (not > or)



- (13) Yuehan mei he cha *huozhe/huoshi* kafei.  
 John not drink tea or coffee.  
*'It was tea or coffee that John didn't drink (but I (= a speaker) don't know which one).'*  
 (or > not)
- (14) John-wa ocha *ka* kohi-o noma-nakat-ta.  
 John-Top tea or coffee-Acc drink-Neg-Past.  
*'It was tea or coffee that John didn't drink (but I (= a speaker) don't know which one).'*  
 (or > not)

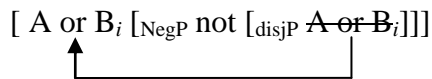
The Surface structure of the examples in (12) to (14) are all identical; negation taking scope over the domain where disjunction is positioned (for shorthand: *not* > *or*), as depicted in (15). Let us call the interpretation derived by this scope pattern a *surface scope interpretation*.

- (15) Scope relation: *not* > *or*  

$$[\text{NegP not } [\text{disjP A or B}]]$$

However, the scope relation between the two operators in the semantic representation (or Logical Form) may not be the same as those in the surface form. While English (12) maintains the same scopal relation as its surface form yielding a '*neither*' reading, the scope assignment in Mandarin (13) and Japanese (14) is reversed with disjunction taking scope over negation (i.e., *or* > *not*). The interpretation derived from this scope assignment is in fact captured by the gloss below (13) and (14), expressed by a cleft sentence where the disjunction phrase (i.e., *tea or coffee*) is extracted out from the original position within the subordinate clause (i.e., *John didn't drink ~~tea or coffee~~*). To account for this 'covert' scope shifting, we assume that another syntactic mechanism *movement* – displacement of an element from one structural position to the other – is undergoing. (16) illustrates the consequence of the scope shift.

(16) Scope relation: *or* > *not*



Thus, the semantic representations of (13) and (14) can be structurally illustrated as in (17).

Let us call the interpretation derived by this scope assignment *an inverse scope interpretation*.



Given the scopal account of variation in interpretation of disjunction, one might ask why languages like Mandarin and Japanese undergo a ‘covert’ scope shifting while the others do not. According to Goro (2007) and Goro and Akiba (2004), this is because disjunction in human language is related to a linguistic phenomenon known as Positive Polarity. These researchers further propose that Positive Polarity items (PPIs) are subject to parametric variation as proposed within the framework of the Principles and Parameters theory (Chomsky, 1981). By definition, lexical items with a feature of Positive Polarity cannot be interpreted under the scope of negation within the same clause (Baker, 1970; Szabolcsi, 2002).<sup>5</sup> The English quantificational expression *some* in (18) is another example.

- (18) John didn't see *someone*.  
*'There is someone who John didn't see.'* (*someone* > *not* / *\*not* > *someone*)

Intuitively, the interpretation of (18) is described as ‘*there is someone that John didn't see*’, in which *someone* is interpreted higher than negation *n't*. If *someone* is interpreted in the

<sup>5</sup> There are several diagnostic properties of PPIs. We refer the reader to Goro (2007) and Szabolcsi (2004) for the details of these properties.

original position, it is meant to convey the same interpretation as ‘*John didn’t see anyone.*’ Note that, in contrast with *someone*, *anyone* is a Negative Polarity Item (NPI) that must be interpreted under the scope of negation.

Interestingly, PPIs have another characteristic. Disjunction with a positive polarity feature cannot take scope over negation that sits in the higher clause (Goro, 2007; Szabolcsi, 2002). This is illustrated in the Mandarin (19) and Japanese (20) examples.

- (19) Wo bu renwai Yuehan he le cha *huozhe*/*huoshi* kafei.  
 I not think John drink Asp tea or coffee  
 ‘*I don’t think John drank tea or coffee.*’ (not >> or / \* or >> not)
- (20) Watashi-wa John-ga ocha *ka* kofi-o non-da to omowa-nai.  
 I-Top John-Nom tea or coffee-Acc drink-Past Comp think-Neg  
 ‘*I don’t think John drank tea or coffee*’ (not >> or / \* or >> not)

Both in Mandarin (19) and Japanese (20), the only possible interpretation is the surface scope interpretation (i.e., *not* > *or*). This is the same interpretation that English speakers also adopt in English sentence ‘*I don’t think John drank tea or coffee.*’ What this evidence suggests is that the cross-linguistics variation is only observed in certain linguistic contexts, such as simple negative sentences, in which disjunction is permitted to take wide scope of negation.

### 3.3. Children’s interpretation of disjunction in negative statements

Let us now turn to discuss some previous research investigating children’s interpretation of disjunction. Recent acquisition studies have found that children consistently interpret disjunction equivalent to the interpretation in logic across different linguistic contexts (e.g., Goro & Akiba, 2004; Gualmini & Crain, 2005; Jing et al., 2005; Notley et al., 2011; Su &

Crain, 2009; Su et al., 2011). This section focuses on the research investigating children's interpretation of disjunction in simple negative statements.

According to the Principles and Parameters theory of language acquisition (Chomsky, 1981), language development is viewed as a process by which language learners adjust parameter values to match those that are operative in the language of their community. Within this framework, there are various proposals about how the initial value is determined (e.g. Berwick, 1985; Crain, Ni, & Conway, 1994; Crain & Thornton, 1998; Yang, 2002). Based on learnability considerations in the absence of negative evidence (Bowerman, 1988; Marcus, 1993), one proposal is that there is a learnability constraint known as the Subset Principle that requires learners to initially choose the value that generates the smallest possible language. By positing such a constraint, it ensures that language learners can converge on the correct parameter settings for their language based solely on the positive evidence.

Taking learnability issues into consideration, Goro (2007) and Goro and Akiba (2004) made a prediction regarding how children would initially interpret negative statements with disjunction, ones like in (12) to (14), repeated in (21) to (23) respectively.

- (21) John didn't drink tea or coffee.  
*'John drank neither tea nor coffee.'* (not > or)
- (22) Yuehan mei he cha huozhe kafei.  
John not drink tea or coffee.  
*'It was tea or coffee that John didn't drink (but I (= a speaker) don't know which one).'* (or > not)
- (23) John-wa ocha ka kofi-o noma-nakat-ta.  
John-Top tea or coffee-Acc drink-Neg-Past.  
*'It was tea or coffee that John didn't drink (but I (= a speaker) don't know which one).'* (or > not)

Based on a variant of the Subset Principle known as the Semantic Subset Principle (SSP) (Crain, et al., 1994), Goro (2007) predicted that Japanese-speaking children would initially interpret Japanese sentences like (23) in the same way as English speakers interpret (21), with negation taking scope over disjunction (*not > or*). Essentially, the SSP stipulates that if there are two accessible semantic interpretations in a sentence, one of which asymmetrically entails the other, children initially adopt the interpretation containing the narrowest range of circumstances. Taking the SSP as a defining principle, it is argued that in a parameter-setting scenario, children need to initially assign the parameter value that yields a narrower range of interpretations so that children can avoid a learnability dilemma. In other words, on this account, children initially set the value of the PPI parameter to the [-PPI] setting that generates the surface scope interpretation (i.e., an English-like interpretation). This reading is a subset of the interpretations that correspond to the inverse scope interpretation (i.e., Japanese- or Mandarin-like interpretation). Children can then switch to the alternate value if it is motivated by positive evidence from the adult language.

An experiment by Goro and Akiba (2004) confirmed this prediction. Using the Truth-value judgment task (Crain & Thornton, 1998), they investigated three- to five-year-old Japanese-speaking children on negative sentences with disjunction like (23). What they found was that the majority of the child participants consistently interpreted such sentences with the non-target surface scope interpretation, despite the fact that all Japanese-speaking adult controls adopted an inverse scope reading.

Similar results were found by Jing, et al. (2005) in Mandarin-speaking children. Following the parameter approach to disjunction, Jing et al. proposed that the Mandarin word for disjunction *huozhe* takes the [+PPI] value of the parameter in the adult language, while Mandarin-speaking children take [-PPI] as an initial value. Using a Truth-value

judgment task, Jing et al. found that twenty out of twenty one Mandarin-speaking child subjects consistently interpreted negative sentences with disjunction like (22) with the surface scope interpretation. This was contrasted with Mandarin-speaking adults, many of whom adopted the inverse scope interpretation. In short, these previous studies suggest a uniform pattern in the children's development of the interpretation of disjunction across different languages: children begin by interpreting these negative statements as having negation taking scope over disjunction.

It is worth noting, however, that the findings from these studies do not necessarily indicate that children cannot access the inverse scope interpretation at all. Recent studies have revealed that children are indeed able to access the inverse scope interpretation if specific contexts are set up to encourage them to do so (e.g. Conroy, Lidz, & Musolino, 2009; Gualmini, Hulsey, Hacquard, & Fox, 2008; Musolino & Lidz, 2006). It may rather suggest that by setting one parametric value over the other, children or even adults may have preference for a certain scope assignment, and whenever a preferred interpretation is hindered by certain linguistic and/or cognitive factors, or the alternative interpretation is enforced for certain reasons, the preferred interpretation can be abandoned (e.g., Musolino, 2011; Musolino & Lidz, 2006; Notley, et al., 2011).

### **3.4. Disjunction in negative questions**

The acquisition literature that we have just reviewed discusses children's interpretation of disjunction in statements, but little is known about how children interpret disjunction in questions. The present study therefore, aims to address this issue. In what follows, we will illustrate how disjunction behaves in questions that contain negation.

In natural discourse, disjunction appears not only in statements but also in other types of speech acts, such as interrogatives. Interestingly, when disjunction occurs in questions, it allows two possible interpretations. In English, yes/no questions (YNQs) with negation and disjunction are ambiguous. This is illustrated in (24).

- (24) Did John not drink tea or coffee?  
 YNQ: *'Is it the case that John didn't drink tea or coffee?'* (not > or)  
 AltQ: *'Which of the beverages did John not drink, tea or coffee?'* (or > not)


One interpretation corresponds to a YNQ. When the answer is 'Yes', we are informed that John drank neither tea nor coffee. When the answer is 'No', on the other hand, we are informed that John drank either tea or coffee or both. On the other interpretation, the question asks which particular one, among the alternatives (i.e., tea or coffee), John didn't drink. This second interpretation is known as an alternative question (AltQ). The AltQ interpretation sometimes is dependent on pragmatic context, and it is characteristically associated with a prosodic break, and with stress being placed on the disjunctive phrase.

How do the two interpretations of (24) differ in their syntactic/semantic representation? According to some analyses (cf. Han & Romero, 2004; Larson, 1985), it is claimed that on an AltQ interpretation, the disjunction phrase *tea or coffee* is moved to the left periphery, to a position higher than the negation, thereby assigning inverse scope (*or* > *not*).<sup>6,7</sup> Let us illustrate this syntactic representation in (25).

<sup>6</sup> It is worth noting that there is an alternative account for AltQs that does not assume movement of the disjunction phrase (Beck & Kim, 2006).

<sup>7</sup> In contrast to Larson (1985) and Han and Romero (2004), we assume that an entire disjunction phrase moves to the higher position, following the analysis by Munn (1992). This is simply because we do not want to commit to the idea that there is a covert operator *Op* as shown in (i) and the idea that only this operator undergoes movement to mark the scope of the disjunction phrase.

(i) [*Op*<sub>i</sub> [did you drink [*Op*<sub>i</sub> coffee or tea]]]?

- (25) [CP tea or coffee<sub>i</sub> [C[+Q] did John not drink ~~tea or coffee~~<sub>i</sub>]]
- 

By contrast, when the YNQ interpretation is adopted, the phrase with disjunction is considered to be within the scope of negation. This is illustrated in (26). Therefore, on this interpretation, negation scopes over disjunction (*not* > *or*).

- (26) [C[+Q] did John not drink tea or coffee]

The ambiguity that shows up in English is observed only in one class of languages, however. In another class of languages, such as Mandarin Chinese, there is no ambiguity. Rather, each interpretation is manifested by a unique form of question. For example, to convey an AltQ interpretation in Mandarin, questions are constructed as in (27).

- (27) Yuehan meiyou he cha *haishi* kafei?  
 John not drink tea or coffee  
 AltQ: 'Which of the beverages did John not drink, tea or coffee?' (*or* > *not*)

Notice that the disjunctive word used in this type of question (i.e., *haishi*) is different from the lexical item for disjunction that we have seen so far (i.e., *huozhe/huoshi*). The lexical item *haishi* is used only to form an AltQ in Mandarin Chinese. As the interpretation of (27) and the AltQ interpretation derived by English shown in (24) are identical, we can consider that the syntactic/semantic representation of the two is also identical. Therefore, in (27), disjunction takes scope over negation (*or* > *not*).

On the other hand, when a Mandarin speaker intends to convey a YNQ, the speaker uses a question like (28). In this type of question, the disjunction word *huozhe/huoshi* is



used, as we saw previously in negative statements with disjunction like (2), repeated in (29).

- (28) Yuehan meiyou he cha *huozhe/huoshi* kafei *ma*?  
 John not drink tea or coffee Q  
 YNQ: ‘*Is it the case that it was tea or coffee that John didn’t drink?*’ (or > not)
- (29) Yuehan meiyou he cha *huozhe/huoshi* kafei.  
 John not drink tea or coffee.  
 ‘*It was tea or coffee that John didn’t drink.*’ (or > not)

By comparing question (28) to statement (29), we can notice that these two sentences are a minimal pair. The only difference is that question (28) has the question particle *ma*, which uniquely licenses a YNQ (Cheng, 1991).<sup>8</sup> Thus, if we turn the interpretation (29) into a YNQ, we get the interpretation of question (28), corresponding to ‘*Is it the case that it was tea or coffee that John didn’t drink?*’

It is important to note that the scope relation between negation and disjunction on the YNQ interpretation derived by the English example in (24) differs from the interpretation of the Mandarin YNQ in (28). Let us compare the two interpretations below:

- (30) English YNQ interpretation  
 a. *Is it the case that John didn’t drink tea or coffee?* (not > or)
- Mandarin YNQ interpretation  
 b. *Is it the case that it was tea or coffee that John didn’t drink?* (or > not)

On the English YNQ interpretation, negation takes scope over disjunction (i.e., the surface scope). The ‘Yes’ answer to interpretation (30a) informs us that John drank neither tea nor

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<sup>8</sup> Question particle *ma* cannot co-occur with *haishi* in AltQ (27), as the question particle *ma* would conflict with the AltQ interpretation generated by *haishi*.

coffee. By contrast, when the scope relation is reversed as in the Mandarin YNQ interpretation (30b) (i.e., the inverse scope interpretation), the ‘Yes’ answer informs us that John didn’t drink at least one of the beverages.

This observation is critical to our study on children’s scope interpretation. As Goro (2007), Goro and Akiba (2004), and Jing et al. (2005) argued, children are expected to interpret disjunction within the scope of local negation due to the fact that they should begin with the [-PPI] setting of the parameter. If the same scope restriction is also applicable in Mandarin YNQs like (28), it is predicted that children would adopt the interpretation corresponding to English YNQ interpretation (30a).

The same prediction applies to Mandarin AltQs like (29). If children adopt the surface scope interpretation (*not > or*) due to the [-PPI] setting of the parameter in Mandarin AltQs like (29), it is expected that children would also adopt the interpretation equivalent to the English YNQ interpretation shown in (30a). In order to investigate our predictions, we conducted experiments which will be presented in the next section.

### **3.5. Experiment**

#### *3.5.1. Experimental design*

In the present experiment, we examined children’s interpretations of question sentences by analysing their responses to the questions. Negative questions with disjunction elicit two possible ways of responding depending on the scope relation between negation and disjunction. To exemplify this, consider the English question in (31) produced in a circumstance in which John drank coffee but not tea.

- (31) Did John not drink tea or coffee?

YNQ interpretation

*'Is it the case that John didn't drink tea or coffee?'* (not > or)

**Expected answer:** 'No, he drank coffee.'

AltQ interpretation

*'Which of the beverages did John not drink, tea or coffee?'* (or > not)

**Expected answer:** 'Tea' / 'He didn't drink Tea.'

When question (31) is interpreted as a YNQ where the surface scope is taken (*not > or*), it elicits a 'No' response. For the justification of the rejection, it should be pointed out which beverage that John drank (i.e., coffee). By contrast, if the disjunction takes scope out of negation to convey an AltQ, the response should address the beverage that John didn't drink (i.e., tea). Therefore, this difference in possible responses can be used to identify the scope assignment of disjunction and negation in question sentences.

In this study, we are concerned with the two Mandarin questions illustrated in (32) and (33).

- (32) Yuehan meiyou he cha **huozhe/huoshi** kafei ma?  
 John not drink tea or coffee Q  
 YNQ: *'Is it the case that it was tea or coffee that John didn't drink?'*  
 (or > not)
- (33) Yuehan meiyou he cha **haishi** kafei?  
 John not drink tea or coffee  
 AltQ: *'Which of the beverages did John not drink, tea or coffee?'* (or > not)

Based on the claim that Mandarin disjunction is a PPI in the adult language, the interpretation of (32) contains the inverse scope assignment (*or > not*). Although in English, this scope relation yields an AltQ interpretation, Mandarin (32) rarely does. This is due to the question particle *ma* in (32) that uniquely licenses an YNQ (Cheng, 1991), as we discussed earlier. Therefore, the interpretation of (32) is a YNQ interpretation but

disjunction takes scope over negation like the gloss below (32). On this interpretation, the answer ‘Yes’ informs us that John didn’t drink at least one of the beverages, whereas the answer ‘No’ informs us that John drank both tea and coffee. Thus, in the circumstance in which John drank coffee but not tea, the expected answers are ‘*Yes, he didn’t drink tea*’ and the answers point to the beverage that John did not drink (i.e., tea).

On the other hand, (33) is uniquely interpreted as an AltQ, so Mandarin-speaking adults would respond to it by saying ‘*Tea*’ or ‘*He didn’t drink tea*’ where the answers also point to the beverage that John did not drink. In other words, in the adult language, the responses for both question types address the same object ‘tea’.

According to the claims by Jing et al. (2005), by contrast, if disjunction contain the [-PPI] value, children would adopt the surface scope interpretation, which is equivalent to the English YNQ interpretation, for both YNQ with disjunction *huozhe/huoshi* (32) and AltQ with disjunction *haishi* (33). If so, ‘No’ answers are expected to be produced, followed by the justification of the rejection by pointing out the beverage that John did drink; that is, ‘coffee’. Therefore, we can identify which scope assignment children adopt in interpreting YNQ with *huozhe/huoshi* like (32) and AltQ with *haishi* like (33), by looking at which object children point to. To examine whether children behave like adults or not, we conducted the experiment outlined below.

### 3.5.2. *Participants*

We recruited participants from two different countries, People’s Republic of China and Taiwan, where Mandarin Chinese is spoken. Twenty three Mandarin-speaking children raised in Beijing, People’s Republic of China and 28 Mandarin-speaking children raised in Taipei, Taiwan (total 55 children) participated in the experiments. However, only the data from 14 of the children from China (age range = 3;8 to 5;11, mean = 4;4) and 20 children

from Taiwan (age range = 3;5 to 5;8, mean = 4;6) who completed two experimental sessions were included in the analyses. The remaining child participants were excluded because either they failed to complete the first session, or they couldn't participate in the second of the two experimental sessions. The child participants were recruited from the university-affiliated kindergarten at Beijing Language and Culture University in Beijing, China and National Taiwan University Kindergarten in Taipei, Taiwan, respectively. For the adult participants, 20 Mandarin-speaking undergraduate students who were native speakers of Mandarin were recruited at Beijing Language and Culture University in Beijing, China and 15 undergraduate students at National Tsing Hua University in Hsinchu, Taiwan.

### 3.5.3. *Procedures*

In addition to the test question sentences, negative statements with disjunction were also tested as a control structure. In order to test sentences that convey different speech acts, we adopted the methodology used in Peng et al. (2010) and Su et al. (2011), known as the Question-Statement task. This experimental methodology, developed from the Truth-value judgement task (Crain & Thornton, 1998), allowed us to examine the interpretation of questions and statements within a single task.

In this task, participants watch short stories acted out by an experimenter using toys and props. Following the end of each story, a puppet, who watches the story alongside the participant, attempts to describe what happened. Participants are also told in advance that the puppet is easily distracted and often doesn't pay attention to the story. So, sometimes the puppet makes his best guess at what happened, but when he cannot even make a guess, he asks a question instead. The participants' task is to judge whether the puppet's utterance is a statement based on his guess or a question. If the utterance is a statement, then the

participants are required to answer whether the statement is an accurate description of the story. When the participants judge a statement as an incorrect description, the experimenter follows up to ask their justification for the rejection. If the puppet's utterance is judged to be a question, on the other hand, the participants are required to answer the question instead. Participants' verbal responses and gestural responses were collected for the data analyses.

The experimental task consisted of two twenty-minute sessions and participants participated in both sessions. In the child experiments, the time-interval between the two sessions was usually one day, but for several child participants, there were two or three days between sessions. Child participants were tested individually in a quiet room separated from class rooms in the kindergarten. At the beginning of each session, they were given two warm-up trials to ensure whether they could follow the rules of the task. At the end of the warm-up trials, the rules of the tasks were further reinforced with oral instructions by the experimenter. Only the child participants who passed the warm-up trials proceeded to the main session.

In the adult experiments, the two sessions were conducted one after another in the same day. We tested all the participants together in a university lecture room. Instead of using toys and props to demonstrate the stories in front of the participants, we presented several snapshots of the story scenes on a projector screen and an experimenter read aloud the narrations beside the screen. Unlike the child experiments, the adult participants were instructed to write their responses on the answer sheet provided. Warm-up trials were also given to the adult participants but only at the beginning of the first session.

#### 3.5.4. *Materials*

Each experimental session contained one story for a warm-up trial and four stories for the main trials. Each story was further divided into two sub-parts. After the end of each sub-part, the puppet attempted to describe what happened at the end of the sub-part of the story, to make up a total of 2 warm-up sentences and 8 test sentences for one experimental session. Below is an example of a typical trial:

##### **The 1<sup>st</sup> half of the story**

Donald Duck and Winnie the Pooh are invited by Mickey to lunch at his house. On the way to Mickey's house, Donald Duck and Winnie the Pooh eat a lollipop. Suddenly, both of them start to get a tooth ache, so they decide to drop by a dentist. The dentist fixes their teeth quickly but he warns them that they cannot eat anything more today. They thank the dentist and leave for Mickey's house. When they get to his house, Donald Duck and Winnie the Pooh are offered cake and noodles for lunch. Despite the warning by the dentist, Winnie the Pooh feels so hungry that he eats up both cake and noodles. At first, Donald Duck tried hard to follow the dentist's advice, but because the cake looked so delicious and it was just a small portion, Donald Duck changed his mind and started to eat the cake. After finishing the cake, the tooth ache came back and he started to cry. After a short while, Winnie the Pooh also got a tooth ache and started to cry too.

### **The 2<sup>nd</sup> half of the story**

Donald Duck and Winnie the Pooh decide to go back to the dentist. When they get to the dentist, they ask the dentist to fix the pain as soon as possible since their teeth really hurt. The dentist brings two magic medicines, one yellow and the other white. The dentist tells them that if they take both medicines, the pain will stop immediately. But, if they take only one of them, the tooth ache will take a day to stop. The problem with these medicines, is that they are hard to swallow because they are so bitter. Donald Duck takes the two medicines without any hesitation because he cannot stand the toothache. Winnie the Pooh, on the other hand, hesitates to do so because he hates taking medicine. Eventually, Winnie the Pooh only swallows the white coloured medicine and leaves the yellow one, so his tooth ache lasts until the next day.

Figure 1 shows an example of the story scene presented when the test sentences were given. At the end of every sub-story, participants encountered a similar contextual situation in which one story character (i.e., Winnie the Pooh in this example) completed an action of some kind (i.e., ‘eating’) that affects two objects (i.e., ‘cake’ and ‘noodles’, so both disappear in the scene) but the other story character (i.e., Donald Duck) completed his action on one object (i.e., ‘cake’ which disappears in the scene) but not the other object (i.e., ‘noodles’).



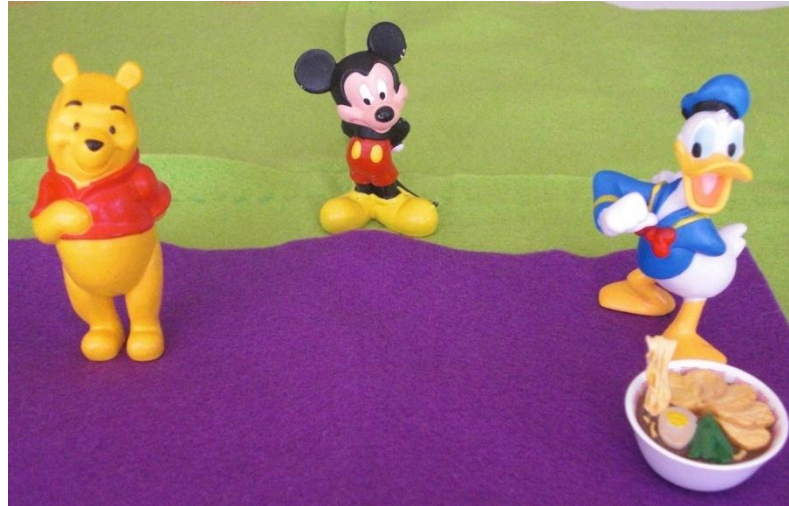


Figure 1: The story scene

After the first sub-part ends, one of the four types of stimuli exemplified in (34) to (37) was uttered by a puppet with an additional lead-in sentence.

### **Lead-in sentence**

“我记得唐老鸭跟维尼熊去米老鼠家吃蛋糕跟麵。可是我不太清楚最后是怎样。”

*“I remember that Donald Duck and Winnie the Pooh went to Mickey’s house to have cake and noodles, but I don’t know what happened at the end...”*

“我想，最后维尼熊两个都吃了，可是...”

*“I think, Winnie the Pooh ate both, but...”*

### **Test sentences**

(34) Tanglaoya meiyou chi dangao *huozhe/huoshi* mian ma?  
Donald not eat cake or noodles Q  
YNQ: *‘Is it the case that it was cake or noodles that Donald didn’t eat?’*

(35) Tanglaoya meiyou chi dangao *haishi* mian?  
Donald not eat cake or noodle  
AltQ: *‘Which of the food did Donald not eat, cake or noodles?’*

(36) Tanglaoya meiyou chi dangao *huozhe/huoshi* mian.  
 Donald not eat cake or noodles  
*'It was cake or noodle that Donald didn't eat.'*

(37) Tanglaoya meiyou chi dangao (mian).  
 Donald not eat cake (noodle)  
*'Donald didn't eat cake (noodle).'*

(34) is a YNQ with disjunction *huozhe/huoshi* and negation and (35) is an AltQ with disjunction *haishi* and negation. (36) is a negative statement with disjunction *huozhe/huoshi* and served as a control. Also, the statements like (37) served as filler sentences to counterbalance 'Yes' and 'No' answers. We interchanged the objects (e.g., between 'cake' and 'noodles') to make the fillers either true or false, depending on the number of previous 'Yes' and 'No' responses that the child had given.

Note that in test sentences (34) and (36), we used disjunction *huozhe* for participants from China and *huoshi* for those from Taiwan. Anecdotal evidence suggests that *huozhe* tends to be used in Beijing Mandarin while *huoshi* in Taiwanese Mandarin. In order to minimize the possibility of children's failure on experimental tasks due to unfamiliarity of a given disjunction word, a different disjunction word was given depending on dialectal background. This lexical distinction, however, gave an impact on experimental outcomes, which we will show in the next section.

The distribution of the test questions/statements was organized as following. The first session included three of the test questions like (34), accompanied by two control statements with disjunction like (36) and three fillers like (37). In the second session, three of AltQs like (35), and five filler statements like (37) were included in the experimental session. Trial sentences were pseudo-randomly ordered and presented to the participants.

The test stimuli were carefully designed to take into consideration the appropriate felicity conditions. Recent acquisition studies highlight the importance of satisfying such

conditions in order to accurately test children's language comprehension (e.g., Crain & Thornton, 1998; Lidz & Musolino, 2002). First, we needed to present negation in a natural manner. This requirement was met by using a positive lead-in sentence with a contrastive coordinator *but*, which makes a negative sentence more natural in the following clause. The use of a positive lead-in sentence also minimizes the difficulty of accessing an inverse-scope reading (Lidz & Musolino, 2002).

In addition, our experimental design satisfied (pre)suppositional requirements associated with use of the two possible interpretations. For example, uttering a negative YNQ like (34) suggests that the person posing the question might believe that Donald Duck didn't eat either kind of food.<sup>9</sup> To satisfy this, we made sure that it was a possible outcome that Donald Duck did not eat either type of food, even though the actual outcome was that he ate something. Similarly, the inverse scope interpretation of negative questions/statements with disjunction also needed to satisfy the presupposition condition that Donald Duck didn't eat one or other of the foods. This presupposition condition is also satisfied by the fact that the noodle was left uneaten. By providing appropriate (pre)suppositional conditions for both of the possible interpretations, the goal was to minimize any contextual bias and make the two interpretations equally accessible.

### 3.5.5. Coding

We categorized participants' responses into four types: the *Surface (scope)* response, the *Inverse (scope)* response, the *Exhaustive* response, and the *Other* response. The *Surface* response refers to the response derived from a surface scope interpretation (*not > or*). This

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<sup>9</sup>If a speaker has no biased belief of whether or not Donald Duck ate the different types of food, it is more natural to use a positive YNQ as in (i). On the other hand, if a speaker has a strong belief that Donald Duck didn't eat any food, it induces a tag question like (ii).

- i. Did Donald Duck eat any food?
- ii. Donald Duck didn't eat any food, did he?

response type is expected when participants adopt the interpretation equivalent to the English YNQ interpretation shown in (38).

- (38) *Is it the case that Donald Duck didn't eat cake or noodles?* (not > or)

If this interpretation is adopted, the responses contain a rejection (i.e., 'No'), followed by pointing out the object on which a story character performed an action (i.e., 'cake' in the Donald Duck's case).

On the other hand, the *Inverse* response refers to the responses indicating the inverse scope assignment. Two interpretations contain an inverse scope assignment. One is the adult-like interpretation of the YNQs with *huozhe* like (39), and the other interpretation is an AltQ interpretation like (40).

- (39) *'Is it the case that it was cake or noodles that Donald didn't eat?'* (or > not)

- (40) *'Which of the food did Donald not eat, cake or noodles?'* (or > not)

The responses derived from these interpretation included 'Yes' or pointing out the object on which a story character did not perform an action (i.e., the uneaten noodles in Donald Duck's case). Therefore, all these responses were counted as an *Inverse* response.

In addition to these two response types, we further obtained one more distinct response type, *Exhaustive* response. The *Exhaustive* response refers to the following responses without explicit utterances of 'Yes' or 'No'.

- (41) a. Tanglaoya chi le dangao, mei chi mian.  
           Donald eat ASP cake not eat noodle  
           'Donald Duck ate the cake, didn't eat the noodles.'
- b. Tanglaoya zhi chi le dangao.  
       Donald only eat Asp cake  
       'Donald Duck only ate the cake.'

(41a) describes what Donald Duck did eat and what he didn't eat. Likewise, (41b) also generates an exhaustive expression by using an exhaustivity word *zhi* (only). Lastly, we also obtained the response which did not fall in any of the above three categories. For convenience, let us label these responses *Other*. The proportion of each response type was calculated for the analysis.

### 3.5.6. Results and discussions

The experimental findings of these experiments revealed distinct response patterns between the two groups of children speaking Beijing Mandarin and Taiwanese Mandarin. Thus, we present the results from each group independently. For the participants speaking Beijing Mandarin, no child failed the warm-up trials so the data obtained from 14 children and 20 adults were used for the analysis. However, for the Taiwanese groups, the data of one adult participant were excluded from the analysis due to an incorrect answer on a warm-up trial. Therefore, the results of 20 child participants and 14 adult participants formed the data set used for analysis.

In the following subsections, we first present the results of AltQs with disjunction *haishi* like (35), followed by the results of YNQs with disjunction *huozhe/huoshi* like (34). Then, we will present the results of control statements like (36).

### 3.5.6.1. Results of AltQs with disjunction *haishi*

Before presenting the results, let us illustrate the prediction again. If children adopt an adult-like interpretation to AltQs with *haishi* like (35), we expect the *Inverse* responses. However, if children adopt the surface scope interpretation (i.e., non-adult interpretation) due to [-PPI], we expect the *Surface* responses. Table 2 summarized the proportions of each response type.

**Table 2:** Proportions of four response types in AltQs with disjunction *haishi* by children and adults.

Response type	<i>Surface</i>	<i>Inverse</i>	<i>Exhaustive</i>	<i>Other</i>
Child (Beijing)	14% (6/42)	74% (31/42)	12% (5/42)	0%
Adult (Beijing)	0%	100% (60/60)	0%	0%
Child (Taiwanese)	0%	98% (59/60)	2% (1/60)	0%
Adult (Taiwanese)	12% (5/42)	88% (37/42)	0%	0%

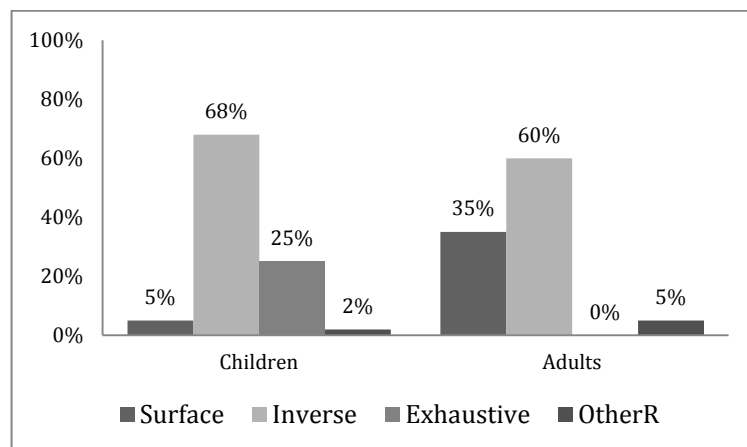
It was found that no significant difference was observed between the child and adult group. The participant groups produced a high proportion of *Inverse* responses (74% to 100%) in AltQs with *haishi*. Although the children speaking Beijing Mandarin produced a slightly lower proportion of *Inverse* responses than that of the adult group, we found no statistical significance between the two groups in this type of responses (Mann-Whitney test:  $Z = 2.50, p > .05$ ). Likewise, no statistical significance was found between the child and adult participants who speak Taiwanese Mandarin in the *Inverse* responses (Mann-Whitney test:  $Z = 1.47, p > .05$ ). Therefore, the findings suggest that children adopted the adult-like interpretation in AltQs with *haishi*.

### 3.5.6.2. Results of YNQs with disjunction *huozhe/huoshi*

Unlike AltQs with disjunction *haishi*, YNQs with disjunction *huozhe/huoshi* revealed a more complex pattern of results. Essentially, it was found that the children speaking Taiwanese Mandarin resembled the corresponding group of adults; both groups tended to produce *Inverse* responses. By contrast, in the participants speaking Beijing Mandarin, the discrepancy between children and adults was significant. Let us first summarize the data obtained by the participants speaking Taiwanese Mandarin, and then we will return to the results from the participants who speak Beijing Mandarin.

#### 3.5.6.2.1. Results of YNQs with disjunction *huoshi*: Taiwanese Mandarin

For YNQs with disjunction *huoshi*, the adult participants are expected to produce *Inverse* responses as they assign an inverse scope interpretation in these questions. It was found that like adult participants, child participants were also likely to interpret disjunction taking wide scope of negation (i.e., the inverse scope interpretation). This is evident by 68% (41/60) of *Inverse* responses in the child group and 60% (25/42) in adult group, with no statistical significance between the groups (Mann-Whitney test:  $Z = .66, p > .05$ ). The summary of the proportions of each response type is given in Figure 3.

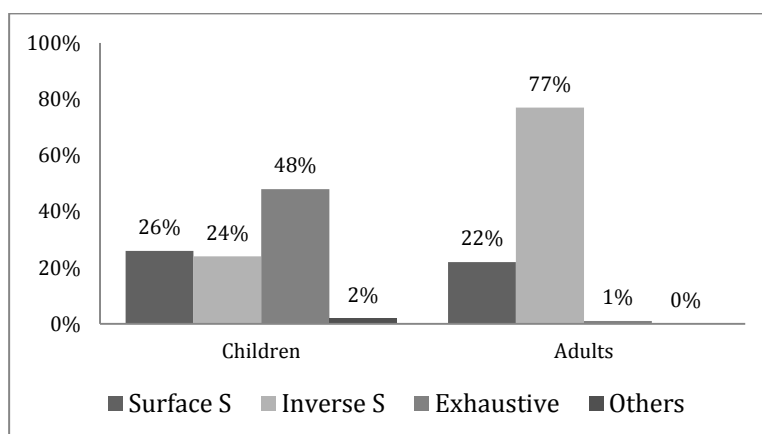


**Figure 2:** Proportions of the four response types in YNQs with disjunction *huoshi* by children and adults speaking Taiwanese Mandarin.

We found a noticeable difference in the proportions of *Surface* responses and *Exhaustive* responses. The *Surface* responses in the adult group shared 35% (15/42) of the total number of responses whereas they made up only 5% (3/60) of the responses in the child group. It is also revealed that in *Exhaustive* responses, the child participants showed 25% of the time (15/60) but such a response type was not observed in adult participants. However, non-parametric test (Mann-Whitney test) showed no statistical significance in these two types of responses (Surface:  $Z = 2.36$ ,  $p = .083$ ; Exhaustive:  $Z = 2.64$ ,  $p = .051$ ). Therefore, the overall results suggest no significant difference between child and adult participants in all response types.

### 3.5.6.2.2. Results of YNQs with disjunction *huozhe*: Beijing Mandarin

The child participants who speak Beijing Mandarin showed a sharp contrast with the Taiwanese Mandarin-speaking children, as shown in Figure 3.



**Figure 3:** Proportions of four response types in YNQs with disjunction *huozhe* by children and adults speaking Beijing Mandarin.

The results showed that adult participants were likely to produce *Inverse* responses, which was the predicted result. On the other hand, the proportion of the *Inverse* responses by children was significantly reduced to 24% (10/42) of the time, as compared with 77%



(46/60) of the time by adults. Non-parametric test (Mann-Whitney test) revealed significant difference between the child and adult participants in this response type ( $Z = 3.03, p = 0.05$ ). The results also show that almost half of the children's responses were categorized as an exhaustive response 48% (20/42) although this response type barely appeared in the adult participants (1%, 1/60)). Statistical significance was found in this response type as well (Mann-Whitney test:  $Z = 4.59, p < .05$ ). *Surface* responses, by contrast, showed no difference between the two groups (Child: 26%, 11/42; Adult: 22%, 13/60). (Mann-Whitney test:  $Z = .69, p > .05$ ). Taken together, the results indicate a clear difference in the response patterns of children and adults.

Our findings, therefore, invite us to consider what might have caused the discrepancy. The key to the solution of this issue seems to lie in *Exhaustive* responses. Given the resemblance between the child and adult group in *Surface* responses and *Others* responses, the proportion of *Inverse* responses in the child group was reduced significantly because the *Exhaustive* responses accounted for almost half of the total responses by children. In other word, the answer to this question rests on how we account for the *Exhaustive* responses.

One possibility is that children gave an *Exhaustive* response simply because they did not understand the question properly. When children were unsure about what information of a story character (e.g., Donald Duck) was asked, they might give the answer in the most informative way, exhaustively addressing the state of affairs that the story character was involved in. This suggestion, however, seems to be contradicted by previous studies conducted with Mandarin-speaking children by Notley et al. (2011), Jing et al. (2005), Su and Crain (2009), and Su et al. (2011), none of which reported that Mandarin-speaking children had difficulty understanding the meaning of *huozhe*.

An alternative possibility is that exhaustive responses were, in fact, derived from the surface scope interpretation of the questions but in a way that was unique to children. Let us assume that children understood the meaning of test questions perfectly well. If so, children could have accessed either of the two possible scope interpretations. It is unlikely, however, that children produced *Exhaustive* responses in response to an inverse scope interpretation. This is because the results of the YNQs with disjunction *huoshi* from Taiwanese children presented earlier showed that children tended to produce *Inverse* responses if they adopted the inverse scope interpretation. Therefore, this invites us to infer that exhaustive responses were possibly derived from the other interpretation, i.e., the surface scope interpretation. If this analysis is on the right track, the difference between children and adults is due to a difference in scope assignment.

This analysis of *Exhaustive* responses also conforms to the results in YNQs with disjunction *huoshi* by Taiwanese participants. Recall that children who speak Taiwanese Mandarin produced *Surface* responses at only 5% (3/60) of the time, but *Exhaustive* responses at 25% of the time (15/60). This is contrasted with the adult participants who showed 35% (15/42) in *Surface* responses but 0% in *Exhaustive* responses. If *Exhaustive* responses were unique to children in response to the surface scope interpretation, these results are not surprising.

There are some caveats to this hypothesis, however. First, it would be hasty to propose that all exhaustive responses are responses to the surface scope interpretation because we cannot entirely rule out the possibility that some of these responses may have been derived by a misunderstanding of the question or some other reason. Another issue is that, in our experiments, we cannot track down why children but not adults responded to the surface scope interpretation in this way. Therefore, some follow-up studies are required in order to gain full understandings of the source of the exhaustive responses.

Let us now compare the groups of participants across Mandarin Chinese dialects (i.e., Beijing Mandarin and Taiwanese Mandarin). Although a clear difference was observed between the two child groups in response patterns, there was no remarkable difference in the two adult groups. Both adult groups were likely to produce *Inverse* responses. This suggests that there is no dialectal difference in the interpretation of disjunction *huoshi* and *huozhe* in adult language. In turn, we can assume that the difference in children should not be attributed to the adult input; there must be some other reason for the difference between the two groups of children. We will return to this issue in the General Discussion.

### 3.5.6.3. *Results from the control statements*

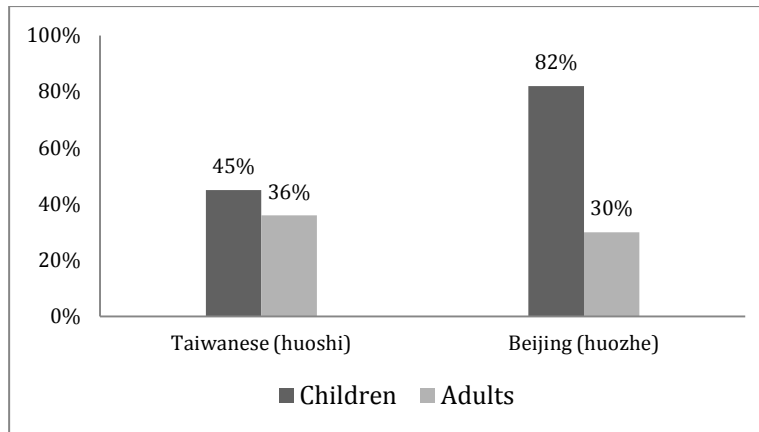
In this section we discuss the results of the negative statements with disjunction. We tested this type of sentence as a control for both Mandarin-speaking children and adults. Here, we repeat the control statement in (42).

- (42) Tanglaoya meiyou chi dangao ***huozhe/huoshi*** mian.  
 Donald not eat cake or noodles  
 Adult: *'It was cake or noodle that Donald didn't eat.'*  
 Child: *'Donald ate neither cake nor noodles.'*

Recall that adults tend to interpret negative statements with disjunction like (42), with disjunction *huozhe/huoshi* taking scope over negation. Therefore, the interpretation is equivalent to *'it was cake or noodles that Donald didn't eat.'* With this interpretation, the expected answer will be 'Yes' in the circumstance in which Donald ate cake but not noodles. However, if children get a surface scope interpretation in (42) due to the [-PPI] value, according to Jing et al. (2005), our child participants would be expected to produce 'No' responses.

The experimental findings revealed that the two child groups behaved differently.

The proportions of rejection rates were summarised in Figure 4.



**Figure 4:** Proportions of ‘No’ response in negative statements with disjunction by children and adults speaking Taiwanese Mandarin and Beijing Mandarin.

The group of children speaking Taiwanese Mandarin who were given negative statements with disjunction *huoshi* showed that 45% of responses (18/40) were rejections of the statement. All the rejections were accompanied by a correct justification for the rejection. Moreover, this figure did not differ much from that of adult controls who showed 36% (10/28) rejections. A non-parametric Person’s chi-square test showed no statistical significance ( $\chi^2(1) = .586, p > .05$ ). Therefore, it suggests that even in negative statements with disjunction, the inverse scope interpretation was adopted by many children in this group.

Children speaking Beijing Mandarin, on the other hand, exhibited the opposite tendency, revealing a difference between children and adults. While children interpreted disjunction *huozhe* under the scope of negation, adults tended to interpret disjunction out of the scope of negation. This is illustrated by the fact that children rejected the control sentence 82% of the time (23/28) whereas adults did only 30% of the time (12/40). The statistical analysis revealed significance between the two groups ( $\chi^2(1) = 17.93, p < .05$ ).

In other words, only the children speaking Beijing Mandarin produced more rejections than acceptances. As noted, these response patterns are in fact compatible with their responses to negative *ma*-questions with disjunction, in which only children speaking Beijing Mandarin tended to adopt a surface scope interpretation.

To summarize our findings, children and adults exhibited similar behavior in responding to AltQs with disjunction *haishi*, demonstrating children's early mastery in interpreting this type of question. On the other hand, in YNQs with disjunction *huozhe* and the control negative statements with disjunction *huozhe*, the children speaking Beijing Mandarin behaved differently from the adult speakers. Despite the adults' preference for the inverse scope interpretation, the children were unlikely to get this reading. These results conform to the observations by Jing et al. (2005). By contrast, children speaking Taiwanese Mandarin opted for an inverse scope interpretation in both YNQs with disjunction *huoshi* and negative statements with disjunction *huoshi*. Therefore, no interpretive difference was found between children and adults who speak Taiwanese Mandarin.

### **3.6. General Discussion**

The present study investigated how disjunction was interpreted in relation to local negation in question sentences. In particular, given the argument that children are likely to adopt the surface scope interpretation (i.e., *not > or*) in statements (Goro, 2007; Goro & Akiba, 2004; Jing et al., 2005), we asked whether the same interpretive restriction also applied to disjunction appearing in questions. It was found that, in AltQs with disjunction *haishi*, children behaved similarly to adults. In responding to these questions, the majority of our child participants, regardless of whether they spoke Beijing Mandarin or Taiwan Mandarin,

produced an answer derived from an AltQ in which disjunction is required to take a wide scope of negation. In contrast to these questions, YNQs with disjunction *huozhe/huoshi* revealed distinct results in child participants. The child participants speaking Beijing Mandarin were likely to produce an answer indicating a surface scope interpretation in YNQs with disjunction *huozhe*. The child participants from Taiwan showed the opposite result; an inverse scope interpretation was the preferred interpretation. Despite the different linguistic behavior in the child groups, no such a distinction was observed in adult participants. That is, both adult groups showed a preference for the inverse scope interpretation. Moreover, children's performance on negative statements with disjunction correlates with the results from YNQs with disjunction. Although our child participants speaking Beijing Mandarin behaved similarly to those in Jing and her colleagues' study (2005) who were likely to adopt a surface scope interpretation, many Taiwanese children showed adult-like behavior in which disjunction takes wide scope over negation.

Our experimental findings, therefore, give rise to two questions. Given the evidence that disjunction in child language tended to stay within the scope of negation in statements, why did our child participants, regardless of Mandarin dialects, perform in an adult-like way in response to AltQs with disjunction *haishi*? Secondly, why did the children speaking Beijing Mandarin and Taiwanese Mandarin perform differently in YNQs with disjunction *huozhe/huoshi* and negative statements with disjunction *huozhe/huoshi*?

Before pursuing this issue, let us review some of our theoretical assumptions that may bear on our discussion. Earlier, we spent a fair amount of time demonstrating cross-linguistic differences in the interpretation of disjunction in adult language. We take this difference to be due to parametric variation, as argued by Goro and others (Goro, 2007; Goro & Akiba, 2004; Jing et al., 2005) in a series of studies. According to the Principles

and Parameters theory of Universal Grammar (Chomsky, 1981), the principles and parameters govern the hypothesis space of a possible human language to ensure success in language acquisition. On this view, language development is a process by which children learn to adjust parametric values in order to match those values that are operative in the local language. If so, this process leaves open the possibility that, at some point in time, children may adopt parametric values that are not attested in the local language but ones that are manifested in other natural languages (Crain, 1991; Crain & Pietroski, 2001, 2002).

This is, in fact, what Goro and Akiba (2004) and Jing et al. (2005) found in their experiments. Japanese- and Mandarin-speaking children committed to the surface scope interpretation in negative statements with disjunction, an interpretation which is not attested in the input but attested in other languages like English. Moreover, in our experiments, children speaking Beijing Mandarin also showed similar behavior in that they tended to adopt a surface scope interpretation in YNQs with disjunction *huozhe* and the negative statements with disjunction *huozhe*, despite the fact that the majority of adult participants adopted an inverse scope interpretation. Given this new evidence, we agree that the variation in interpretation of disjunction can be attributed to parametric variation.

Goro and Akiba (2004) and Jing et al. (2005) have further proposed that a positive polarity parameter is responsible for the child-adult mismatch. On this account, children set the initial parametric value as [-PPI], which leads children to begin with a preference for a surface scope interpretation, despite the fact that such an analysis is unlikely attested in the input. If a Positive Polarity parameter is the one that is responsible for interpretation of disjunction in relation to local negation, we could consider that children who speak Beijing Mandarin set the [-PPI] value for disjunction *huozhe*, but set the [+PPI] value for disjunction *haishi*. On the other hand, children who speak Taiwanese Mandarin set the [+PPI] value for both disjunction *huoshi* and *haishi*. It is plausible that children may set a

different parametric value to a different form of disjunction, if there is a reasonable account to explain how and why they do so.

The notion of positive polarity, however, encounters some issues in accounting for differences in parameter settings across three disjunction words. According to Goro (2007), if the PPI parameter is responsible for an inverse scope interpretation, Mandarin- or Japanese-speaking children are required to observe a sufficient number of negative sentences with disjunction as positive evidence. This positive evidence allows them to know that disjunction can take wide scope over negation. Furthermore, Goro (2007) argues that, even though such positive evidence is attested in the adult language, children are unlikely to switch the parameter setting from [-PPI] to [+PPI] until later in development, due to immaturity of certain cognitive skills that the change depends on. It is argued that children age three to five are not mature enough to take a speaker's perspective to assess a given situation, part of so-called 'theory of mind'. This skill is thought to be required in inferring a speaker's mental state of uncertainty which is expressed by the inverse scope interpretation of negative statements with disjunction. As mentioned earlier, this uncertainty state is expressed by the implicature '*but I (= the speaker) don't know which one*' as in (43).

- (43) Tanglaoya meiyou chi dangao *huozhe*/*huoshi* mian.  
Donald not eat cake or noodles  
'It was cake or noodle that Donald didn't eat, (but I (=the speaker) don't know which one).'

So, the late maturation of this ability means that children are not amenable to the critical positive evidence at the early stage of development. This results in late convergence on adult grammar. This account of parameter change in the positive polarity parameter,



however, raises a question of why Mandarin-speaking children already adopt the inverse scope in AltQs with *haishi* and YNQs with *huoshi*, despite such cognitive difficulties.

In order to ameliorate this problem, we, therefore, revise the PPI proposal and suggest that disjunction lexical items in Mandarin Chinese (and also Japanese) behave like a PPI because they bear a focus feature in the lexicon. That is, we propose to replace the [ $\pm$ PPI] parameter with a focus parameter [ $\pm$ Foc(us)]. So how does this focus parameter affect the scope interpretation of disjunction?

A focus parameter represents whether a focus feature is present or absent in a relevant lexicon. When a focus feature is present in the lexicon, it determines the focus domain of a sentence (cf. Selkirk, 1984). For example, the word for disjunction *haishi* with [+Foc] defines an entire disjunction phrase (disjP) as the focus domain, as illustrated in (44).<sup>10</sup>

- (44) Tanglaoya meiyou chi [disjP dangao *haishi*<sub>[+Foc]</sub> mian]<sub>F</sub>.  
 Donald not eat cake or noodle  
 AltQ: ‘Which of the food did Donald not eat, cake or noodles?’

As far as the syntax is concerned, the focused constituent (i.e., disjP) then undergoes LF-movement to the specifier of Focus Phrase (FocP) which is considered to be located in a position higher than local negation (i.e., a position within the left periphery) (cf. Chomsky, 1976; Krifka, 2006; Rizzi, 1997). The same scenario is also applied to disjunction *huozhe*

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<sup>10</sup> In this analysis, we assume that *haishi* is the head of disjP ‘coffee *haishi* tea’ and follows Selkirk (1984)’s focus projection rules as defined below.

**Phrasal focus rule**

A constituent may be a focus if (i) or (ii) (or both) is true:

- (i) The constituent that is its head is a focus.
- (ii) A constituent contained within it that is an internal argument of the head is a focus.

(Selkirk, 1984, pp. 207)

and *huoshi* since they behave like PPIs in adult language. Therefore, all test sentences in (45) to (47) have an LF structure like (48) in adult grammar.

- (45) Tanglaoya meiyou chi dangao *haishi* mian?  
Donald not eat cake or noodle  
AltQ: ‘Which of the foods did Donald not eat, cake or noodles?’
- (46) Tanglaoya meiyou chi dangao *huozhe/huoshi* mian *ma*?  
Donald not eat cake or noodles Q<sub>(YN)</sub>  
YNQ: ‘Is it the case that it was cake or noodles that Donald Duck didn’t eat?’
- (47) Tanglaoya meiyou chi dangao *huozhe/huoshi* mian.  
Donald not eat cake or noodles  
‘It was cake or noodles that Donald Duck didn’t eat, (but I don’t know which).’
- (48) [<sub>FocP</sub> cake *haishi/huozhe/huoshi* noodles<sub>i</sub> [<sub>Foc</sub> ∅ [<sub>IP</sub> Donald Duck did not eat ~~cake-haishi/huozhe/huoshi~~ noodles<sub>i</sub>]]]

On the other hand, when a focus feature is absent in disjunction; i.e., setting the [-Foc] value, a disjunction phrase stays at the original position as no LF-movement undergoes. In this case, negation takes the position higher than the disjunction phrase.

Furthermore, this focus feature also contributes to presentation of discourse information (e.g., Halliday, 1967; Lambrecht, 1994). In AltQs like (45), the focused element (i.e., ‘*cake or noodles*’) pertains to the information that a questioner is seeking from the hearer. The unfocussed part (i.e., ‘*Donald Duck not eat x*’), on the other hand, is the component presupposed by the questioner and/or the hearer. Similarly, in (47), while the unfocussed part is the presupposed information, the focused element of ‘*cake or noodles*’ is the information of which the hearer is unsure. Therefore, it normally induces

the implicature of ‘*but I (= a speaker) don’t know which.*’<sup>11,12</sup>

By proposing a focus parameter, let us now address some possible solutions to the two questions raised earlier in this section. The first question addresses why children already behaved like adults in AltQs with disjunction *haishi*, despite the fact that they may not always do in other contexts like YNQs with disjunction or negative statements with disjunction, particularly in children speaking Beijing Mandarin. Putting this in another way, what makes these children quickly learn the correct [+Foc] value of the disjunction word *haishi*?

As mentioned earlier, Goro (2007) argues that children in age three to five have difficulty in setting the [+PPI] value because they do not have the cognitive capacity to take a speaker’s perspective to assess a given situation. The delayed maturation of such ability, therefore, led children to have difficulty in finding the crucial evidence of such interpretations, and this resulted in delayed convergence on the adult grammar. We concur with this account for explaining why children who speak Beijing Mandarin had hard time setting the correct value on disjunction *huozhe*. Since children are not good at inferring another speaker’s perspective, it is also conceivable that they have difficulty detecting the focus of a sentence that expresses a speaker’s uncertainty when they make a statement.

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<sup>11</sup> A speaker’s implicature of uncertainty ‘*but I don’t know which*’ is only yielded in statements. Therefore, such an implicature is not generated in questions like (46).

<sup>12</sup> More formally speaking, focus turns the disjunctive phrase in (i) into the set denotation as in (ii) (Rooth, 1985; Krifka, 2001). The background/presupposed component is then denoted by a lambda abstraction as in (iii).

- (i)      [[cake or noodle]] = cake  $\vee$  noodle
- (ii)     [[cake or noodle]]<sup>F</sup> = {cake, noodle}
- (iii)     $\lambda x$ [Donald Duck didn’t eat x]

In this approach, only the difference among (59) to (61) is a clause typing licenser. (59) involves a Quest(ion) operator uniquely licensing content questions including AltQs, whereas (60) contains a Q operator uniquely licensing a YNQ. (61) is, on the other hand, licensed by an Assert(ive) operator which is phonologically null in Mandarin Chinese. These are illustrated in (i) to (iii) respectively (cf. Krifka (2001)).

- (a)      *Quest*<sub>(AltQ)</sub> <{cake, noodles},  $\lambda x$ [Donald Duck didn’t eat x]>
- (b)      *Quest*<sub>(YNQ)</sub> <{cake, noodles},  $\lambda x$ [Donald Duck didn’t eat x]>
- (c)      *Assert* <{cake, noodles},  $\lambda x$ [Donald Duck didn’t eat x]>

Fortunately, this problem due to children's immature general cognitive ability seems to be ameliorated in the case of *haishi*. Unlike focus in statements, the focus of questions is reliably detectable from the input without any assistance of ability of 'perspective taking'. The detectable evidence comes from answers to these questions. This is because questions often coincide with an answer in relation to focus, what is called question-answer congruence (Halliday, 1967; Krifka, 2001; von Stechow, 1990). The notion of question-answer congruence addresses that an answer to content questions as in (49a) or (50a) receives focus on the element that fulfils the querying part (also the focused part) in a question sentence. That is, 'coffee' in (49a) is focussed because it fulfils 'what' in the question sentence. Moreover, in natural discourse, these answers are often shortened as in (49b) or (50b) in which only the focused element is pronounced.<sup>13</sup>

(49) [What]<sub>F</sub> did John drink?

Answer

- a. John drank [coffee]<sub>F</sub>.
- b. Coffee.

(50) Taro he le [cha *haishi* kafei]<sub>F</sub>?

Taro drink Asp tea or coffee

YNQ: 'Which of the beverage did Taro drink, tea or coffee?'

Answer

- a. Taro he le [kafei]<sub>F</sub>.  
Taro drink Asp coffee  
'Taro drank coffee.'
- b. Kafei.  
Coffee

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<sup>13</sup> Nishigauchi (2006) analyze that this fragment answer is derived from focus movement followed by ellipsis of the unfocussed component.

Since questions with disjunction *haishi* are unique to an AltQ, frequent observations of question–answer pairs related in such a way permit children to identify the focus of questions without taking a speaker’s perspective. This advantage eventually leads children to revise their current parameter setting and re-set the parametric value to [+Foc].

In the case of Japanese, we find a different scenario. Japanese disjunction *ka* should have a [+Foc] feature, as disjunction takes scope over local negation as given in (51). In Disjunction *ka* also occurs in questions as shown in (52). However, questions with *ka* like (52) are never interpreted as AltQs in adult grammar; only an YNQ interpretation is permitted. If so, there is no detectable evidence for Japanese-speaking children to be aware of a focus feature on disjunction *ka* because YNQs do not always accompany with congruent answers. The answer to the question ‘Did John drink coffee?’ can be satisfied with ‘Yes’ or ‘No’ which does not directly indicate the focus of questions. Therefore, children would not change the parameter value until their ‘perspective taking’ is fully developed to learn its feature from statements.

- (51) John-wa ocha ka kofi -o nomi-ma-sendeshi-ta .  
 John-Top tea or coffee -Acc drink-Pol-Neg-Past  
 YNQ: ‘It was tea or coffee that John didn’t drink.’

- (52) John-wa ocha ka kofi -o nomi-mashi-ta ka?  
 John-Top tea or coffee -Acc drink-Pol-Past Q  
 YNQ: ‘Was it the case that John drank coffee or tea?’

The same scenario is also true of Mandarin disjunction *huozhe*. This type of disjunction also appears in YNQs and statements, but not content questions like AltQs. Therefore, children take some time to pick up on the focus feature of *huozhe* as this must await maturation of their cognitive skills which emerge only later in development.

Let us now turn to discuss the second question. As we have mentioned several times earlier, *huozhe* and *huoshi* are identical in usage and meaning. If so, we should expect that children performed similarly on both disjunctions. But why did children speaking Beijing Mandarin and Taiwanese Mandarin act differently in YNQs with disjunction *huozhe/huoshi* and negative statements with disjunction *huozhe/huoshi*?

Our decision to use a different lexical item for each group was based on the fact that *huozhe* is more frequently used in Beijing Mandarin while *huoshi* is more frequent in Taiwan Mandarin. This decision was originally made to avoid the possibility that children might perform poorly on our experimental tasks because of unfamiliarity with less frequently observed items.

This, however, turns out to be the source of the discrepancy between the two groups of children in our results. On the one hand, children speaking Beijing Mandarin tested with the disjunction word *huozhe* showed a strong tendency to adopt a surface scope interpretation, replicating the findings in Jing et al. (2005). Children speaking Taiwanese Mandarin tested with the disjunction word *huoshi*, on the other hand, interpreted the sentences in the adult way, in which disjunction takes scope over local negation. Note that the source of this discrepancy should not be attributed to the adult input. This is because their usage is identical, and the results of the two adult groups in our experiments showed no significant difference in their performance. Therefore, it is unlikely that children speaking Taiwanese Mandarin have a significant advantage to learn the correct parameter setting. Moreover, it is very unlikely that the behavioural difference can be attributed to experimental artefacts since we conducted an identical experiment for the two groups.

We therefore anticipate that the source of this phenomenon is attributed to the lexicon itself. In particular, a morphological difference between *huozhe* and *huoshi* may play a role in this case. Our particular interest is the morpheme *shi* (是) in *huoshi* (或是)

but not in *huozhe* (或者).<sup>14</sup> *shi* is a focus morpheme. It can be used as a focus maker as shown in (53a-c).

- (53) a. *shi* [wo]<sub>F</sub> zuotian qu Xingbake he kafei  
           Foc I yesterday go Starbucks drink coffee  
           *'It was I who went to Starbucks for coffee'*
- b. wo *shi* [zuotian]<sub>F</sub> qu Xingbake he kafei  
           I Foc yesterday go Starbucks drink coffee  
           *'It was yesterday that I went to Starbucks for coffee.'*
- c. wo zuotian *shi* [qu Xingbake]<sub>F</sub> he kafei  
           I yesterday Foc go Starbucks drink coffee  
           *'It was to Starbucks that I had coffee.'*

Focus marker *shi* in (53a-c) defines the focussed constituent in a sentence. So *wo* 'I' is the focussed constituent in (53a), *zuotian* 'yesterday' in (53b), and *qu le Xingbake* 'went to Starbucks' in (53c). Furthermore, *shi* can be part of a focus sensitive operator. It appears in *huoshi* (或是) 'or', *haishi* (还是) 'or', *yeshi* (也是) 'also', *keshi* (可是) 'but', and so forth. In fact, the appearance of the focus morpheme *shi* (是) in disjunction *haishi* (还是) supports our earlier claim stating that there is a focus feature in this disjunction. Lastly, *shi* is most commonly used as a copula like (54). Interestingly, some linguists have suggested that a copula is closely associated with focus in some languages (e.g., Green, 2007; Hiraiwa, 2002), and Mandarin seems to be one of these languages. More specifically, these

<sup>14</sup> *Huozhe* (或者) and *huoshi* (或是) is derived from *huozheshi* (或者是) by eliding *shi* (是) in the former and *zhe* (者) in the latter. *Huozheshi* (或者是) can be also reduced to *huo* (或) to mean *or* as well.

researchers have argued that a copula in these languages is projected in Focus Phrase.<sup>15</sup>

- (54) wo zuotain qu de kafeiguan *shi* Xingbake  
I yesterday go Gen café is Starbucks  
'The café I went yesterday is Starbucks.'

Considering the analyses proposing *shi* as a focus related morpheme, it is possible to speculate that this morpheme in *huoshi*, but not in *huozhe*, may assist to take an inverse scope interpretation in Taiwanese children. Focus morpheme *shi* is very frequently observed in Mandarin child-directed speech. As for an indication, for example, we analysed the Chang corpus (Chang, 1998) from the CHILDES database (MacWhinney, 2000) which was collected in Taiwan to count frequency of *shi*. We found that 487 of *shi* from total 2,601 adult utterances. Thus, it is probable that children may utilize the syntactic/semantic information of *shi* attested in other contexts and incorporate it into interpretations of *huoshi*.

This account, however, is highly speculative and there are many factors unknown to us, underlining the need for further investigations. We do not believe that sharing the same focus morpheme alone is a sufficient condition for this account; there must be other factors. Furthermore, little is known to us to what extent morphological information comes effective in sentence comprehension. We, therefore, leave these issues for future study.

As a final note, it is worth stressing that setting a focus parameter in the lexicon does not mean that the derived scopal interpretations are absolute; there exists the

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<sup>15</sup> We speculate that this account is in particular applicable to topic-prominent languages like Mandarin Chinese (Li & Thompson, 1976). In these languages, a copula sentence tends to form in a topic-comment construction and the comment part is considered as focus (e.g., Lambrecht, 1994). Thus, the syntactic structure of a copular sentence in Mandarin can be constructed like (i).

(i) [<sub>TopP</sub> XP [<sub>Top</sub>  $\emptyset$  [<sub>Foc</sub> *shi* [<sub>IP</sub> ~~XP~~ YP]]]]



possibility of adopting an alternative interpretation. For example, disjunction with a [+Foc] value is sometimes interpreted under local negation whenever it is forced to be. YNQs with disjunction *huoshi/huozhe* tested in our experiments, repeated in (55), can be used in the same way as English YNQ with preposed negation as in (56). In this type of questions, a certain speaker's epistemic state is conveyed. In using (55), a questioner already holds the belief that Donald Duck ate cake or noodles, but he/she asks a question to confirm the belief. This kind of interpretation forces disjunction to stay under the scope of negation, as evident by the fact that English (55) cannot yield an AltQ interpretation (see Romero & Han, 2004).

- (55) Tanglaoya meiyou chi dangao *huozhe/huoshi* mian    *ma*?  
 Donald    not    eat cake    or    noodles Q<sub>(YN)</sub>  
 AltQ: \* 'Which of the beverages did John not drink, coffee or tea?'  
 YNQ: 'Didn't Donald Duck eat cake or noodles?'

- (56) Didn't Donald Duck eat cake or noodles?  
 AltQ: \* 'Which of the beverages did John not drink, coffee or tea?'

What these facts invite us to consider is, therefore, that although the parameter may define a default interpretation (or preferred interpretation) at the lexical level, scope interpretations are ultimately determined by integrating other linguistic and non-linguistic information.

### 3.7. Conclusion

Our investigation of Mandarin-speaking children's interpretation of disjunction in negative questions revealed some new findings which shed further light on children's scope interpretation. We found that the development of the interpretations associated with

disjunction seems to be tied to lexical items. Some disjunction words, such as *haishi*, are mastered relatively early while the adult interpretation for *huozhe*, for example, is acquired later in the course of acquisition. This asymmetry can be captured by assuming a focus parameter within the Principles and Parameters theory of Universal Grammar. We have attempted to argue that setting the [+Foc] value for *haishi* is relatively quick as it depends on positive evidence that is reliably attested in the input. However, detecting evidence for a focus feature in *huozhe* requires further cognitive ability that be difficult for children. Furthermore, our experimental findings also suggest that interpretations of sentences with disjunction may be affected by focus, as evident by the fact that, unlike *huozhe*, children performed adult-like on *huoshi* which contains the overt focus morpheme *shi*.

In spite of our novel findings, many factors remain unknown to us from both an empirical and theoretical perspective. Focus is one of the most complex properties in human languages. Not only does it closely link to the core properties of language, such as syntax, semantics, and phonology, but it is also relevant to pragmatic/discourse information including interlocutors' mental state. If our account of a focus parameter is on the right track, it implies that interpretations of disjunction are also a complex matter. Hence, future research requires comprehensive approaches to fully understand children's knowledge of disjunction.

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# **CHAPTER IV**

## **THE EMERGENCE OF QUESTION PARTICLES IN CHILD JAPANESE: AN ASYMMETRY BETWEEN YES/NO-QUESTIONS AND WH-QUESTIONS**



## Abstract

The present study examines the acquisition of the Japanese question particles *ka* and *no* by analyzing longitudinal child speech corpora. It reports a developmental pattern showing that the question particles *ka* and *no* emerge significantly earlier in yes/no questions than in wh-questions. This phenomenon is taken to be similar to a phenomenon observed in the acquisition of English auxiliary inversion, where English-speaking children invert auxiliaries earlier in yes/no questions than in wh-questions (e.g., Klima & Bellugi, 1966). We account for this asymmetry by proposing that Japanese-speaking children initially consider a wh-word as a question licenser, preventing a question particle from occurring in wh-questions. Some possible scenarios about how children recover from their mis-analysis so as to converge on the adult grammar are also discussed.

*Keywords: Child language production, Question particle, Yes/no question, Wh-question.*



- (2) a. Does the kitty stand up?  
 b. Will you help me?  
 c. Where the other Joe will drive?  
 d. What he can ride in? (Klima & Bellugi, 1966)

Although the existence of this second developmental stage is subject to some controversy (Erreich, 1984; Ingram & Tyack, 1979), many linguists and acquisition researchers have accepted the evidence at face value, and have proceeded to ask why such a developmental asymmetry should exist between YNQs and wh-questions (de Villiers, 1991; Radford, 1990, 1994; Roeper, 1992; Roeper & de Villiers, 2011; Rowland, 2007; Rowland & Pine, 2000; van Valin, 2002). Some researchers working within the generative framework argue that the developmental asymmetry is due to incomplete syntactic structures in child grammar, such as the absence of functional categories (Radford, 1990, 1994), or the absence of a specifier position in the Complementizer Phrase (CP) (Roeper, 1992; Roeper & de Villiers, 2011). Other researchers, working from a usage-based perspective, argue that the asymmetry in the development of SAI is the consequence of frequency effects derived from the adult input (Rowland, 2007; Rowland & Pine, 2000). On this view, words grouping with higher-frequency in the input are expected to emerge earlier in children's production, as compared with lower-frequency items. As YNQs are more frequent in the input than wh-questions, SAI is expected to occur earlier in children's YNQs than in their wh-questions (Rowland, 2007).

Despite a spate of acquisition studies of Subject-aux inversion in English, only a few studies have focused on typologically different languages, such as Japanese, which lack auxiliary or modal inversion. In Japanese, the interrogative force of YNQs and wh-questions is licensed by a question particle that is placed in sentence-final position.

Furthermore, unlike English in which the inverted element involves *tense*, *number*, and *person* agreement, Japanese question particles do not involve such agreements. This may explain why the acquisition of Japanese questions has demanded less attention by researchers working within the generative framework.

The aim of this study is to shed light on the acquisition of Japanese questions. In particular, we show that Japanese-speaking children exhibit a developmental asymmetry between YNQs and wh-questions similar to the one observed in the productions by English-speaking children involving SAI. In the case of Japanese, however, the focus is question particles. By investigating longitudinal child speech corpora, the present study reveals that Japanese-speaking children go through the stage in which a question particle appears in YNQs, but not in wh-questions. We argue that this stage is comparable to the stage in which English-speaking children invert an auxiliary or modal verb in YNQs but not in wh-questions.

The present chapter is organized as following. In the next section, we will illustrate the properties of YNQ and wh-question constructions in Japanese. This is followed by the findings of corpus analyses of these constructions in child language. We then propose an account of why question particles emerge later in wh-questions than in yes/no questions in child Japanese. In Section 4.5, we discuss some alternative accounts of the delayed emergence of question particles in wh-questions. In Section 4.6, we consider some possible scenarios of how children achieve adult like productions, before the concluding remarks in Section 4.7.

## 4.2. Japanese question particles *ka* and *no*

A Japanese YNQ is constructed by placing a question particle at the sentence-final position of a non-interrogative construction. Japanese has a range of question particles which we list in (3) to (7).

- (3) John-wa kofi-o nomi-mashi-ta ***ka***?  
John-Top coffee-Acc drink-Polite-Past Q  
'Did John drink coffee?'

- (4) John-wa kofi-o non-da ***no***?  
John-Top coffee-Acc drink-Past Q  
'Did John drink coffee?'

- (5) John-wa kofi-o non-da ***kana***?  
John-Top coffee-Acc drink-Past Q  
'Did John drink coffee (I wonder...)?'

- (6) John-wa kofi-o non-da ***kashira***?  
John-Top coffee-Acc drink-Past Q  
'Did John drink coffee (I wonder...)?'

- (7) John-wa kofi-o non-da ***desho***?  
John-Top coffee-Acc drink-Past Q  
'John did drink coffee, didn't he?'

The first two question particle *ka* and *no* in (3) and (4) are considered to be 'genuine'

question particles.<sup>1</sup> They differ from the remaining question particles *kana*, *kashira*, *desho*, in (5) to (7) respectively, in that the former two do not convey pragmatic or speaker's epistemic information, but the latter three do. For example, both (5) and (6) are considered to be monologue questions in which a speaker asks him-/herself a question because of dubitative status in his/her mind (Matsugu, 2005). Despite being monologue questions, the questions often elicit a response from a respondent, which is possibly dictated by some pragmatic principles. A YNQ with the question particle *desho*, as in (7), involves the speaker's expectation towards an answer from a respondent (Sudo, 2010). This type of YNQ is equivalent to English tag questions, as indicated by the gloss. In the present study, we limit our attention to two question particles, *ka* and *no*. The rationale for this is twofold. First, *ka* and *no* are the most frequently observed question particles. Second, the acquisition of the remaining three question particles (*kana*, *kashira*, and *desho*) arguably depend on the development of children's pragmatic knowledge; this could cause a delay in the acquisition of these particles, which would be confounded with the structural factors that are the main concern of the present study.

The question particles *ka* and *no* in (3) and (4) also occur in wh-questions. In (8) and (9), the question particle *ka* or *no* occurs at the end of each sentence.

- (8) *dare-ga kōhi-o nomi-mashi-ta ka?*  
 who-Nom coffee-Acc drink-Polite-Past Q  
 'Who drank the coffee?'

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<sup>1</sup> However, there is an alternative view according to which *no* is not a Question particle. Kuno (1980) argues that a YNQ with *no* in (4) is an elided version of a cleft-like sentence, as illustrated in (i). Here the copula *desu* and the Question particle *ka* are elided. On this account, the particle *no* is an embedded complementizer rather than a Question particle.

- (i) [<sub>CP</sub> John-wa kōhi-o non-da no] ~~desu-ka?~~  
 John-Top coffee-Acc drink-Past Comp Cop Q  
 'Is it that John drank coffee?'

Although Kuno's analysis is plausible, it is not relevant to the present study; instead adopted the more common view that *no* is a Question particle.



- (9) *dare*-ga kōhi-o non-da *no*?  
 who-Nom coffee-Acc drink-Past Q  
 ‘Who drank the coffee?’

In order to avoid confusion, we note at this point that the two question particles differ in their pragmatic usage, in particular in regard to speech style. The question particle *ka* normally appears with a polite form marked by verb morpheme *mashi* (or *masu*), as shown in YNQ (3) and wh-question (8). By contrast, the question particle *no* appears with an unmarked plain form. In terms of grammaticality, however, the question particle *ka* used with a plain form is still acceptable.<sup>2</sup> The stylistic difference does not affect the emergence of the question particles, as both emerge in children’s productions around the same time. We will discuss this in greater detail in the next section.

The question particle *ka* is free to occur in copular sentences like (10a-d). In these sentences, the polite form copular *desu* can be optionally omitted.<sup>3</sup>

- (10) Noun + Copular + *ka*  
 a. kōhi (~~desu~~) *ka*? (YNQ)  
     coffee Cop.Polite Q  
     ‘Is it coffee?’
- b. dore-ga kōhi (~~desu~~) *ka*? (WhQ)  
     which-Nom coffee Cop.Polite Q  
     ‘Which one is coffee?’
- Adjective + Copular + *ka*  
 c. kōhi-wa oishii (~~desu~~) *ka*? (YNQ)  
     coffee-Top tasty Cop.Polite Q  
     ‘Is the coffee tasty?’

<sup>2</sup> Question particle *ka* with a plain form sometimes occurs in masculine speech style. Question particle *no* in a polite form, on the other hand, is extremely rare in speech, though a small population of Japanese-speaking females may use such structures.

<sup>3</sup> If omission occurs, a polite style is no longer maintained because copular *desu* that carries the stylistic information (i.e., politeness) no longer appears.

- d. dono kōhi-ga oishii (~~desu~~) *ka*? (WhQ)  
 which coffee-Nom tasty Cop.Polite Q  
 ‘Which coffee is tasty?’

However, in some cases, the copula *desu* cannot be omitted. This is when a wh-word immediately precedes the copula, as shown in (11a-b). In other words, the question particle *ka* cannot appear immediately next to wh-words.

- (11) a. dare \*(desu) *ka*?  
 who (Cop.Polite) Q  
 ‘Who?’  
 b. [kōhi-o non-da no]-wa dare \*(desu) *ka*?  
 coffee-Acc drink-Past Comp-Top who (Cop.Polite) Q  
 ‘Who drank the coffee?’

Unlike copular sentences, there is not restriction on the occurrence of the question particle *ka* in questions with a main verb. This is illustrated in (12a-b).

- (12) Verb + ka  
 a. John-wa kōhi-o nomi-masu *ka*? (YNQ)  
 John-Top coffee-Acc drink-Polite Q  
 ‘Does John drink coffee?’  
 b. John-wa dono kōhi-o nomi-masu *ka*? (WhQ)  
 John-Top which coffee-Acc drink-Polite Q  
 ‘Which coffee does John drink?’

In most respects, the licensing conditions of the question particle *no* are identical to those of the question particle *ka*. However, the question particle *no* has one further restriction. Like copular sentences with *ka*, the plain form of the copula *na* cannot be omitted. This is because the question particle *no* cannot appear immediately next to a wh-

word. This is illustrated in (13a-b). But the copula *na* further cannot be omitted when a NP immediately precedes the copular. This is shown in (14a-b).

- (13) a. dare \*(na) *no*?  
           who (Cop) Q  
           ‘Who?’
- b. [kohi-o non-da no]-wa                      dare \*(na) *no*?  
           coffee-Acc drink-Past Comp-Top who (Cop) Q  
           ‘Who drank the coffee?’
- (14) a. kohi   \*(na) *no*?  
           coffee (Cop) Q  
           ‘Coffee?’
- b. dore-ga       kohi \*(na) *no*?  
           which-Nom coffee (Cop) Q  
           ‘Which one is coffee?’

It is also important to note that both YNQs and wh-questions can be constructed without a question particle like *ka* or *no*. As shown in (15a-b), when a question particle is omitted from YNQs, it must be replaced by rising intonation (represented by an upward arrow). Rising intonation is vital because, otherwise, the question is indistinguishable from a declarative sentence. In the case of wh-questions, rising intonation also occurs, as shown in (16a-b). However, the presence of rising intonation is not as significant as it is in YNQs because, regardless of the presence or the absence of rising intonation, sentences containing a bare wh-word are always interpreted as a wh-question.<sup>4</sup>

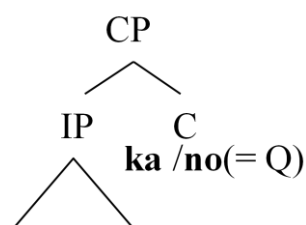
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<sup>4</sup> In Japanese, a wh-word with the particles *ka* or *mo* as a suffix, as in WH-*ka* or WH-*mo*, generate quantificational expressions, comparable to English *some* and *every*. In a later section, we discuss some of these expressions.

- (15) a. kōhi (~~na~~-no/desu-ka)↗?  
 Coffe (Cop Q/Cop.Polite Q)  
 ‘(Is it) coffee?’
- b. John-wa kōhi-o nomu (~~no~~/ka)↗?  
 John-Top coffee-Acc drink (Q)  
 ‘Does John drink coffee?’
- (16) a. dore-ga kōhi (~~na~~-no/desu-ka)↗?  
 Which-Nom coffee (Cop Q/Cop.Polite Q)  
 ‘Which one is coffee?’
- b. dare-ga kōhi-o nomu (~~no~~/ka)↗?  
 who-Nom coffee-Acc drink (Q)  
 ‘Who drinks coffee?’

As far as the theory of syntax is concerned, the structure of Japanese questions is subject to controversy. The controversy is about the presence or absence of a Complementizer Phrase (CP) in the structure. One view claims that Japanese sentence structure does not have a CP (Fukui, 1986, 1988; Fukui & Sakai, 2003). We adopt an alternative claim, which is more prevalent in the Japanese linguistic literature. The analysis we adopt supposes that Japanese sentence structures have a CP, as in English. Thus, we assume that question particle *ka* or *no* is located in the head of CP (C<sup>0</sup>) (e.g., Ginsburg, 2009; Hagstrom, 1998; Nishigauchi, 1990). The structure of YNQs is illustrated in (17).

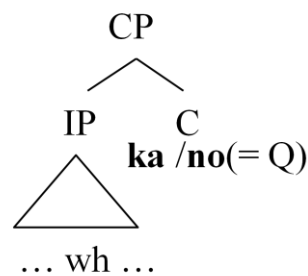
(17)



For wh-questions, Japanese does not involve wh-movement unlike English counterparts, i.e., it is a wh *in situ* language according to the analysis we adopt. So the

structure of Japanese wh-questions is as illustrated in (18) (Ginsburg, 2009; Hagstrom, 1998).<sup>5</sup> Here, we may either assume that a question particle in wh-questions is base-generated in  $C^0$  or that it moves there from the IP-internal position, as proposed in Hagstrom (1998). The details of the movement analysis will be discussed later.

(18)



Given these theoretical assumptions, Japanese question constructions are different from those of English. The two main differences are, first, that wh-movement is not involved and, second, that question particles reside in  $C^0$  in Japanese, instead of in the position of an auxiliary or modal verb, as in English. As noted earlier, the question particles in  $C^0$  in Japanese also differ from English auxiliaries or modal verbs, because they do not involve *tense*, *number*, and *person* agreement. Therefore, Japanese question formation is relatively straightforward, as compared with English. Nevertheless, the next section demonstrates that Japanese-speaking children show the same asymmetry in the emergence of question particles, as English-speaking children. Children acquiring both languages show comparable distinctions between YNQs and wh-questions.

<sup>5</sup> There is an alternative proposal by Nishigauchi (1990), who argues for large scale pied-piping in Japanese wh-questions. On this view, an entire IP including the wh-word moves to the CP-specifier position, as in (ib).

- (i) a. John-wa nani-o nomimasu ka?  
       John-Top what-Acc drink.Polite Q  
       ‘What does John drink?’  
       b. [<sub>CP</sub> [<sub>IP</sub> John-wa nani-o nomimasu]<sub>i</sub> [<sub>C</sub> ka t<sub>i</sub>]].
-

### 4.3. The emergence of question particles: A corpus study

#### 4.3.1. Participants and methods

We analyzed the transcripts of three Japanese-speaking children from the CHILDES database (MacWhinney, 2000), Tai and Aki (Miyata, 1995, 2000) and Jun (Ishii, 1999). All three transcripts contained adult-child conversational speech for children between the ages of one and three years. Table 1 offers a summary of the Tai, Aki, and Jun corpora. Two other corpora based on the speech of children in the same age range were available in the CHILDES database, but they were excluded from the analyses. One corpus contained no instances of the question particle *ka* in wh-questions, and the other was based on a collection of diary records, and only contained a small amount of data in each session.

**Table 1:** Participants' age and MLU and the number of child utterances in corpora

Name	Age range	MLU range	Number of utterances
Tai	1;5.20-3;1.29	1.23-3.13	32,554
Aki	1;5.7-3;0.0	1.00-2.44	22,020
Jun	1;5.5-3;6. <sup>a</sup>	1.18-3.04	42,247

<sup>a</sup> Jun's speech data are available as early as age of 6 months, but we used the data from age of 1;5.

The target YNQs and wh-questions that we examined were restricted to matrix questions. The target questions were extracted by the CLAN program using the *combo* function with a searching keyword of “ka^?” for the question particle *ka* and the search-word “no^?” for the question particle *no*. The extracted utterances were then manually sorted by question type (YNQ vs. wh-question). Questions containing unclear expressions, as well as imitative utterances, were excluded from the analysis. If a child's utterance was identical to the immediately preceding adult utterance, it was considered to be an imitative utterance and was also excluded from the analysis. For the question particle *no*, we asked

whether it appeared in final position or, alternatively, was the homophonous genitive case marker *no*, as exemplified in (19). In (19), since a nominal head is *pro*-dropped, the genitive case marker appears at the end of an utterance.

- (19) a. dare *no* (*pro*)?  
           who Gen?  
           ‘Whose?’  
           ‘\*Who?’
- b. kumachan *no* (*pro*)?  
           Teddy bear Gen  
           ‘Is it Teddy bear’s?’  
           ‘\*Is it Teddy bear?’

#### 4.3.2. Findings

##### 4.3.2.1. Tai

Tai’s first utterance of question particle *ka* was observed in a YNQ at age 1;5 as shown in (20), but it became more frequently observed in YNQs from age 1;9 (see Figure 1).

- (20) nai no *ka*?  
       not.existing Comp Q  
       ‘Has it gone?’ (Tai, 1;5.27)

On the other hand, approximately nine months after the initial appearance of *ka* in YNQs, at age 2;2, the question particle *ka* emerged in *wh*-questions. Tai’s initial productions of *wh*-questions occurred at age 1;8, so there was a period of six months during which this question particle was absent in *wh*-questions. During this period, particle-less *wh*-questions took the forms illustrated in (21).

- (21) a. doko?  
           where  
           ‘Where?’ (Tai, 1;8.13)
- b. doko ichatta?  
           where gone  
           ‘Where has it gone?’ (Tai, 1;9.3)

While question particle *ka* was observable in various types of YNQ constructions, it only appears in limited types of wh-question constructions. The most common type of wh-question containing *ka* was constructed with a polite form copula *desu*, as in (22a-b). Among a total of 70 wh-questions with *ka* in Tai’s speech, 42 (60%) were this type of question constructions.

- (22) a. nani *desu ka*?  
           what Copula.Polite Q  
           ‘What is it?’ (Tai, 2;4.30)
- b. doko-ga itai *desu ka*?  
           where-Nom painful Copula.Polite Q  
           ‘Where is the pain?’ (Tai, 2;5.19)

The second most frequent type of wh-questions were those like (23a-b) containing a volitional/hortative verb morpheme *-(y)oo*. This is evident in 24% (17/70) of his utterances of wh-questions with *ka*.

- (23) a. kore doko-ni ok-oo *ka*?  
           this where-Loc put-Voli Q  
           ‘Where shall we put this?’ (Tai, 2;2.6)
- b. dore ni shi-yoo *ka*?  
           Which-Dat do-Voli Q  
           ‘Which one shall we pick?’ (Tai, 2;4.3)



Lastly, the third most frequent type contained a polite form of a light verb *shimasu* ‘do’ like (24) (11%, 8/70).

- (24) doo shimashi-ta ka?  
how do.Polite-Past Q  
‘What happened?’ (Tai, 2;6.24)

A similar developmental pattern was exhibited for the Question-particle *no* (see Figure 2). The first occurrence of *no* in a YNQ appeared at age 1;5; it was not observed in wh-questions until age of 2;1. This is almost the same time that *ka* was first observed in wh-questions. The first utterance of *no* in a YNQ is shown in (25) and first utterance of *no* in a wh-question is shown in (26).

- (25) inai no?  
absent Q?  
‘Is (he/she) absent?’ (Tai, 1;5.27)

- (26) dore yaru no?  
Which do Q?  
‘Which one do (we) do?’ (Tai, 2;1.23)

Unlike question particle *ka* which was used in a polite form of questions, question particle *no* only appeared in a plain form as it is attested in adult language. Furthermore, another noticeable finding is that *no* was also observed in many adjunct wh-questions, such as *dooshite/nande* (‘why’) and *dooyatte* (‘how’), dominating half of the utterances of the wh-questions containing the question particle *no* (49%, 36/73).

#### 4.3.2.2. *Jun*

In Jun's speech, we only found 8 utterances of *ka* in wh-questions, which is much fewer than the number we obtained in Tai's speech. The first appearance was at age of 2;8 – one year after the onset of wh-questions at age of 1;8. By contrast, the initial appearance of *ka* in YNQs was as early as age of 1;10. Jun's initial utterance of a YNQ with *ka* and a wh-question with *ka* are illustrated in (27a-b) and (28) respectively (see Figure 3). Note that, *puchin* in (27a) is an onomatopoeic word expressing the action of turning a switch off. Like Tai, the majority of wh-questions with *ka* were those containing copular *desu* (75%, 6/8).

- (27) a. *puchin ka?*  
onomatopoeia Q  
= *asking if he should switch off*
- b. *atchii ka?*  
hot Q  
'*Is it hot?*' (Jun, 1;10.15)
- (28) *nan desu ka?*  
what copular.Polite Q  
'*What is it?*' (Jun, 2;8.24)

For question particle *no* (see Figure 4), the first appearance in a YNQ was also earlier than in a wh-question. The first utterance of *no* in a YNQ (29) was found at age of 2;1 whereas the first utterance of *no* in a wh-question (30) was at age of 2;5. It mostly appeared in a plain form and many of the wh-questions containing *no* were adjunct wh-questions (40%, 51/128).

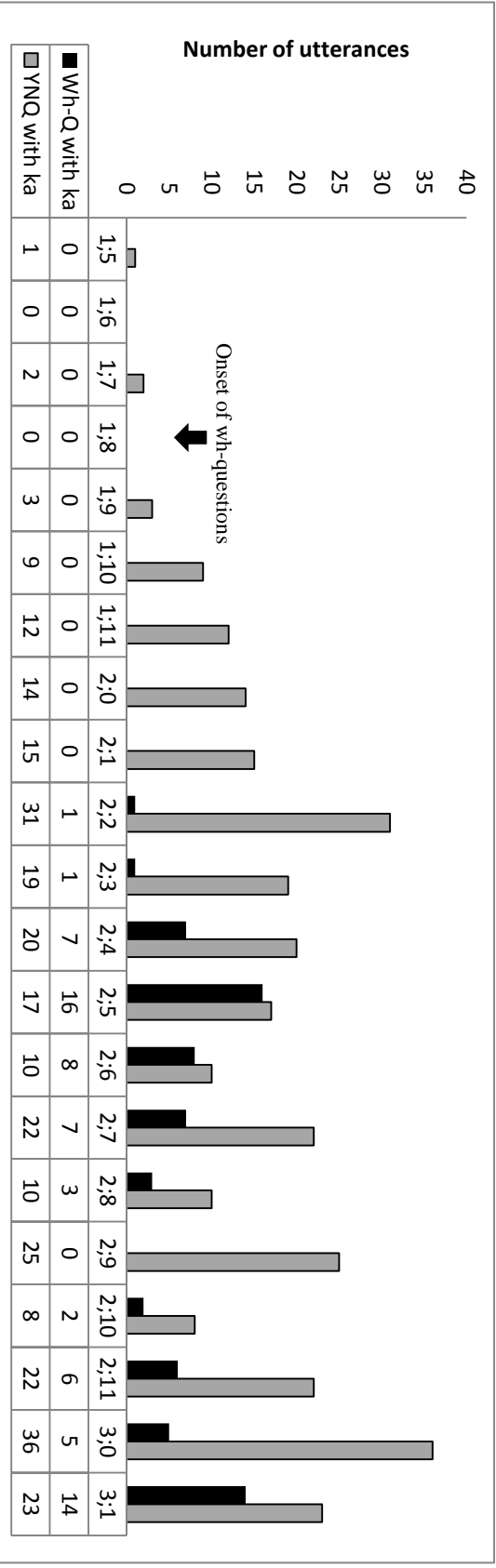


Figure 1: The number of Tai's yes/no questions and wh-questions with question particle *ka*

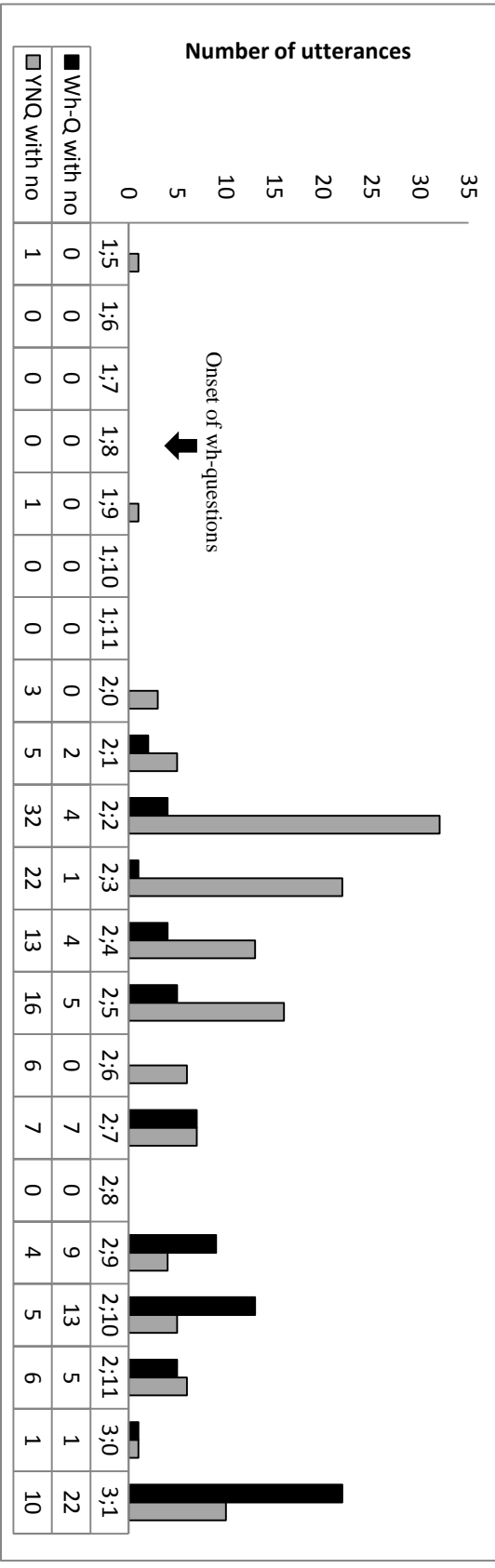


Figure 2: The number of Tai's yes/no questions and wh-questions with question particle *no*

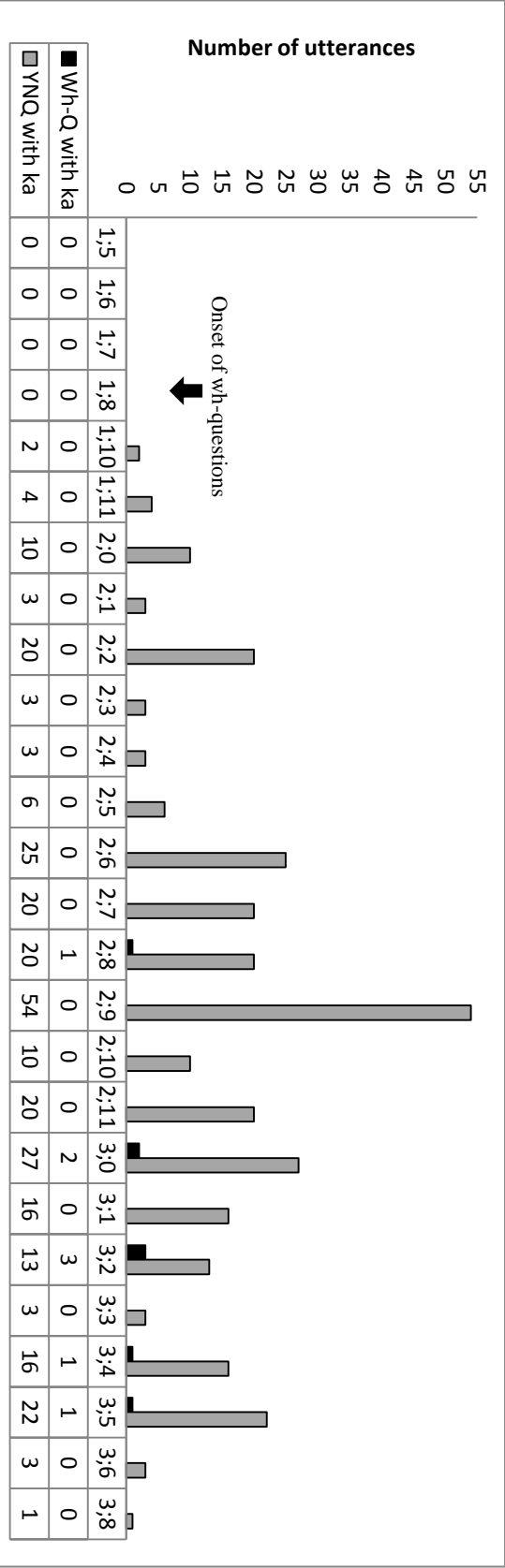


Figure 3: The number of Jun's yes/no questions and wh-questions with question particle *ka*

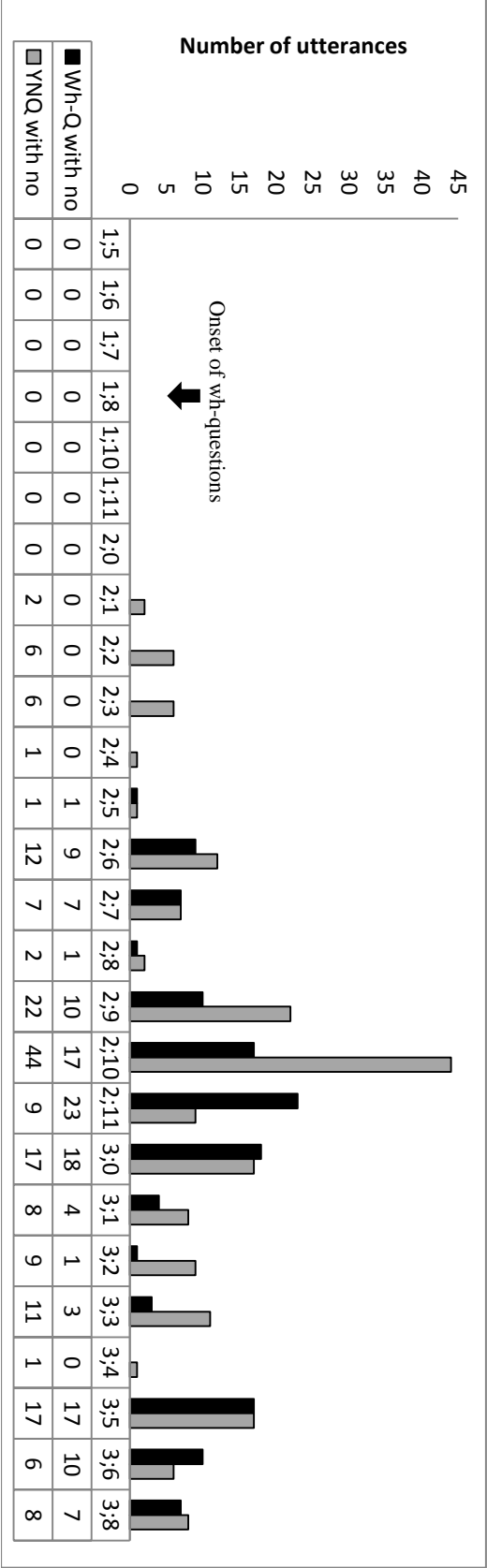


Figure 4: The number of Jun's yes/no questions and wh-questions with question particle *no*

- (29) jia, akan *no*?  
so, disallowed Q  
'*So, can't do it?*' (Jun, 2;1,18)
- (30) dote (=dooshite) sun *no*?  
why do Q  
'*Why do you do it?*' (Jun, 2;5,18)

#### 4.3.2.3. Aki

Aki's developmental pattern in the acquisition of question particles is significantly different from the other two children. Although Tai and Jun showed a significant age interval between the onset of question particles appearing in YNQs and in wh-questions, Aki's question particles emerged in a YNQ and a wh-question almost at the same time (see Figure 6 for question particle *ka* and Figure 7 for question particle *no*). Moreover, the first wh-question in Aki's speech also emerged around the same period. It is speculated that this difference between Aki and the other two children is attributed to Aki's prolonged stage of one-word utterances, as evident in Figure 5 showing mean length of utterance (MLU) of each child over the relevant timeframe. Tai and Jun have already produced a number of two-word utterances from the earliest data of the corpora, but Aki's two-word utterances are very limited until the age of two years and two months. Moreover, his question utterances were also very limited during the one-word stage. From age 1;5 to 2;2, only 30 question utterances were found among a total of 3,760 child utterances. Given these facts, it is not surprising that Aki's speech showed no question particles until he started to produce a sufficient number of question utterances.

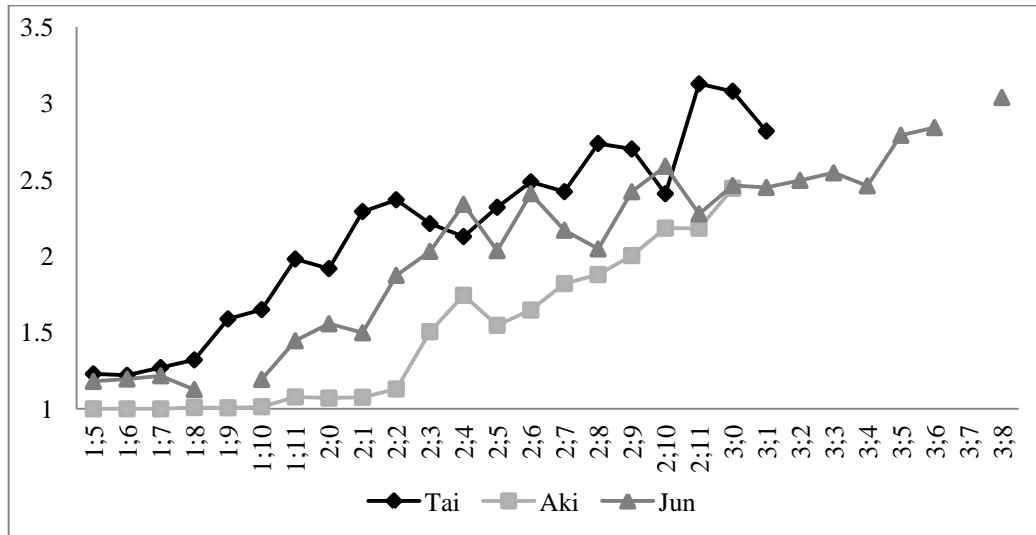


Figure 5: MLU of Tai, Aki, and Jun from age of one year and five months

Aki's initial YNQ with the question particle *ka* as in (31) was observed at the age of 2;4 and one month later, the question particle *ka* emerged in wh-questions as in (32). Most of the time, *ka* in wh-questions appeared in conjunction with a polite copular *desu* (77% (10/13) of occurrences) and only once presenting with a volitional/hortative verb morpheme *-(y)oo*.

- (31) te kak-oo ka?  
hand draw-Hort Q  
'May I draw a hand?'

- (32) shinkansen hon (=shinkansen no hon)-wa (\*no) doko ka?  
Bullet-train book (=bullet-train's book)-Top Gen where Q?  
'Where is the bullet-train's book?' (Aki, 2;5.13)

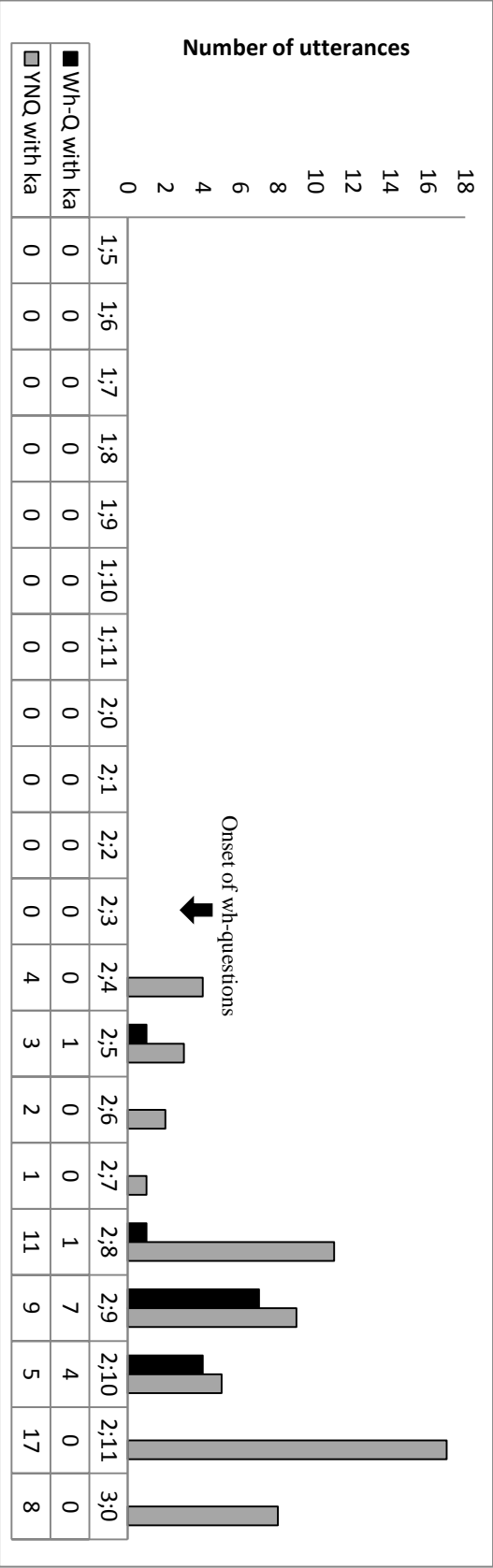


Figure 6: The number of Aki's yes/no questions and wh-questions with question particle *ka*

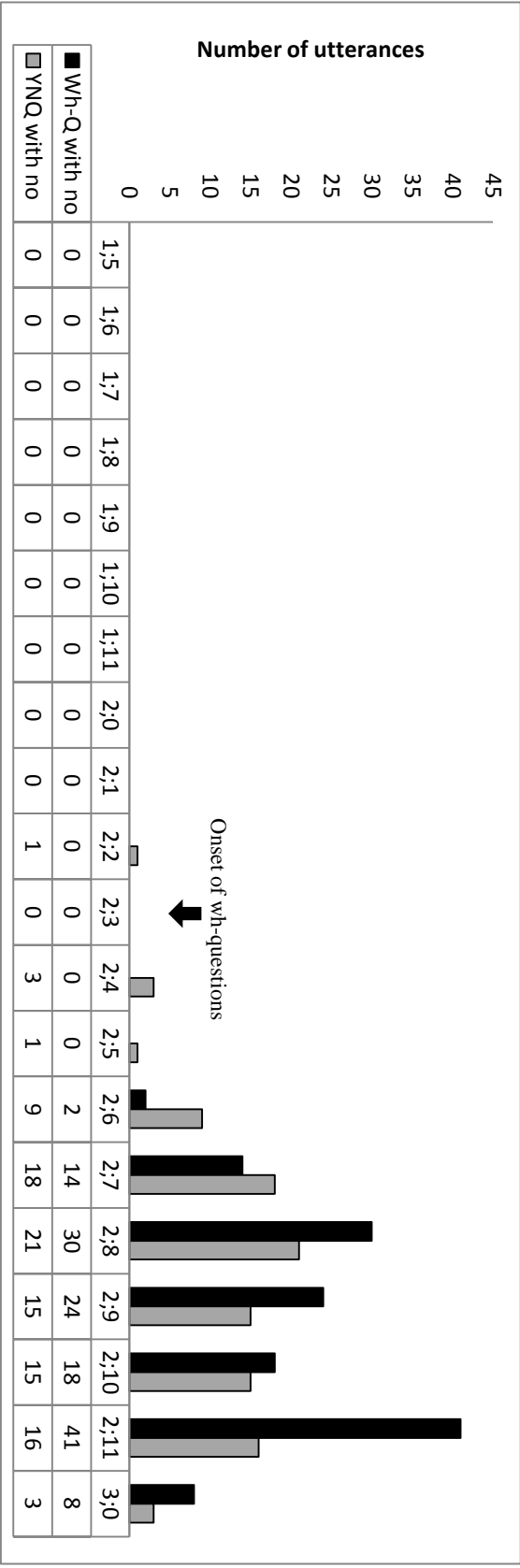


Figure 7: The number of Aki's yes/no questions and wh-questions with question particle *no*

Question particle *no*, on the other hand, initially appeared in a YNQ at the age of 2;2 whereas the onset of *no* in a wh-question was at the age of 2;6. The initial utterance of each question type is shown in (33) and (34) respectively. Unlike the previous two children, the question particle *no* was unlikely to appear in adjunct wh-questions in Aki's speech (11%, 15/137).

- (33)    *nai no?*  
           not.existing Q  
           '*Isn't there any?*'
- (34)    *nani aru no?*  
           what have Q  
           '*What do we have?*'

In summary, the results of our corpus analysis show a developmental trajectory in the acquisition of question particles. In Tai's and Jun's speech, the question particles *ka* and *no* appeared in YNQs first. Four to nine months later, these same question particles began to appear in wh-questions. Tai and Jun's data also revealed a time interval between the onset of wh-questions and the onset of a question particle appearing in wh-questions. However, Aki's results were less clear: the question particles *ka* and *no* were observed in the earliest wh-questions that Aki produced. Furthermore, these question particles in YNQs also emerged around the same period. We consider that this is because of the prolonged period of Aki's one-word utterances. Individual differences are, however, not a surprising factor. In fact, some English speaking-children also exhibit a similar pattern in the acquisition of auxiliary inversion: an auxiliary or modal verb is inverted in YNQs and wh-questions around the same age (Ingram & Tyack, 1979; Erreich, 1984). Another important finding we need to address is that in Tai's and Aki's speech, two different question particles emerged in wh-questions around the same period of time. Jun, however, showed an interval between the onsets of the



two particles in wh-questions (about four months). We believe that this is possibly due to the limited number of instances of the question particle *ka* obtained from the corpus, which made us unable to draw a precise timeline of development. Despite some variation, overall findings indicate that Japanese-speaking children are already competent to use *ka* and *no* as a question licenser at the time when wh-questions start to appear in their speech. However, it is likely that children do not place these question particles in wh-questions until a certain point of development.

#### **4.4. Proposal for the delayed emergence of question particles in wh-questions**

This section addresses a possible account of why Japanese-speaking children show a delayed emergence of question particles in wh-questions. To begin with, we demonstrate a very brief introduction of a feature theory advanced in recent generative grammar (Chomsky, 1993, 1995), which we adopt in accounting for this developmental phenomenon.

According to a feature theory, each lexical item contains a bundle of different types of features. These include phonological features, semantic features, and functional (formal) features. The phonological and semantic features are responsible for representing the sounds and meanings of a corresponding lexical item, whereas the functional features play an important role in determining how functional items are represented in syntactic structure. A functional feature is considered to be a pair, consisting of a valued feature and an unvalued feature. The valued feature is carried by the lexical item that represents a functional meaning. For example, the Japanese question particles *ka* and *no* are lexical items bearing a valued Q-feature; these particles license sentences with interrogative force. By contrast, an unvalued feature is one that has not yet been assigned a value. It is often assumed that an unvalued Q-feature is located in the head of a Complementizer Phrase ( $C^0$ ) (e.g., Ginsburg, 2009). This

unvalued Q-feature needs to undergo feature checking with its matching valued feature (i.e., a valued Q-feature in a question particle) in order for it to gain a value before the completion of the syntactic computation.

There are three possible ways to undergo feature checking. First, a lexical item containing a Q-feature can be base-generated at  $C^0$  through the syntactic operation called Merge. Second, a lexical item with a Q-feature can be base-generated in a position other than  $C^0$ . In this case, the unvalued Q-feature in  $C^0$  and the valued feature undergo an Agree relation; the former unvalued Q-feature (the Probe) searches for the corresponding valued feature (the Goal) in the former's c-command domain. Third, feature checking can be achieved by moving a lexical item carrying a Q-feature to the  $C^0$  position, where the unvalued Q-feature is located.

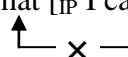
Bearing this theoretical background in mind, we are now in a position to discuss why the emergence of a question particle is delayed in wh-questions. As stated earlier, the Japanese question particle is optional. This means that question particles can be replaced by prosody, rising intonation. This optionality of the question particle is considered in two possible ways. One possible account stipulates two different types of question particles in respect to phonological conditions. On some occasions, the overt question particle, *ka* or *no*, undergoes feature checking with the unvalued Q-feature in  $C^0$ . On other occasions, a phonologically null question particle, rather than *ka* or *no*, undergoes feature checking. Alternatively, it is also possible that the feature-checked question particle *ka* or *no* is optionally elided later, at the phonological interface. Either way, in adult grammar, the question particle undergoes feature checking with a corresponding unvalued feature in  $C^0$ .

Let us assume, however, that children initially hypothesize that another lexical item in the sentence carries a valued Q-feature. For children at this stage, the lexical item is able to satisfy the feature checking relationship required by the unvalued Q-feature in  $C^0$ . If so, then

the question particle becomes redundant. Since it is redundant, the question particle will not be placed in a question sentence. We propose that this is what happens in wh-questions in child Japanese. Children consider a wh-word to be a question licenser. That is, they assign a valued Q-feature in a wh-word. This ‘mistakenly’ assigned Q-feature prevents a question particle from appearing, because the wh-word has already fulfilled its requirement for feature checking.

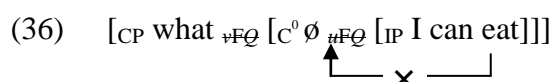
YNQs are different from wh-questions, however. There is no lexical item that can be mis-analyzed as having a Q-feature, so children can optionally insert the question particles *ka* or *no* as soon as they acquire them. This is why the Japanese-speaking children produced question particles in YNQs as soon as they acquired these particles, but the emergence of these question particles was delayed in wh-questions.

A similar idea has been explored by several researchers investigating the acquisition of English subject-auxiliary inversion (Radford, 1994; Roeper, 1992; van Valin, 2002). Roeper (1992) argue that children do not have a CP-specifier position; that is only the  $C^0$  position exists in child grammar. This immature syntactic structure forces English-speaking children to place wh-words at the  $C^0$  position, instead of the CP-specifier position. He further argues that since English-speaking children misanalyse wh-words as a question licenser, the Q-feature at  $C^0$  is satisfied by the wh-word. As illustrated in (35), this leads to the uninverted auxiliary or modal verb because the  $C^0$  position is already filled by the wh-word.

(35)  $[C^0 \text{ what } [_{IP} \text{ I can eat}]]$   


Radford (1994) proposes a similar line of analysis by assuming that wh-words have a Q-feature. In contrast to Roeper (1992), Radford suggests that children already have a full

Spec-Head structure in CP.<sup>6</sup> On this view, wh-words overtly move from inside the clause to the CP-specifier position. Since wh-words carry a Q-feature, they need to undergo feature checking with an unvalued Q-feature in C<sup>0</sup>, via Spec-Head agreement (Rizzi, 1991). Since the unvalued Q-feature is satisfied, it is unnecessary to invert an auxiliary or modal verb that has a Q-feature, despite the fact that C<sup>0</sup> is still empty. This analysis of the situation in child language is illustrated in (36). In contrast to wh-questions, an auxiliary or modal verb can freely move to C<sup>0</sup> in YNQs in order to check its Q-feature. There is no wh-word to block auxiliary or modal inversion.



Why do children initially consider a wh-word as a question licenser? For Japanese cases, we speculate they draw such a conclusion because of the ways that the input is given to children. Suppose that children need to learn what linguistic information in a clause signals an interrogative force. In YNQs, this task is relatively easily accomplished by comparing YNQs with a corresponding declarative sentence. For example, an assertion with a single word “Coffee” can be turned into a YNQ by adding the question particle *ka*, as in “Coffee *ka*?” This apparent contrast invites Japanese-speaking children to infer that the question particle *ka* is the question licenser. The same story can also apply to longer clauses.

<sup>6</sup> Radford (1994) in fact offers two more accounts that are alternatives to this account. One is almost identical to Roeper (1992) except that he assumes that wh-movement is undergone from the IP-internal position to C<sup>0</sup>. The other account contends that children gradually build up functional categories as they develop. Under this view, children initially have a structure with the maximal projection of VP; that is, no IP and CP in early child grammar. Each functional phrase then gradually emerges as children witness the existence of these functional categories in their local language. In the absence of CP, children can only place a wh word in the position adjunct to IP. This syntactic structure prohibits an auxiliary or modal verb moving from I<sup>0</sup>. For more details of these two accounts, we refer the reader to his original work.

However, such a contrast is not available in wh-questions. Wh-questions without question particles or rising intonation are still interpreted as wh-questions, as long as the sentence contains a wh-word. Moreover, frequently, many wh-questions uttered by adults are particle-less. In the Tai corpus, for example, we found that Tai's mother uttered 2,532 particle-less wh-questions. This is contrasted with only 292 utterances of wh-questions with the question particle *ka* and 492 wh-questions with the question particle *no*. That is, non-particle wh-questions are approximately three times greater than the total number of wh-questions with a question particle. In addition, these wh-questions are sometimes constructed in a very simple way with only one or two words like (37a-b).

- (37) a. dare?  
           who  
           'Who?'  
       b. (*Pro*) nani tabe-ta?  
           what eat-Past  
           'What did (you) eat?'

Given this kind of input, children may draw a conclusion that a wh-word is the question licenser because it is the only form that consistently occurs in association with wh-questions.

If this account is on the right track, we can predict that this asymmetrical development of question particles may not be generalized to all languages, as the input varies across languages. In other words, children speaking some languages may not show the delayed emergence of question particles in wh-questions. For example, Mandarin Chinese is predicted to have this outcome. In Mandarin Chinese, a wh-word can appear in both declarative sentences and wh-questions like (38) and (39) respectively. When a wh-word appears in a declarative sentence, it conveys an indefinite expression, compatible with English *any*. On the other hand, when a wh-word appears in a sentence with either rising intonation or the

question particle *ne*, the sentence is interpreted as a wh-question. This also suggests that rising intonation or a question particle *ne* in (39) plays a greater role than the wh-word in determining the type of illocutionary forces.

(38) ni mei jian *shei*.  
 you not see who  
*'You did not meet anyone?'*

(39) ni mei jian *shei* ↗ /(*ne*)?  
 you not see who  
*'Who did you not meet?'*

If so, it is expected that Mandarin-speaking children would not jump to assign a Q-feature to a wh-word. Rather, they would pay more attention to the element that reliably identifies the type of illocutionary forces, i.e., rising intonation or question particle *ne*. If so, we predict that in child Mandarin, the question particle *ne* will appear in wh-questions as soon as children acquire the question particle. We leave this for future studies to confirm.

#### 4.5. Some alternative accounts for the delayed emergence of question particles

A possible account for the delayed emergence of question particles in wh-questions is not limited to the current proposal. Several alternative accounts have been offered by the usage-based model of language acquisition (e.g., Rowland, 2007; Rowland & Pine, 2000; Tomasello, 2003). In this section we present these alternative accounts and examine their viability.

#### 4.5.1. *Usage-based models of language acquisition*

Recently, generativists' accounts of the acquisition of English subject-auxiliary inversion (SAI) have been challenged by some researchers who work within the usage-based models of language acquisition (Rowland, 2007; Rowland & Pine, 2000; Rowland & Theakston, 2009; Theakston & Rowland, 2009). This model of language acquisition rejects the rule-based approaches taken by generative researchers, and presumes that language acquisition is to learn a unique construction associated with its meaning. That is, to be able to produce adult-like question structures, children's task is to find a particular construction uniquely associated with question meanings.

According to this model of language acquisition, children initially learn language by keeping track of exemplars attested in the input and storing them as their linguistic knowledge. Exemplars are particular phrases or sentences that appear to be simple and occur frequently in the adult speech. As the time goes by, the collection of exemplars gradually and slowly form a lexical-based frame, consisting of a pivot and variable slot. For example, the lexical-based frames for wh-questions appear like *Where's+X*, *What's+X*, *What+does+X*, *What+can+X*, in which X is a slot that children can freely put words or phrases.

Based on this theoretical assumption of language development, the usage-based model of language acquisition predicts particular features of child language. Because children's speech is based primarily on entrenched frames like the ones shown above, children are expected to be conservative. The claim is that child language more or less matches the input they receive (MacWhinney, 2004; Tomasello, 2000, 2003). Only when children do not have an appropriate frame to express a particular meaning do they utilize their generalization ability to make a novel construction based on existing frames. Most of time, the constructions created by generalizations match the corresponding adult constructions, and only in a few cases will children create non-adult constructions. Following this brief

introduction to the usage-based models of language acquisition, let us consider some alternative accounts for the delayed emergence of question particles in wh-questions, which can be possibly offered by this model.

#### 4.5.2. *Limited production account*

It is quite reasonable to assume that wh-questions in the early stage of development are formed in a very simple way. For example, the very first English wh-questions uttered by children appear in simple forms like “*what’s that?*” or “*where’s the bottle?*” (Tomasello, 1992). If so, one concern may be that Japanese-speaking children also produce such very simple wh-questions. (40a-b) show some wh-question structures possibly uttered by Japanese-speaking children.

- (40) a. dare (\**ka/no*)?  
           Who Q  
           ‘Who?’
- b. kore nani (\**ka/no*)?  
           this what Q  
           ‘What is this?’

As noted in earlier sections, the Japanese question particles *ka* and *no* have some restrictions on their occurrence. When a wh-word appears at the end of a sentence, a question particle cannot be placed next to the wh-word. This also includes single-word or two-word constructions like (40a-b). That is to say, wh-questions like (40a-b) with the question particle *ka* or *no* have never been attested in the input. If Japanese-speaking children only produce such very simple wh-questions in their early speech, and if children are conservative as the usage-based model of language acquisition assumes (e.g., Rowland, 2007; Tomasello, 2003),



it is anticipated that a question particle would not be present in Japanese children's early speech.

Although many wh-questions like (40a-b) were found in the corpora we investigated, this account is disproved by at least two facts. One is that, during the period of the absence of question particles, children also produce wh-questions other than those like (40a-b). Examples are illustrated in (41a-b). Moreover, in these questions, a question particle is permitted as wh-words do not appear at the end of sentences. That is, this evidence suggests that children produce wh-questions that can have a question particle, but they are unlikely to produce a question particle in these questions.

- (41) a. doko itchat-ta?  
           where have.gone-PAST  
           ‘Where has (he/she) gone?’ (Tai, 1;9.3)
- b. dore-ga ii?  
           Whchi-Nom like?  
           ‘Which one would (you) like?’ (Tai, 2;0.18)

The second factor that argues against the limited production account is that children sometimes generate a non-adult utterance by placing question particle *no* in wh-questions like (40a-b). That is to say, children are not conservative as the usage-based model assumes. For example, consider the following two short dialogues between Aki and his mother or an experimenter, given in (42) and (43):

- (42) **Mum:** mina tsukareta kara gohan-o tabete ocha-o nonde dewa sayonara  
           mata asoboo tte yutte Daruma-chan ga kaette ikimashita.  
           ‘Everyone got tired, so had a meal, had a cup of tea, and Daruma-  
           chan said, “Let’s play again next time, see you!” and then he went  
           home.

**Aki:** daruma-chan no uchi doko no?  
 Daruma-chan Gen house where Q  
 ‘Where is Daruma-chan’s house?’ (Aki, 2;11.0)

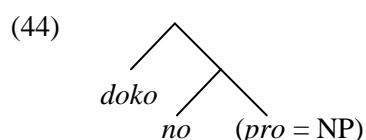
(43) **Exp:** Aki-chan, Suuze ga ne hon motte kita kara miru?  
 ‘Aki-chan, Suzie brought a book, wanna take a look?’

**Aki:** doko no?  
 where Q  
 ‘Where?’

**Exp:** asoko ni oiteru.  
 ‘(I) put it there.’

**Aki:** doko no?  
 where Q  
 ‘Where?’ (Aki, 2;11.16)

Aki placed a question particle *no* adjacent to the wh-word *doko* ‘where’, which is prohibited in adult Japanese. Note that *no* in “*doko no*?” is possibly interpreted as a homophonous genitive case *no*. In this case, “*doko no*?” is grammatical and it means ‘What (*pro*)?’ or ‘Which (*pro*)?’ (e.g., ‘What (restaurant)?’, ‘Which (school)?’ etc), in which the head NP is *pro*-dropped. This genitive structure is illustrated in (44). However, given the context of the dialogues, it is unlikely that this *no* is meant to express a genitive case.



Tai also showed the same over-generation, as shown in (45).

(45) **Mum:** ja toriaezu Matsuzakaya ni tsuita kara, kaimono shite ikoo?  
*'As we arrived at Matsuzakaya (=the name of a department store), shall we go for shopping?'*

**Tai:** un.  
*'Yes.'*

**Tai:** doko no? (Tai's mother seems mis-interpret  
 where Q this utterance as "which one?")  
*'Where?'*

**Mum:** ha?  
*'Pardon?'*

**Tai:** doko no?  
 where Q  
*'Where?'*

**Mum:** Matsuzakaya de kaimono shinai?  
*'Why don't we do shopping at Matsuzakaya?'*

**Tai:** doko-ga Matsuzakaya?  
 Where-Nom Matsuzakaya  
*'Where is Matsuzakaya?'* (Tai, 3;1.29)

Based on the context, it is likely that Tai's utterance of "*doko no*?" was meant to express 'where?' This is clearly indicated by the Tai's last utterance, asking where Matsuzakaya is. But since *no* in "*doko no*?" is only interpreted as a homophonous genitive *no* in adult language, Tai's utterance was mis-interpreted by his mother as 'which one (which Matsuzakaya)?'. This misinterpretation resulted in a conversational mismatch between Tai and Tai's mother, as we can see in the dialogue.

Over-generation of question particle *ka*, however, seems unlikely as few instances were observed. The only instance of this over-generation that we found is the Aki's first utterance of wh-questions with the question particle *ka* as in (32) repeated in (46). Again, it is ungrammatical to place the question particle *ka* in this question because the wh-word *doko* appears at the end of the sentence.

- (46) shinkansen hon (=shinkansen no hon)-wa (\*no) doko ka?  
 Bullet-train book (=bullet-train's book)-Top Gen where Q?  
 'Where is the bullet-train's book?' (Aki, 2;5.13)

These pieces of evidence suggest that children do not always adhere to the input; they sometimes over-generate ungrammatical questions. Crucially, this over-generation is only observed after the onset of question particles in wh-questions. This indicates that even though children already know that *ka* and *no* are question particles as they used them in YNQs, such over-generation is prohibited until the onset of question particles in wh-questions. On our account, this is because children initially mis-analyze a wh-word as a question licenser, preventing the possibility of question particles from occurring in wh-questions. But once children re-analyze the grammar and jettison the Q-feature from a wh-word, it allows for the possibility of over-generation.

#### 4.5.3. Frequency account

The second possible account offered by the usage-based model stipulates that the delayed emergence of question particles in wh-questions is due to frequency effects. The usage-based model of language acquisition predicts that high-frequency items in the adult input emerge earlier in child language (e.g., Lieven, 2010; Rowland, 2007; Rowland & Pine, 2000). This is because if there are abundant exemplars available to children, it is easier for them to form relevant frames. Since YNQs are likely to be more frequent than wh-questions in the input, children will form a YNQ frame like *X+ka*, *X+no* earlier than a wh-question frame like *WH+X+ka*, *WH+X+no*. This prediction is in fact supported by the corpus data. In Tai's corpus, for example, his mother produced the question particle *ka* more frequently in YNQs than in wh-questions (YNQ+*ka*: 818 utterances, wh-Q+*ka*: 292 utterances), and likewise

more question particle *no* in YNQs than in wh-question (YNQ+*no*: 1002 utterances, wh-Q+*no*: 497 utterances).

However, we also found the evidence suggesting that the input frequency does not always correlate with the order of emergence of linguistic properties. For example, we found in Tai's corpus that the question particle *no* in wh-questions in the adult input is more frequent than the question particle *ka* (wh-Q+*no*: 497; wh-Q+*ka*: 292). The discrepancy is more significant if we calculate the number of each question particle in wh-questions from the earliest available data to the onset of question particles in wh-questions (i.e., age 1;5 to 2;1). Only 83 utterances of the question particle *ka* were found in wh-questions, whereas 207 utterances of the question particle *no* were found. This tendency is not surprising if we consider the difference in pragmatic usage between these question particles. As pointed out earlier, the question particle *ka* most frequently occurs with a polite form, whereas the question particle *no* occurs with a plain form. As adults generally speak to children using the plain form of verbs, it is natural to consider that the question particle *no* is more frequently attested in the input than the question particle *ka*.

Despite the difference in frequency, the two question particles, nevertheless, emerge in wh-questions around the same age in Tai's and in Aki's speech. This finding, therefore, casts doubt on the predictability of the frequency account. Input frequency does not always correlate with the order of emergence of linguistic properties. If so, we cannot straightforwardly draw a conclusion that the delayed emergence of question particles in wh-questions is attributable to the input frequency.

#### 4.6. How do children converge on the adult grammar?

Our proposal contends that a Q-feature is incorrectly associated with a wh-word in early child grammar. This leaves us with one important question to be answered: How do children converge on the adult grammar? According to the proposed account, children become adult-like when they jettison a Q-feature from a wh-word. Once this has been successfully done, the emergence of question particles in wh-questions comes for free.

We offer two possible scenarios for this developmental process. One scenario would have children reanalyze the grammar by becoming aware of overt syntactic movement, as witnessed in Japanese wh-questions. This account stems from the theoretical assumption that Japanese wh-questions involve overt movement of the question particle *ka* (Hagstrom, 1998).<sup>7</sup> The other scenario stipulates that children are forced to jettison a Q-feature from wh-words by knowing that a particular type of wh-questions obligatorily requires the question particle *ka*. In what follows, we individually examine these two accounts in greater detail.

##### 4.6.1. Syntactic movement as a cue for grammar change

In Japanese, the particle *ka* is not only used as a question particle but is also used as a quantificational particle (e.g., Hoji, 1985; Kuroda & Shige-Yuki, 1965; Nishigauchi, 1990). For example, the existential quantifier is constructed by combining a wh-word and particle *ka*, as in *nani-ka* (what+ka) for ‘something’, *doko-ka* (where+ka) for ‘somewhere’, *dare-ka* (who+ka) for ‘someone’, *naze-ka* (why+ka) for ‘somehow’, and so forth.

The movement analysis of the question particle *ka* proposed by Hagstrom (1998) is based on the assumption that the quantificational particle *ka* in *nani-ka* ‘something’ in (47)

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<sup>7</sup> Also see Ginsburg (2009) and Cable (2007) for a similar approach.

and the question particle *ka* in wh-question (48) is the identical particle denoting the same semantic value.<sup>8</sup>

- (47) John-ga nani-*ka*-o nomimahsi-ta.  
 John-Nom what-ka-Acc drink.Polite-Past  
 ‘John drank something.’
- (48) John-ga nani-o t<sub>i</sub> nomimashi-ta *ka*<sub>i</sub>?  
 John-Nom what-Acc drink-Past Q  
 ‘What did John drink?’
- 

As the question particle *ka* and the quantificational particle *ka* are identical in semantic denotation, Hagstrom (1998) proposes that the question particle *ka* in (48) is base-generated in the position adjunct to the wh-word *nani* ‘what’, which is identical to the position of quantificational particle *ka* in (47). Given this assumption, Hagstrom (1998) further proposes that this *ka* then overtly moves to C<sup>0</sup> to undergo Q-feature checking with the unvalued Q-feature in C<sup>0</sup>. This is evident by the fact that, all other things being equal, the only difference between statement (47) and question (48) is the type of illocutionary force; only (48) has an interrogative force.

This movement analysis is also empirically supported by the fact that *ka*-movement is subject to a minimality condition. This condition stipulates that the overt movement cannot be intervened by elements with the same kind of properties. For example, the grammaticality of (49) is judged to be very marginal because the particle *ka* in the subject *dare-ka* ‘someone’ intervenes in the movement of the question particle *ka*, launched from inside the clause.

<sup>8</sup> Hagstrom (1998) proposes that particle *ka* in both (47) and (48) denote existential quantification over choice function. Working within the Type theory of compositional semantics, he further argues that *ka* in (47) is base-generated in the position next to the wh-word *nani* ‘what’, and it ‘covertly’ moves to the position above IP (via Quantifier Raising) to eliminate a type mismatch, leaving a trace in the original position. As the Question particle *ka* in (47) denotes the same semantic value, it also needs to move above IP, but the movement is overt due to Q-feature checking. For more detail, we refer the reader to the original work (Hagstrom, 1998).

- (49) a. ??dare-**ka**-ga nani-o nomimashi-ta **ka**?  
 who-ka-Nom what-Acc drink.Polite-Past Q  
 ‘What did someone drink?’ (Hagstrom, 1998, pp. 52)

b.  $C^0_{[+Q]}$ - $ka_i$  dare-**ka**-ga nani-o  $t_i$  nomimashi-ta

Given this theoretical assumption, it invites us to hypothesize that if children can correctly assign the adult-like interpretation of sentences like (47) and (48), they can infer that the overt movement of *ka* is driven by a Q-feature because semantic information in the two sentences is identical except for the illocutionary force. This inference, therefore, leads children to realize that particle *ka* is the lexical item that should carry a Q-feature, not a wh-word.

If this account is on the right track, children should already produce wh-indefinites at the time at which a question particle emerges in wh-questions. This prediction is borne out by our child participants’ speech. All our child participants produced sentences with wh-indefinites before or around the time a question particle emerged in wh-questions. Below is an example utterance from each child.

- (50) a. nan(i)-ka tsukutte (ir)u.  
 what-ka make-Prog  
 ‘(He/she) is making something.’ (Tai, 1;10.14)
- b. tsuiten no, nani-ka?  
 Sticking Q what-ka  
 ‘Something is sticking?’ (Jun, 2;5.24)
- c. dok(o)-ka-ni aru yo.  
 Where-ka-Loc there.is SFP  
 ‘It should be somewhere.’ (Aki, 2;7.12)

Children’s competent use of existential expressions can also explain why children tend to over-generate ungrammatical wh-questions with the question particle *no* (i.e., “\**doko*



*no*?” (‘where?’), but are unlikely to produce non-adult wh-questions with the question particle *ka* (i.e., “\**doko ka*?” (where?)). Since children know a wh-word with the particle *ka* refers to an existential expression, children can avail themselves of the uniqueness principle (Pinker, 1984; Wexler & Culicover, 1981) to avoid over-generations. Essentially, this principle dictates that language learners assume that forms and meanings are one-to-one mappings, in the absence of evidence for more than one mapping. Therefore, children are reluctant to produce “*doko ka*?” as a wh-question.

One may question how this analysis can account for the case of the question particle *no*. The question particle *no* cannot be used to construct a quantificational expression, so the same analysis cannot be applied. We contend that it is unnecessary for the question particle *no* to undergo the same process. Once children jettison a Q-feature from a wh-word through the proposed process attested in question particle *ka*, the emergence of question particle *no* comes for free. This is because a wh-word no longer carries a Q-feature that prohibits the occurrence of question particles, including *no*.<sup>9</sup> This analysis conforms to the fact that the question particles *ka* and *no* emerged around the same time in Tai’s and Aki’s speech.

#### 4.6.2. *Obligatory question particle as a cue for grammar change*

Let us now turn to the second possible scenario of how children converge on the adult grammar. This account argues that a Q-feature in wh-words can be jettisoned by knowing that question particle *ka* is obligatory in a particular type of wh-questions. This type of wh-question is exemplified in (50). The crucial element in (51) is the polite form copula *desu*. When *desu* appears in wh-questions, question particle *ka* is obligatory. In (51), question particle *ka* cannot even be replaced by rising intonation.

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<sup>9</sup> Given this analysis, we are assuming that a different syntactic process is undergone by the two Question particles. For Question particle *ka* the movement analysis is applied. But for Question particle *no*, it is base-generated at C<sup>0</sup>.

- (51) kare-wa dare desu \*(ka)?  
 he-Top who Cop Q  
 'Who is he?'

This particular type of wh-question is the potential positive evidence that initiates reanalysis of the current grammar, by inviting children to know that the question particle *ka* is essential to construct wh-questions. Since a question particle is not redundant in this type of wh-question, children notice that the question particle *ka* should be the one that undergoes feature checking with the matching feature in  $C^0$ . Eventually, this leads children to jettison the Q-feature from wh-words. In fact, the corpus data show that the majority of wh-questions with the question particle *ka* produced by our participants were wh-questions with copular *desu* (Tai: 60%, Jun: 75%, Aki: 77%). This is not surprising for this account as these are the crucial type of wh-questions that bring about the change in child grammar.

#### 4.7. Concluding remarks

The present study shows that a Japanese question particle emerges in wh-questions significantly later than the same question particle emerges in YNQs. This developmental phenomenon overlaps with the phenomenon in the development of subject-auxiliary inversion in English: the delayed auxiliary inversion in wh-questions in child English. Although Japanese and English question constructions involve different syntactic structures and computations, the two typologically different languages show the same asymmetry between YNQs and wh-questions. Following Radford (1994), Roeper (1992) among others, we propose that children incorrectly analyze a wh-word as a question licenser. In Japanese, this results in prohibiting a question particle in wh-questions until a certain period of time in development.

Other findings conform to this proposal. Despite the difference in input frequency, the question particles *ka* and *no* emerge around the same age. According to the proposed account, this is expected, because jettisoning a Q-feature from a wh-word suffices to trigger the appearance of both question particles. The observation that children over-generate non-adult wh-questions provided further support for the present analysis, and a further challenge to the usage-based model of language acquisition.

The present study is not without certain limitations, however. The corpus data we investigated is small both in size of corpus data and number of participants. To enhance the viability of our claims, therefore, it will be necessary for future studies to conduct larger scale corpus analysis, including more question utterances and more children. Secondly, we did not look into the acquisition of Japanese question particles in relation to types of wh-words. Many studies in the acquisition of English auxiliary inversion have shown that error rates of auxiliary inversion are subject to the types of wh-words (de Villiers, 1991; Labov & Labov, 1978; Stromswold, 1990; Thornton, 2008). In particular, questions with the adjunct wh-word *why* have been repeatedly observed to be the last wh-questions in which children successfully invert an auxiliary or modal verb (de Villiers, 1991; Labov & Labov, 1978; Thornton, 2008). Therefore, we can take these observations into consideration for the future research in the acquisition of Japanese questions.

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# **CHAPTER V**

## **FINDING INNATE PARAMETERS**



In this final chapter, I start out with a summary of the studies presented so far. I then discuss an issue left open from Chapters 2 and 3. In those chapters, I suggested that language development may be driven by a parameter. I take this opportunity to further discuss the possibility that the parameter I alluded to earlier is indeed specified in UG. This issue is particularly worth addressing in view of recent re-evaluations of the nature of parameters (e.g., Boeckx, 2011; Newmeyer, 2005). Finally, I will present a small-scale typological survey to demonstrate that child language is related to adult language in the way that is consistent with the Principles and Parameters framework.

### **5.1. Summary of the studies**

The first set of studies investigated how Japanese- and Mandarin-speaking children comprehend ‘positive’ yes/no questions containing disjunction (Chapter 2). The study began with a series of simple observations. There are two critical components to yes/no questions with disjunction, i.e., the ability to form yes/no questions and the ability to interpret disjunctive statements. Both of these abilities have been found to be mastered by very young children, by two or three years old at the latest. Children understand and produce yes/no questions often before they are two years old (see the corpus analysis in Chapter 4). Furthermore, in a spate of acquisition studies, children as young as three years old have proven capable of comprehending and producing statements with disjunction (e.g., Goro & Akiba, 2004; Gualmini & Crain, 2005; Jing, Crain, & Hsu, 2005; Morris, 2008). However, when these two linguistic structures are combined, we witness cross-linguistic variation in interpretation. Whereas adult speakers of languages like English allow two readings of the relevant linguistic structures (a yes/no question reading and an alternative question reading), adult speakers of other languages, such as Japanese and Mandarin, exhibit only one of these two readings.

The question we sought to answer, experimentally, was when children become in command of the language-specific restrictions on interpretation. We hoped that the answer to this question would bear on the competing accounts of language development, as noted in Chapter 1. According to one account, viz., the usage-based account, children are expected to acquire only the linguistic structures that are used by adults in the linguistic community, with more frequently used structures acquired earlier, and less frequently used structures acquired. According to the other account, viz., the nativist account, children are free to try out linguistic structures that are not attested in the input, as long as these structures are attested in some possible human language. This difference between child and adult language is the continuity hypothesis discussed in Chapter 1.

The experimental results were intriguing. Some of the findings fall squarely on the side of the nativist account of language development. The interpretations assigned to question constructions by the child participants in the experimental studies depended on the type of yes/no question that was investigated. When disjunction appeared in yes/no questions with the question particle *kana* in Japanese, as in (1), and with the question particle *ma* in Mandarin, as in (2), these questions were often interpreted as alternative questions. This is striking because the same yes/no questions cannot receive this interpretation by adult speakers of these languages.

- (1) butasan-wa ninjin ka piiman-o tabe-ta kana?  
 Mr. Pig-Top carrot or pepper-Acc eat-Past Q  
 Adult: *'Is it the case that Mr. Pig ate the carrot or the pepper?'*  
 Child: *'Which of the vegetables did Mr. Pig ate, the carrot or the pepper?'*
- (2) xiaozhu chi le hongroubuo huoshi jingjiao ma?  
 Mr. Pig eat Asp carrot or pepper Q  
 Adult: *'Is it the case that Mr. Pig ate the carrot or the pepper?'*  
 Child: *'Which of the vegetables did Mr. Pig ate, the carrot or the pepper?'*

In the absence of such an interpretation by adults, it seems highly implausible to suppose that adult input was the source of this interpretation by children. The finding that children adopted an interpretation that was not attested in the input, but is attested in other languages, can be taken as evidence in favour of the continuity hypothesis (e.g., Chomsky, 1981; Crain, 1991; Crain & Pietroski, 2001, 2002). The observed differences between child and adult language, moreover, pose a challenge to the usage-based account of language acquisition. Children do not appear to be conservative (or input matching), as this account would anticipate. In this chapter, we argue that children's language learning does not conform to kind of generalize patterns of information structure, based on the input, which is assumed by Construction Grammar (Goldberg, 1995, 2003, 2006). Instead of learning, perhaps all that is involved is setting the correct value of a parameter.

Nevertheless, there were also some findings that are consistent with the usage-based approach. One such finding is that Mandarin-speaking children and adults assign the same interpretation to A-not-A questions with disjunction. In responding to sentences (3), the interpretive behaviour of children was similar to that of adults.

- (3)    xiaozhu you-mei-you    chi hongroubuo huoshi    jingjiao?  
        Mr. Pig have-not-have eat carrot                    or            pepper  
        Adult: *'Is it the case that Mr. Pig ate the carrot or the pepper?'*  
        Child: *'Is it the case that Mr. Pig ate the carrot or the pepper?'*

This finding gives rise to the question of why children behaved non-adult-like in (1) and (2) but they assigned an adult-like interpretation in (3). To account for this phenomenon, we propose a focus parameter of the lexical items that licenses interrogative force. That is, the focus parameter assigns one value to the question particle *kana* in (1) as well as to the question particle *ma* and (2), and a different value to the A-not-A question in (3).

Considerations of language learnability in the absence of negative evidence dictate how rapidly the focus parameter value is set to the target value of the local language. As the continuity hypothesis supposes, children may initially assign a parameter value that differs from the value assigned by adult speakers of the local language. On some occasions, recovery from a parameter mis-setting is expected to happen immediately, because children can easily detect a mismatch between their grammar and the grammar of adults. In such cases, children's adult-like behaviour is expected to emerge at an early stage of development. By contrast, recovery is delayed when children do not have access to abundant positive evidence that the parameter value they have adopted is not consistent with the value adopted by adult speakers. In that case, re-analysis is expected to take longer.

We witnessed that Japanese-speaking children experienced a considerable delay in converging on adult grammar in questions like (1). This delay is presumably due to an incorrect parameter setting that poses a learnability problem for children (i.e., a subset problem). By contrast, in A-not-A questions with disjunction, parameter re-setting was found to be immediate, as children presumably could avail themselves of abundant and reliable input to expunge the incorrect value of the focus parameter. We further argued that children's non-adult interpretation in Mandarin *ma*-questions with disjunction, such as (2), is not due to a mis-set parameter since Q-particle *ma* acted similarly in child grammar and adult grammar. Rather, we speculate that the discrepancy between children's and adults' performances on Mandarin *ma*-questions with disjunction is attributed to children's vulnerability in pragmatic processing.

In Chapter 3, we investigated how Mandarin-speaking children interpreted 'negative' questions with disjunction. Adding a logical operator, negation, made this study significant in testing children's scope interpretations. In previous studies using negative



statements containing disjunction, Mandarin-speaking children were found to assign the interpretation in which negation takes scope over disjunction, despite the absence of such an interpretation for adult speakers of Mandarin (Jing, et al., 2005). Based on this finding, we posed a research question, asking whether the same scope assignment is adopted in questions. Taking advantage of the fact that Mandarin Chinese has three different lexical items representing disjunction – *huoshi*, *huozhe*, and *haishi*, we tested Mandarin-speaking children's interpretation of questions like the ones in (4) and (5).

- (4) Yuehan meiyou he cha *huozhe/huoshi* kafei ma?  
 John not drink tea or coffee Q<sub>(YNQ)</sub>  
 YNQ: *'Is it the case that it was tea or coffee that John didn't drink?'*
- (5) Yuehan meiyou he cha *haishi* kafei?  
 John not drink tea or coffee Q  
 AltQ: *'Which of beverages did John not drink, tea or coffee?'*

In adult Mandarin, (4) is interpreted as a yes/no question in which disjunction takes scope over negation, as the gloss indicates, whereas (5) is interpreted as an alternative question.

The findings of the experiments reported in Chapter 3 revealed that children's interpretation depended on the lexical item that was used to express disjunction. Irrespective of dialect (Beijing Mandarin or Taiwanese Mandarin), children tended to interpret negative questions containing *haishi* as alternative questions, with disjunction taking scope over negation (Disj > Neg). This interpretation is consistent with that of adults. Children's interpretations of (4) were, however, found to be different depending on the lexical items representing disjunction (i.e., *huozhe* vs. *huoshi*). Children who speak Beijing Mandarin assigned a non-adult interpretation to negative questions with *huozhe*. These children adopted the interpretation in which negation takes scope over disjunction (Neg > Disj), whereas adults favour the interpretation on which disjunction takes scope

over negation. But, children who speak Taiwanese Mandarin responded in the same way as adult speakers did to negative questions with *huoshi*, with disjunction taking scope over negation (Disj > Neg) for both children and adults.

In order to explain why children behaved adult-like in negative questions with certain types of disjunctions, but not with others, we again proposed a focus parameter as we did in Chapter 2. However, the focus parameter resides in disjunction in this case. In adult language, all disjunction words, *haishi*, *huozhe*, and *huoshi*, have a focus feature. The disjunctive phrase is headed by a focus-bearing disjunction word, which then moves to a position in the Focus Phrase projection at the level of Logical Form. Since the Focus Phrase projection is higher than negation, the disjunctive phrase takes scope over negation. It was found that children in the age range of three-to-five interpreted negative questions with either of disjunction *haishi* or *huoshi* in the same way as adults did. This invites us to conclude that, at least by age 5, children have already set the correct value of focus parameter.

On the other hand, the parametric value in *huozhe* remained mis-set, as children in the 3-to-5 age-range behaved differently from adults in interpreting negative questions with *huozhe*. These results give rise to the question of why such a contrast was found in the setting of the focus parameter. On our analysis, young children can easily set the adult value of focus parameter for the disjunction word *haishi* because children avail themselves of reliable evidence to expunge the initial value of the focus parameter. We argued that reliable evidence for parameter re-setting comes from answers to questions with disjunction *haishi*. Focus of this type of questions is closely tied with its answers, what is called question-answer congruence. The input consisting of question-answer pairs that are related in such a way informs children that the disjunction word *haishi* has a focus feature. This evidence eventually leads to parameter re-settings. By contrast, parameter change is

delayed in dealing with the disjunction word *huozhe*. This is because children do not receive critical evidence until a specific cognitive ability becomes fully developed. We also argue that children set the correct value for the disjunction word *huoshi*, because children make use of focus morpheme *shi* in *huoshi* as a cue to the presence of a focus feature in this disjunction word.

In Chapter 4, we shifted our attention to children's language production. By analysing longitudinal child speech corpora, the study reported in Chapter 4 found a developmental stage in which Japanese-speaking children produce question particle *ka* or *no* in yes/no questions but not in *wh*-questions. This stage was taken to be a similar developmental stage in which English-speaking children invert an auxiliary or modal verb in yes/no questions but not in *wh*-questions (e.g., Cazden, 1970; Klima & Bellugi, 1966; Rowland, 2007; Rowland & Pine, 2000). We attributed this developmental trajectory to the fact that children initially mis-analyse a *wh*-word as a question licenser. Since a *wh*-word plays the role as a question licenser, the question particles *ka* or *no* are redundant, resulting in the absence of these question particles in *wh*-questions.

This analysis evokes the question of why Japanese-speaking children mis-analyse a *wh*-word as a question licenser. We suggested that the input to children guides them to do this. Children need to discover the linguistic form that signals an interrogative force in *wh*-questions. In adult Japanese, the question particles *ka* or *no* are often omitted in *wh*-questions, such that the only form that is consistently attested in *wh*-questions is a *wh*-word. This invites children to conclude that a *wh*-word signals an interrogative force, rather than the optional question particles.

This study revealed other intriguing findings. Some children were found to over-generate the use of question particles. The typical over-generation resulted in forms like (6)

in which the question particle *no* appeared immediately next to a wh-word. Although this formation is prohibited for adult speakers, children occasionally produced such questions.

- (6) doko (\**no*)?  
      where  
      ‘Where?’

This evidence, again, poses a challenge to the usage-based account of language development, because children, again, are not being conservative. More specifically, the usage-based model would not predict such over-generations in language constructions that are simple and that are frequently attested in the input.

Throughout the three sets of studies, the analyses that were proposed were grounded on the common assumption that language acquisition largely consists of discovering which lexical item is associated with which functional feature. This assumption conforms to the conceptualization of parameters put forwarded in Chomsky (1995). On this view, parameters are attributable to functional features residing in the lexicon. However, this conceptualization of parameters has been recently re-evaluated by some linguists (Boeckx, 2011, Newmeyer, 2005). Specially, debates come down to the question of whether such parameters are innate parameters specified by UG. Therefore, in the next section, I attempt to defend the proposal that the focus parameter advanced in in Chapter 2 and Chapter 3 is specified in UG.

## **5.2. Is there an innate parameter in the lexicon?**

From the inception of the Minimalist Program (Chomsky, 1993, 1995), the language faculty has been viewed as a perfectly designed system, an optimal interface between the human sensori-motor system (PF) and the conceptual-intentional system (LF). The human

genetic endowment for language is expected, according to the Minimalist Program, to be a conceptually simple account of language evolution (Chomsky, 2007). On this model, the innate parameters that explain language variation are based on functional (formal) features that are specified in the lexicon (Chomsky, 1995) (cf. Baker, 2008 for an alternative view). This is because the lexicon was conceived of as the component that can best tolerate a wide range of variation and still remain learnable.<sup>1</sup> This conceptualization of parameters faces an issue of whether such lexical parameters can be an innately specified parameter (e.g., Boeckx, 2011; Newmeyer, 2005). In what follows, I will defend the conclusion that the proposed focus parameter is specified by UG, using acquisition data.

Let me first illustrate why lexical parameters face such an issue. Functional features in the lexicon are assumed to be privative (cf. Olsen, 1994; Olsen & Weinberg, 1999). In other words, the parametric values of a lexical parameter are either ‘marked (+)’ or ‘unmarked (–)’. To illustrate this more, let us take the *number* feature, one of the functional features, as an example. Consider children who are born in the linguistic community in which a language has *number* agreement between a subject and a verb, such as English (i.e., a language in which *number* agreement is marked). Children acquiring English need to witness the fact that relevant lexical items have a *number* feature. This contrasts with children born in a language community where there is no *number* agreement, such as Japanese (i.e., a language in which *number* agreement is unmarked). In this case, children don’t witness this functional feature. Therefore, only English-speaking children are required to change the parameter value from [-*number*] to [+*number*].

The same scenario can be applied to the focus parameter proposed in Chapters 2 and 3. Some languages have a [+Focus] value of lexical items that licenses interrogative force (i.e., Japanese *kana*, and Mandarin A-not-A structures). Children who acquire these

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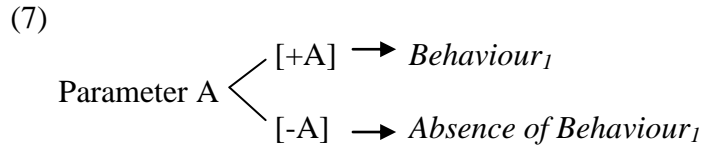
<sup>1</sup> Boeckx (2010, 2011) argues that language variation is also contributed by features related to Phonetic Form (e.g., edge (or EPP) features).

language will witness the focus feature and, eventually, will set the focus parameter to a [+Focus] value. On the other hand, children who acquire languages like English don't witness focus features; therefore, the value of the focus parameter remains [-Focus] (unmarked) for these children. Likewise, if children acquire a language with a focus feature for certain disjunction words, they need to change the parametric value from [-Focus] to [+Focus] for these words. But if a language does not assign a focus feature to disjunction words, parametric change is not required. The same scenario will go on for other parameters as long as the parameters reside in the lexicon.

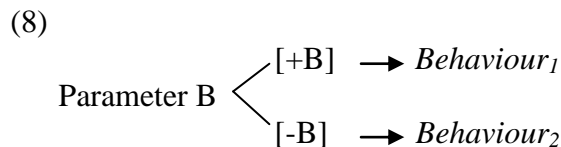
The issue is, therefore, that this conceptualization of parameter settings does not differ from the proposal by experience-based or usage-based models of language acquisition which argue that language acquisition is learning to map functional meaning onto particular lexical items (e.g., Goldberg, 1995, 2006; Tomasello, 2000, 2003). If there is no difference, proposing innately specified parameters is not theoretically and empirically motivated. In the remainder of this section, however, I argue that functional parameters like the *number* parameter differs in important respects from the proposed focus parameter, such that the focus parameter can be considered to be specified in UG.

So how do these two types of parameters differ? The difference lies in the negative value of parameters. For example, when the *number* parameter is initially set with [-*number*], it indicates that a *number* agreement is absent in a language or absent in children's linguistic 'behaviours' (i.e., children's language comprehension or production). That is to say, the [+*number*] value is set if a *number* agreement is attested in children's production, but the absence of a *number* agreement is the consequence of the [-*number*] value. We can illustrate this type of parameter in a schematic way, as in (7). So the positive value of Parameter A induces a particular *Behaviour*<sub>1</sub>, while the negative value of Parameter A refers to the absence of *Behaviour*<sub>1</sub>. I argue that this type of parameters is

conceptually inseparable from the form-function pairings presumed by experience-based models of language acquisition.



The proposed focus parameter, however, differs from parameters like (7) in the way that the negative value of the focus parameter induces a particular behaviour distinct from the behaviour induced by the positive value. Let us schematically illustrate this type of parameters in (8). So, the negative value of Parameter B induces *Behaviour<sub>2</sub>* which is a distinct behaviour from *Behaviour<sub>1</sub>*. Since parameters polarize possible human languages, according to the continuity hypothesis (Crain & Pietroski 2001, 2002), all human beings, including children, must commit to either of *Behaviour<sub>1</sub>* or *Behaviour<sub>2</sub>*.



That is to say, as argued in Chapter 2, when a question particle in the left periphery (such as Japanese *kana* or Mandarin *ma*) has a [-Focus] value, an alternative question interpretation is possible. By contrast, if the focus parameter is set with a [+Focus], only the YNQ interpretation is derived. Furthermore, a distinct behaviour can be also drawn depending on the value of the focus parameter in disjunction words. As found in the studies reported in in Chapter 3, and in previous studies by Goro and Akiba (2004), Jing, Crain, and Hsu (2005) and others, when children have not yet assigned a focus feature to

disjunction words, i.e., [-Focus], the scope interpretation of negation and disjunction is predicted to conform to the surface scope interpretation. But once the focus parameter for a disjunction word is set to [+Focus], it induces the interpretation derived by the inverse scope assignment between negation and disjunction.

This observation gives rise to the question of what determines the linguistic behaviours during the absence of a relevant functional feature. In other words, what determines *Behaviour<sub>2</sub>* in (8)? The answer is presumably found among the three factors listed by Chomsky (2005, p. 6) that should be considered in inquiring into language acquisition. These three factors are illustrated in (9).

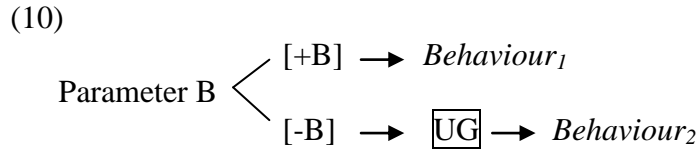
(9)

- a. Genetic endowment. This is assumed to be nearly uniform in the species. Using the human genetic endowment children are able to interpret part of the environmental input as linguistic experience. Although this is a nontrivial task, human infants carry out the task reflexively, and follow the same general course in the development of the language faculty.
- b. Experience. This enables languages to vary, but only within a fairly narrow range, as is the case with other subsystems of human cognition, and in other organisms more generally.
- c. Principles not specific to the faculty of language. These principles fall into several subtypes, including (a) principles of data analysis (b) principles of cognitive architecture and computational efficiency and (c) developmental constraints.

Using these factors, it seems reasonable to suppose that the source of *Behaviour<sub>2</sub>* can be attributed to either (a) genetic endowment, or to (c) third factor principles, which are not specific to the faculty of language. It is unlikely, however, that a third factor dictates a specific behaviour in the absence of a focus feature in question particles or disjunction. Principles of data analysis or principles of structural architecture and developmental constraints would not dictate that an alternative question interpretation is



allowed during the absence of a focus feature in question particles. Therefore, the source must be the factor (a), i.e., UG. If so, we can re-sketch parameter (8) in a following way:



I would like to argue that we can possibly view ‘innate parameters’ as a parameter closely intertwining with UG, as represented in (10). If this type of parameters can be counted as an innate parameter, finding children’s linguistic behaviours conforming to (10) can be the best research strategy to provide empirical evidence lending support to the innate parameters.

### 5.3. From child language to languages in the world

*[T]he initial state of the faculty of language as a fixed network connected to a switch box; the network is constituted of the principles of language, while the switches are the options to be determined by experience. When the switches are set one way, we have Swahili; when they are set another way, we have Japanese. Each possible human language is identified as a particular setting of the switches – a setting of parameters, in technical terminology.*

– Norm Chomsky (2000, pp.8)

There is one remaining aspect that I need to explore before concluding this thesis.

Throughout the chapters, we ground on the assumption stipulating that the Principles and Parameters of UG demarcate the hypothesis space of possible human languages.

In Chapter 2, we argue that a focus parameter associated with question particles is responsible for the behavioural differences between children and adults in the interpretation of positive questions with disjunction. If the proposed parameter is indeed

part of UG, it can result in language variation just like the flipping of a switch in a switchbox. The final section of the thesis is devoted to complete the picture posed by the Principles and Parameters theory of UG, by demonstrating how the focus parameter in the lexicon configure the cross-linguistic variation in yes/no question constructions.

To begin with, let me introduce the concept of an abstract entity Q which I assume for the remainder of this section. Following Ginsburg (2009), Q is assumed to be a morpho-lexical item that licenses interrogative force of a clause. Q is ‘abstract’ in the sense that it is sometime phonologically null, depending on the specification of an overtiness parameter  $[\pm\text{Overt}]$ . However, when Q is silent, its existence must be at least indirectly ‘detectable’ in surface structures by some other means, such as syntactic movement or prosody. This requirement must be met because otherwise the Q loses its functional role to overtly signal an interrogative force of a clause. Q is also subject to parametric variation, as specified by two other parameters: affixal parameter  $[\pm\text{Affix}]$  and focus parameter  $[\pm\text{Focus}]$ . Note that I use the overtiness and affixal parameter for descriptive purposes only; they may not be innate parameters of the kind argued for in the last section (see Ginsburg (2009) for further discussion of the overtiness parameter and the affixal parameter). Given the concept of Q, in what follows, I shall demonstrate how the proposed three parameters can depict the cross-linguistic variation of yes/no question constructions.

### 5.3.1. *The overtiness parameter*

The overtiness parameter determines whether Q is pronounced as a morpho-lexical item (Ginsburg, 2009). For example, the question particle *ka* in Japanese (11) or the question particle *ma* in Mandarin (12) has a  $[\text{+Overt}]$  value.

- (11) John-wa kesa asagohan-o tabe-mashi-ta *ka*?  
 John-Top this.morning breakfast-Acc eat-Polite-Past Q  
*'Did John eat breakfast this morning?'* (Japanese)
- (12) Yuehan zaoshang chi le zaocan *ma*?  
 John this.morning eat Asp breakfast Q  
*'Did John eat breakfast this morning?'* (Mandarin Chinese)

On the other hand, Q in English (13) and Swedish (14) has a [-Overt] value, as Q has no explicit lexical item marking interrogative force. Instead, both English and Swedish Q employ overt syntactic movement. When a clause is encoded as interrogatives, the tensed verb (auxiliary verb in the case of English) is fronted. According to Chomsky (1995), this movement is driven by covert Q with an affixal feature which I will illustrate shortly.

- (13) a. John ate breakfast this morning.  
 b. Did<sub>i</sub> John t<sub>i</sub> eat breakfast this morning? (English)
- (14) a. Lars läser tidningen.  
 Lars read the.newspaper  
*'Lars is reading the newspaper.'*  
 b. Läser<sub>i</sub> Lars t<sub>i</sub> tidningen?  
 read Lars the.newspaper  
*'Is Lars reading the newspaper?'* (Swedish: Koning & Siemund, 2007)

Likewise, Q in Martuthunira (Western Australia: Dench (1995)) is not lexically pronounced, so we can say that it has a value of [-Overt]. However, the existence of Q can be identified by prosody. Martuthunira yes/no questions like (15) and the corresponding declarative sentences are identical in form, except that only the former has characteristic rising intonation at the end of the clause, as represented by an upward arrow.

- (15) Kartu kanyja-rnuru wirra-tharra-a<sup>3</sup>?  
 2SG.NOM keep-PRES boomerang-DU-ACC  
 'You have two boomerangs?' (Dench, 1995, p. 236)

### 5.3.2. The affixal parameter

The affixal parameter associated with Q determines whether Q encliticizes to other lexical items or stands alone as an independent lexical item (Ginsburg, 2009). Haida (North America: Enrico (1986, 2003)) is an instance of languages with a [+Affix] value (Ginsburg, 2009). In Haida yes/no questions, the interrogative clitic *-gu* suffixes to a lexical item in clause-initial position. Examples (16a-c) illustrate.

- (16) a. 7aa-**gu** dang suda-a-yaa?  
 3rdper-Q you punch-nw  
 'Did you punch him?/Did he punch you?'  
 b. 7anaa-**gu** Bill 7is?  
 inside-Q Bill Cop  
 'Is Bill inside?'  
 c. Bill-**gu** 7anaa 7is?  
 Bill-Q inside Cop  
 'Is Bill inside?' (Enrico, 1986; pp. 104)

The most convincing argument that *-gu* is affixal is the fact that it requires a dummy host when a sentence does not have a potential host for it to attach to. For example, *-gu* cannot attach to a main verb. Therefore, in circumstance in which a sentence only contains a verb, as in (17), the dummy host *huu* is introduced (which is a demonstrative like English 'there' elsewhere) (Enrico, 1986) (also see Ginsburg (2009)).

- (17) Huu-**gu** tajuu?  
 Dummy-Q be.blowing/windy  
 'Is it windy.' (Enrico, 1986, pp. 105)

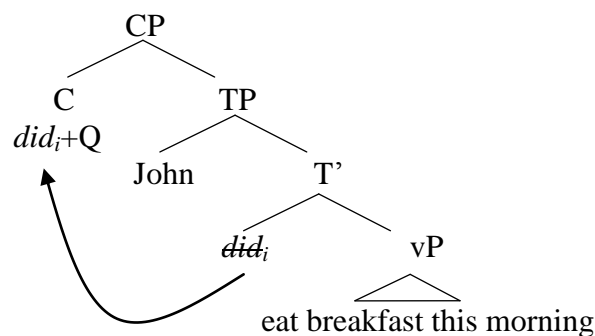
Similarly, Greenlandic Eskimo (Greenland: Sadock & Zwicky, (1985)) also employ Q with a [+Affix] value. Whereas *voq* suffixes to verb *iga* ('cook') in declaratives like (18a), the different suffix *va* is attached in interrogatives like (18b).

- (18) a. Iga=***voq***  
 Cook.3sg.decl  
 'He cooks.'
- b. Iga=***va***  
 cook.3sg.Q  
 'Does he cook?'

(Sadock & Zwicky, 1985, p. 167)

Let us now look at some languages in which an affixal Q is not overtly realized (i.e., the one assigned with a [-Overt] value). English is part of this language group. According to Chomsky (1995), English auxiliary inversion is licensed by an affixal feature of phonologically null Q in C<sup>0</sup>. Because the affixal Q requires a host to attach, it attracts an auxiliary to move to where the Q is located. This is illustrated in (19).

- (19) Did John eat breakfast this morning?



In historical perspectives, this account is not unreasonable to offer. In Gothic language – an extinct ancient language of the East Germanic languages, an interrogative force is marked by clitic *-u* suffixing to the first word of a clause as given (20).

Interestingly, some linguists argue that I-to-C movement attested in modern Germanic languages, such as English or German, is the consequence of the loss of an interrogative clitic like *-u* in Gothic (Ferraresi, 2005).<sup>2</sup> If this analysis is on the right track, it is hypothesized that over the process of language change, English Q becomes phonologically null as its functional role (i.e., overtly marking an interrogative force) that is originally possessed by the interrogative clitic is substituted by overt syntactic movement.

- (20) a. Maguts-***u*** driggkan?  
can-Q drink  
'*Can you drink?*' (Mar 10:38, cited in Ferraresi, 2005, pp. 148)
- b. Wileiz-***u*** ei qipaima?  
Want-Q that command  
'*Do you want us to command?*' (Luk 9:45, cited in Ferraresi, 2005, pp. 148)

French and Polish, on the other hand, are the language having Q with [-Affix] value. In French yes/no question (21) and Polish yes/no question (22), interrogatives are marked by an independent lexical item *est-ce que* and *czy* respectively. These lexical items are located in the clause-initial position.

- (21) *Est-ce que* tu connais Hugo?  
Q you know Hugo?  
'Do you know *Hugo*?'  
(French)
- (22) Czy pan dużo podróżuje  
Q you much travel  
'Do you travel a lot?'  
(Polish: Cheng (1991, p. 48))

<sup>2</sup> Although (Old) English and Gothic are not directly related as the former is the West Germanic languages whereas the latter is the East Germanic languages, Gothic is considered as the language inheriting many clitic features from Proto Germanic, the ancestry of both Old English and Gothic (Trask, 1994). Trask, R. L. (1994). *Language change*. London ; New York: Routledge..

### 5.3.3. The focus parameter

#### 5.3.3.1. Languages with a [+Focus] value

Given the definition of what is overtness and affixal parameter, we are now in the position to introduce the focus parameter that is central to my discussion. Q containing a focus feature assigns focus of question by occurring in the position adjacent to a focussed constituent. Consider interrogative clitic *mI* in Turkish yes/no questions in (23) and (24).

- (23) Ahmet sinema-ya git-ti-**mI**?  
Ahmet cinema-Dat go-Past-Q?  
'Did Ahmet go to the movies?'

- (24) kitab-ı Hasan-**mI** Ali-ye ver-di?  
book-Acc Hasan-Q Ali-Dat give-Past  
'Was it Hasan who gave the book to Ali?' (Kornfilt, 1997, p. 5)

According to Kornfilt (1997), when *mI* encliticizes to the predication of a clause as in (23) (i.e., *ti* 'go'), focus of question is a predicate phrase. On the other hand, when clitic *mI* occurs next to the focussed element like (24) (i.e., *Hasan*), the interpretation of the question (24) is equivalent to an English cleft sentence as indicated by the gloss below (24). Therefore, the parameter setting for Turkish is {[+Overt], [+Affix], [+Focus]}.

Likewise, languages like Sinhala (Sri Lanka) have a Q-particle with a focus feature, but it lacks an affixal feature since Q-particle *də* in (25) to (27) is an independent lexical item. Thus, this language has the values of {[+Overt], [-Affix], [+Focus]}.

- (25) Chitra ee potə **də** kieuwe?  
Chitra that book Q read.E  
'Was it that book that Chitra read?' (Kishimoto, 2005, p. 11)

- (26) Siri hetə **də** waduwæde kərənne?  
 Siri tomorrow Q woodworking do-Pres.E  
*'Is it tomorrow that Siri does woodworking?'*  
 (Gair & Sumangala, 1991, p. 96)

- (27) Chitra ee potə kieuwa **də**  
 Chitra that book read.A Q  
*'Did Chitra read that book?'*  
 (Kishimoto, 2005, p. 11)

Like Turkish, the position of the question particle *də* determines focus of question. So, *ee* *pot* 'that book' in (26) and *hetə* 'tomorrow' in (26) is the focus of question because *də* occurs adjunct to these elements. Likewise, focus of question in (27) falls in the entire clause since it occurs in the clause-final position (Slade, 2011).

I contend that Japanese belongs to the same language family as Turkish and Sinhala. The difference between Japanese and Sinhala is that the Japanese question particle *ka* in (11), repeated in (28), only occurs in clause-final position. This means that the focus of the questions in (28) is the entire clause.

- (28) John-wa kesa asagohan-o tabe-mashi-ta **ka**?  
 John-Top this.morning breakfast-Acc eat-Polite-Past Q  
*'Did John eat breakfast this morning?'*  
 (Japanese)

There are some cases in which Q is [-Overt] but have a focus feature. This observation comes from Russian yes/no questions whose interrogative is licensed by prosodic stress. Unlike Martuthunira in which rising intonation always appears in the sentence-final position, intonation marking in Russian yes/no questions, by contrast, depends upon where focus of question is assigned. This is illustrated in (29).



- (29) a. Maša KUPILA knigu?  
 Masa bought book  
 'Did Maša buy a book?'  
 b. Maša kupila KNIGU?  
 Masa bought book  
 'Was it a book that Maša bought?' (Meyer & Mleinek, 2006, p. 1616)

Yes/no question (29a) in which a prosodic stress (represented by capital letters) falls on verb *kupila* 'bought' is considered to have focus on predication. By contrast, prosodic stress of (29b) marks focus on *knigu* 'book'. So, this type of questions has values of {[-Overt], [-Affix], [+Focus]}.

#### 5.3.3.2. Languages with a [-Focus] value

Let us now look at the languages in which Q has a [-Focus] value. Haida has been previously shown to be a member of this language family. This was illustrated in (16), repeated in (30). In the examples (30a-c), the host of interrogative clitic *-gu* is focussed. But in the case of (31), the sentence consists of a main verb and only one affixable element, so a focus effect is not witnessed (Enrico, 1986, p. 104). Remember that *-gu* cannot attach to a main verb in Haida.

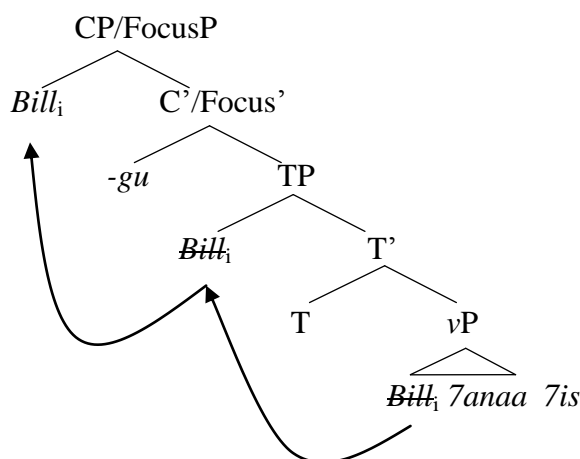
- (30) a. 7aa-**gu** dang suda-a-yaa?  
 3rdper-Q you punch-nw  
 'Did you punch him?/Did he punch you?'  
 b. 7anaa-**gu** Bill 7is?  
 inside-Q Bill Cop  
 'Is Bill inside?'  
 c. Bill-**gu** 7anaa 7is?  
 Bill-Q inside Cop  
 'Is Bill inside?' (Enrico, 1986, p. 104)

- (31) daa-**gu** king?  
 you-Q see  
 'Do you see it?'

(Enrico, 1986, p. 104)

The empirical evidence we have considered, therefore, invites us to conclude that –*gu* does not contribute to defining a focus element. Rather, the focus effect is derived from another mechanism – focus movement (cf. É Kiss, 1998). We speculate that the host of –*gu* (i.e., ‘Bill’ in (30c) for example) is moved from an IP-internal position to a CP-specifier position due to overt focus movement. This is then followed by –*gu* in C<sup>0</sup> suffixing to the moved element, i.e., *Bill*, as illustrated in (32).<sup>3,4</sup>

- (32) Bill-**gu** 7anaa 7is?  
 'Is Bill inside?'



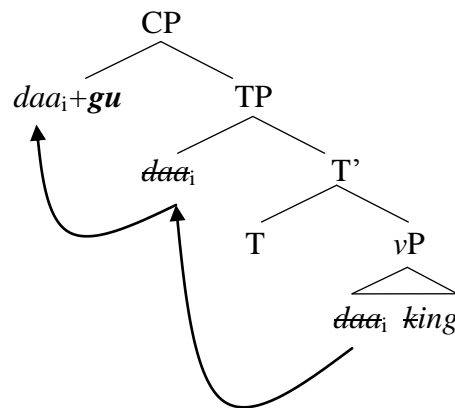
The host of clitic –*gu* in (31), i.e., *daa* (‘you’), is also moved from the IP-internal position, but this movement is not overt focus movement, but movement that is attracted by the [+Affix] feature of –*gu*. This is illustrated in (33). *daa* is selected for the affixal movement because it is the only host to which –*gu* can attach. This is why a focus effect is

<sup>3</sup> See Schwabe (2004) and Rudin, Kramer, Billings, and Baerman (1999) for the similar analysis in Slavic yes/no question clitic *li*.

<sup>4</sup> I cluster CP and FocusP together for simplifying the tree structure; there is no particular theoretical assumption behind this.

not witnessed in (31). Based on this analysis, we can conclude that Haida is a language with the parameter settings {[+Overt], [+Affix], [-Focus]}.

- (33) daa-**gu** king?  
'Do you see it?'



Like Haida, in Marathi yes/no questions (Indo-Aryan, India: Pandharipande (1997))

Q does not have a focus feature; the focus of questions is derived from overt movement.

This language, however, differs from Haida only in the setting of the affixal parameter.

The settings are {[+Overt], [-Affix], [-Focus]} in Marathi. By comparing declarative

sentence (34) to yes/no question (35), we can noticed that yes/no questions in this language are marked by Q-particle *kā/kāy* in the sentence-final position.

- (34) to kāl            parat    ālā  
he yesterday back    come-Past-3sm  
'He came back yesterday.'

(Pandharipande, 1997, p. 7)

- (35) to kāl            parat    ālā            **kā/kāy?**  
he yesterday    back    come-Past-3sm Q  
'Did he come back yesterday?'

(Pandharipande, 1997, p. 8)

Interestingly, particle *kā/kāy* also expresses the meaning of ‘why’/‘what’ respectively if they occur in a clause-internal position like (36) and (37). This suggests that *kā/kāy* must occur in the clause-final position if it licenses a yes/no question.

- (36) *tī kāy toḍte?*  
 she what pick-Pres-3sf  
 ‘What does she pick?’

- (37) *tī kā toḍte?*  
 she why pick-Pres-3sf  
 ‘Why does she pick?’

(Pandharipande, 1997, p. 8)

In order to assign focus of question in Marathi yes/no questions, it employs either an overt focus movement or prosodic stress like (38) or (39) respectively.

- (38) Focus movement:  
*[māḍza kām]<sub>i</sub> tū udyā t<sub>i</sub> karśil kā*  
 my work you tomorrow do-fut-2s Q  
 ‘Will you do [my work]<sub>F</sub> tomorrow?’

- (39) Prosodic stress:  
*tū udyā MĀDZA kām karśil kā*  
 you tomorrow my work do-fut-2s Q  
 ‘Will you do [my]<sub>F</sub> work tomorrow?’

(Pandharipande, 1997, p. 251)

In the case of focus movement as given in (38), the focussed constituent *māḍza kām* ‘my work’ moved from the original position to the sentence-initial position. This is contrasted with (39) in which the canonical word order is maintained. Therefore, it suggests that Q-particle *kā* does not directly contribute to defining focus of question.

The one language family that I have not yet discussed includes languages with a phonologically null Q with [-Focus]. English is in this family. As we illustrated earlier,

English Q sits in C<sup>0</sup> attracting auxiliary movement due to the affixal feature. This Q does not contribute to defining the focus of questions. Instead, the focus of questions is determined by prosodic stress, as exemplified in (40a-c). This suggests the absence of a focus feature for Q in English. When prosodic focus is absent as in (41), the question sentence expresses a neutral question (Kiefer, 1980). So, English is the language with parameter values {[-Overt], [+Affix], [-Focus]}.

- (40) a. Is JOHN leaving for Sydney tomorrow?  
       b. Is John leaving for SYDNEY tomorrow?  
       c. Is John leaving for Sydney TOMORROW?

- (41) Is John leaving for Sydney tomorrow?

If we change the affixal value in the English parameter setting to [-Affix], i.e., {[-Overt], [-Affix], [-Focus]}, we get languages like Martuthunira. In this language, yes/no questions are only marked by intonation. Dench (1995, p. 236) noted that focus of question in Martuthunira is marked by fronting the focused constituent, while raising intonation remains in the clause-final position. So in (42), *Yirrna* ‘this’ is fronted because of overt focus movement. In other words, in this language, Q is not responsible for assigning focus of question.

- (42) Yirrna<sub>i</sub> nhawu-lha t<sub>i</sub> ↗?  
       this.Acc see-Past?  
       ‘Was it *this* (you) saw?’

#### 5.3.4. *Summary*

To conclude this chapter, Table 1 summarizes the proposed account of typological variation of yes/no question constructions. This diagram also includes several languages not previously introduced (these are indicated using *italics*).

In this section, I have attempted to demonstrate that together with the overtness parameter and affixal parameter, the proposed focus parameter responsible for the child-adult behavioural discrepancy, as witnessed in Chapter 2, can also depict a range of cross-linguistic variation in yes/no question constructions, just like by flipping switches in a switchbox. This offers us to see a concrete instance of how child language is related to adult language in the way that is consistent with the general Principles and Parameters theory.

Table 1: Typology table of yes/no question sorted by Overtness, Affix and Focus parameter.

+									
Overt									
Affix	+		-		+		-		
Focus	+	-	+	-	+	-	+	-	
	1. <i>Takehma</i> <sup>i</sup>	1. <i>Choctai</i> <sup>iii</sup>	1. Japanese	1. Mandarin	Nil	1. English	1. Russian	1. <i>Wari</i> <sup>x</sup>	
	2. <i>Tamir</i> <sup>ii</sup>	2. <i>Finnish</i> <sup>iv</sup>	2. <i>Kannada</i> <sup>vi</sup>	2. Marathi		2. <i>Spanish</i> <sup>ix</sup>	(Intonation only)	2. <i>Maori</i> <sup>xii</sup>	
	3. Turkish	3. Haida	3. Mandarin (A-not-A)	3. <i>Punjabi</i> <sup>viii</sup>		3. Swedish		3. <i>Maori</i> <sup>xii</sup>	
		4. <i>Kashmiri</i> <sup>v</sup>						4. Martuthunira	
		5. <i>Russian</i> (litte clitic)		4. <i>Nishnabemwin</i> <sup>vii</sup>				5. <i>Ndyuka</i> <sup>xiii</sup>	
				5. Polish				6. <i>Rapanui</i> <sup>xiv</sup>	
			6. Sinhala						

- i. Penutian (USA): Culy (1999)

ii. Dravidian (India): Lehmann and Pondicherry institute of Linguistics and Culture (1989, p. 232)

iii. Muskogean (USA): Broadwell and Indiana University Bloomington American Indian Studies Research Institute (2006, pp. 191-192)

iv. Finno-Ugrian (Finland): Sulkala and Karjalainen (1992, pp. 8-9)
- v. Indo-Aryan (India/Pakistan): Wali and Koul (1997, pp. 4-5)

vi. Dravidian (India): Sridhar (1990, pp. 5-6)

vii. Algonquian (Canada): Valentine (2001, pp. 975-978)

viii. Indo-Aryan (India): Bhatia (1993, pp. 4-5)

ix. Romance (Spain): Face (2006)

x. Chapakuran (Brazil): Everett and Kern (1997, pp. 12-13)
- xi. Nilo-Saharan (Uganda): Blackings and Fabb (2003, pp. 631-633)

xii. Polynesian (New Zealand): Bauer (1993, pp. 2)

xiii. Creole (Suriname): Hutter and Hutter (1994, pp. 13)

xiv. Polynesian (Easter Island): du Feu (2005, pp. 17)

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24 October 2008

Mr. Nobu Akagi  
483, C5C  
Macquarie University  
NSW 2109

**Reference: HE24OCT2008-D06146L&P**

Dear Mr. Akagi,

**FINAL APPROVAL**

***Title of project: "Interpretation of Disjunction in Human Language"***

Thank you for your recent correspondence. Your responses have addressed the issues raised by the Division of Linguistics and Psychology Sub-Committee of the Ethics Review Committee (Human Research) and you may now proceed with your research.

Please note the following standard requirements of approval:

1. Approval will be for a period of twelve (12) months. At the end of this period, if the project has been completed, abandoned, discontinued or not commenced for any reason, you are required to submit a Final Report on the project. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. The Final Report is available at: [http://www.research.mq.edu.au/researchers/ethics/human\\_ethics/forms](http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms)
2. However, at the end of the 12 month period if the project is still current you should instead submit an application for renewal of the approval if the project has run for less than five (5) years. This form is available at [http://www.research.mq.edu.au/researchers/ethics/human\\_ethics/forms](http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms). If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report (see Point 1 above) and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).
3. Please remember the Committee must be notified of any alteration to the project.
4. You must notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that might affect continued ethical acceptability of the project.
5. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University  
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If you will be applying for or have applied for internal or external funding for the above project **it is your responsibility** to provide Macquarie University's Research Grants Officer with a copy of this letter as soon as possible. The Research Grants Officer will not inform external funding agencies that you have final approval for your project and funds will not be released until the Research Grants Officer has received a copy of this final approval letter.

Yours sincerely



**Mr Colm Halbert**

*MP* **Chair, Division of Linguistics and Psychology Sub-Committee to the Ethics Review Committee  
(Human Research)  
Acting Associate Dean of Research**

**Cc: Professor Stephen Crain, The Macquarie Centre for Cognitive Science**

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